Outcomes and Impacts of Interdisciplinary Research

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In my research, I've investigated the impacts of IDR at three levels:

I. PERSON

McBee and Leahey 2017

II. PAPER/TEAM

Leahey, Beckman, & Stanko 2017

III. ORGANIZATION

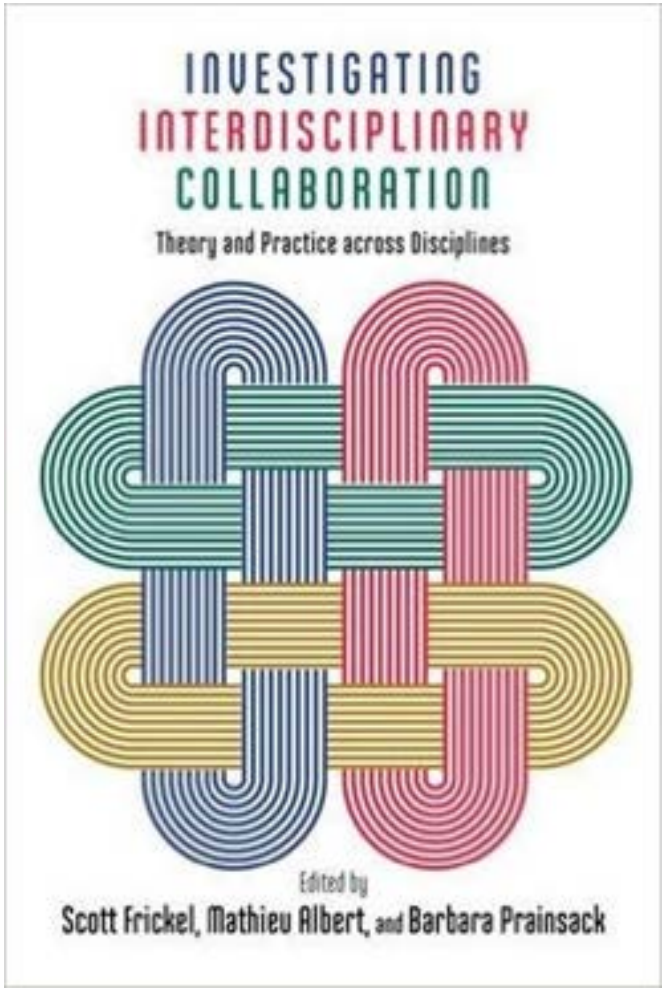
NSF SciSIP Award #1461989

Leahey, Barringer, and Ring-Ramirez 2019

Leahey & Barringer 2020

I. PERSON

McBee, David J., and Erin Leahey (2017). “New Directions in Interdisciplinary Training: Trials and Tribulations.”



Interviewed Mellon Foundation *New Directions* fellows (n=18) about the challenges of engaging in IDR

Two common themes:

Production hurdles

Evaluation hurdles

Theme 1: Production Hurdles

IDR is hard, requires extra commitment, takes more time, and thereby reduces productivity

"If one looks at my research output…. there's actually a big gap. It looks like I went into a coma or something."

Theme 2: Evaluation Hurdles

Need to placate disciplinary colleagues, capture interest 2+ disciplines, and face criticism from multiple audiences

“You’re doing something that, in someone’s lights, is seen as naïve. You feel like an idiot when you expose yourself to being judged by other standards.”

All these scholars were in the humanities, where sole-authored work is common.

Do these challenges persist in the sciences, which are more team-oriented?

I. PERSON

II. PAPER/TEAM

Prominent but Less Productive: The Impact of Interdisciplinarity on Scientists' Research*

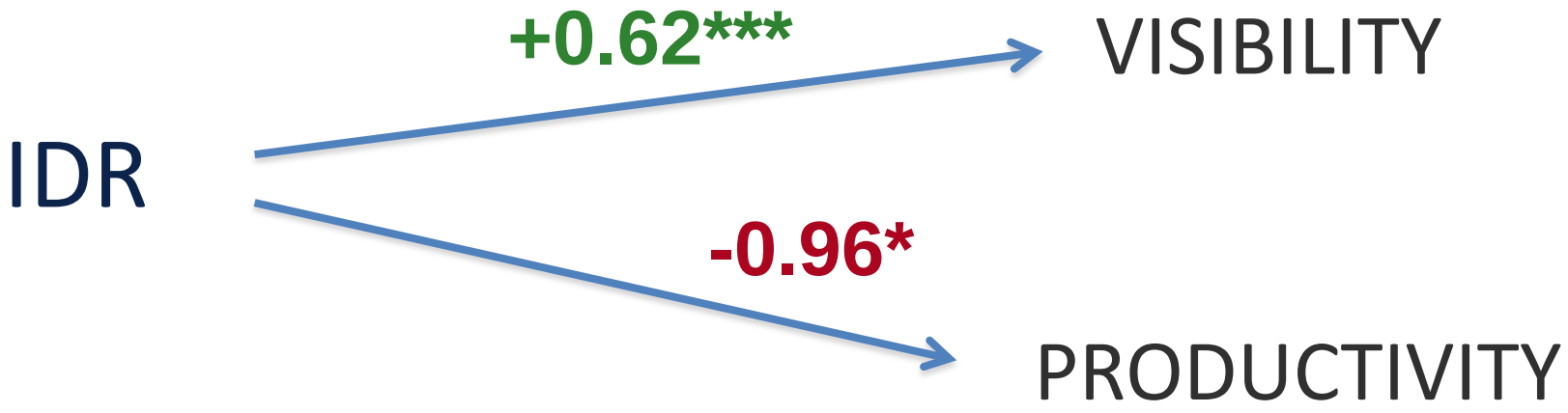
Erin Leahey,[1] Christine M. Beckman,[2] and Taryn L. Stanko[3]

Administrative Science Quarterly
2017, Vol. 62(1)105–139

DOI: 10.1177/0001839216665364
journals.sagepub.com/home/asq
SAGE

We studied 30,000 papers by 900+ authors in almost all fields…

IDR's Effects



An increase of 0.1 in IDR:

- decreases productivity by 9.6%
- increases visibility by 6.2%

Why do ID scholars produce less?

✓ Cognitive Challenges
- harder to generate ideas; slower pace

✓ Collaborative Challenges
- communication suffers
- repeat collaboration reduces penalty

✗ Review Process Challenges
- no difference in time spent under review
- working papers that are eventually published are more ID than those that don't get published

Field Matters

In highly interdisciplinary fields like the life sciences, IDR's positive impact on visibility is particularly strong.

In fields that are becoming more interdisciplinary, IDR's negative effect on productivity is reduced.

Distance between fields matters

IDR's effects manifest when the spanned disciplines are cognitively distant.

When we ignore distance between fields, and simply capture variety:

- productivity penalty disappears
- visibility benefit weakens

IDR is also risky

IDR also increases the variability
in a scholar's visibility, measured by the standard deviation in citations across all their papers

I. PERSON

II. PAPER/TEAM

III. ORGANIZATION

National Science Foundation
WHERE DISCOVERIES BEGIN

University Commitment to Interdisciplinary Research: Scope, Causes, and Consequences

Erin Leahey & Sondra Barringer

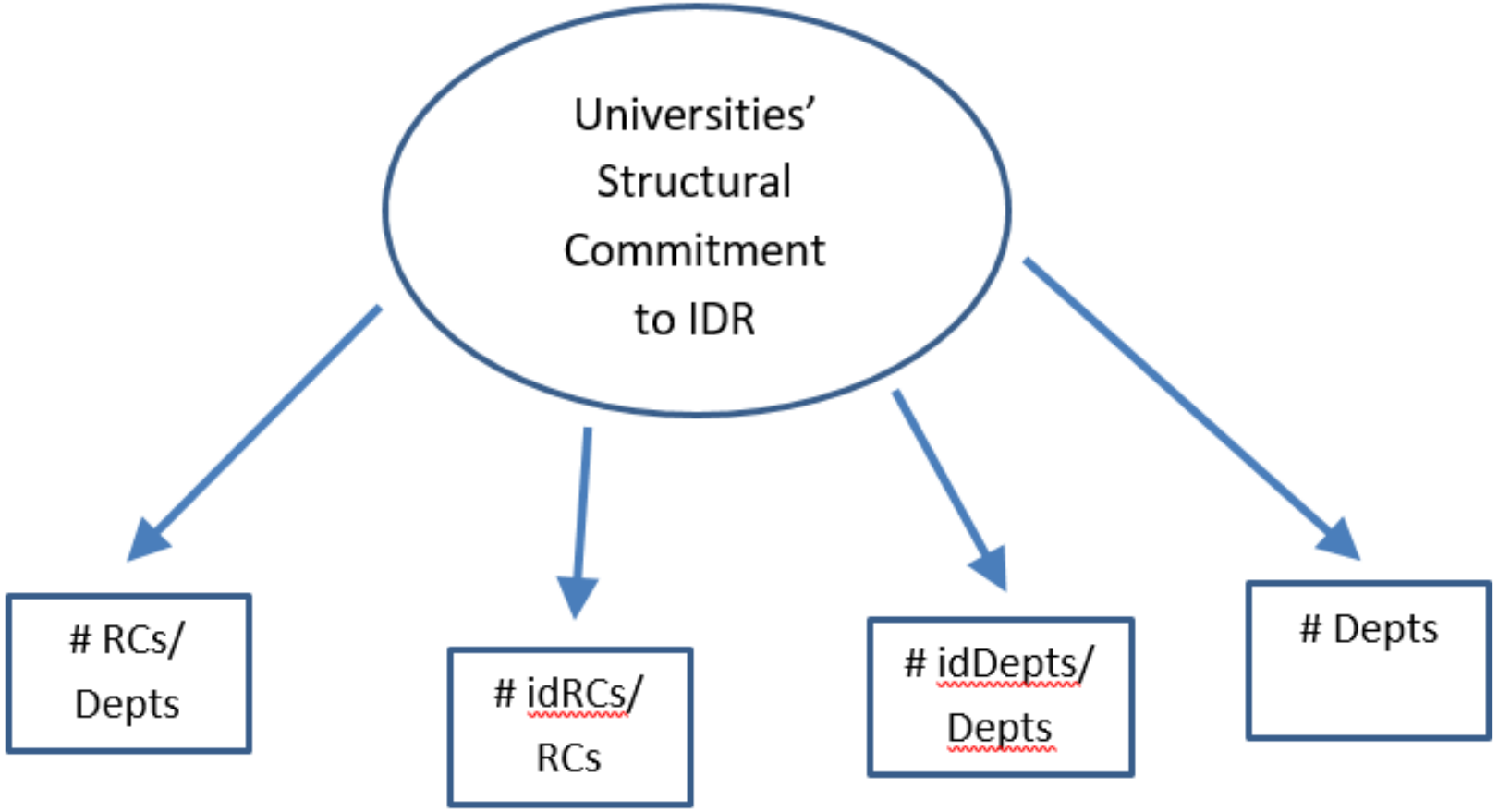
Award Number: 1461989
2015-2018

Measuring University Commitment to IDR

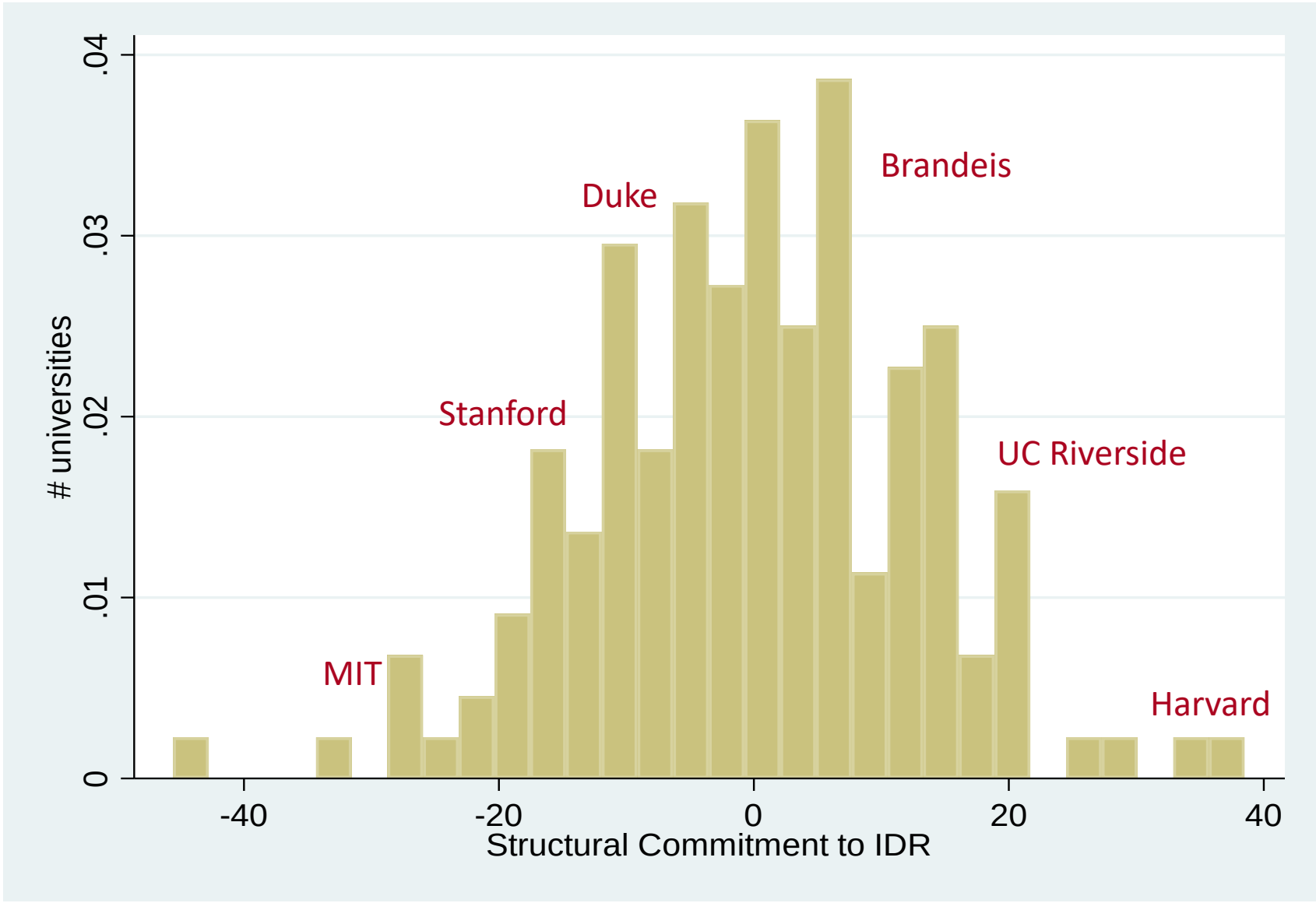
We focus on structural commitments that require financial outlays & (re)organization of units:

1. Research Centers
2. Departments

The (absolute & relative) # of these units matters, as does their nature (whether ID or not)…



Leahey, Barringer, and Ring-Ramirez 2019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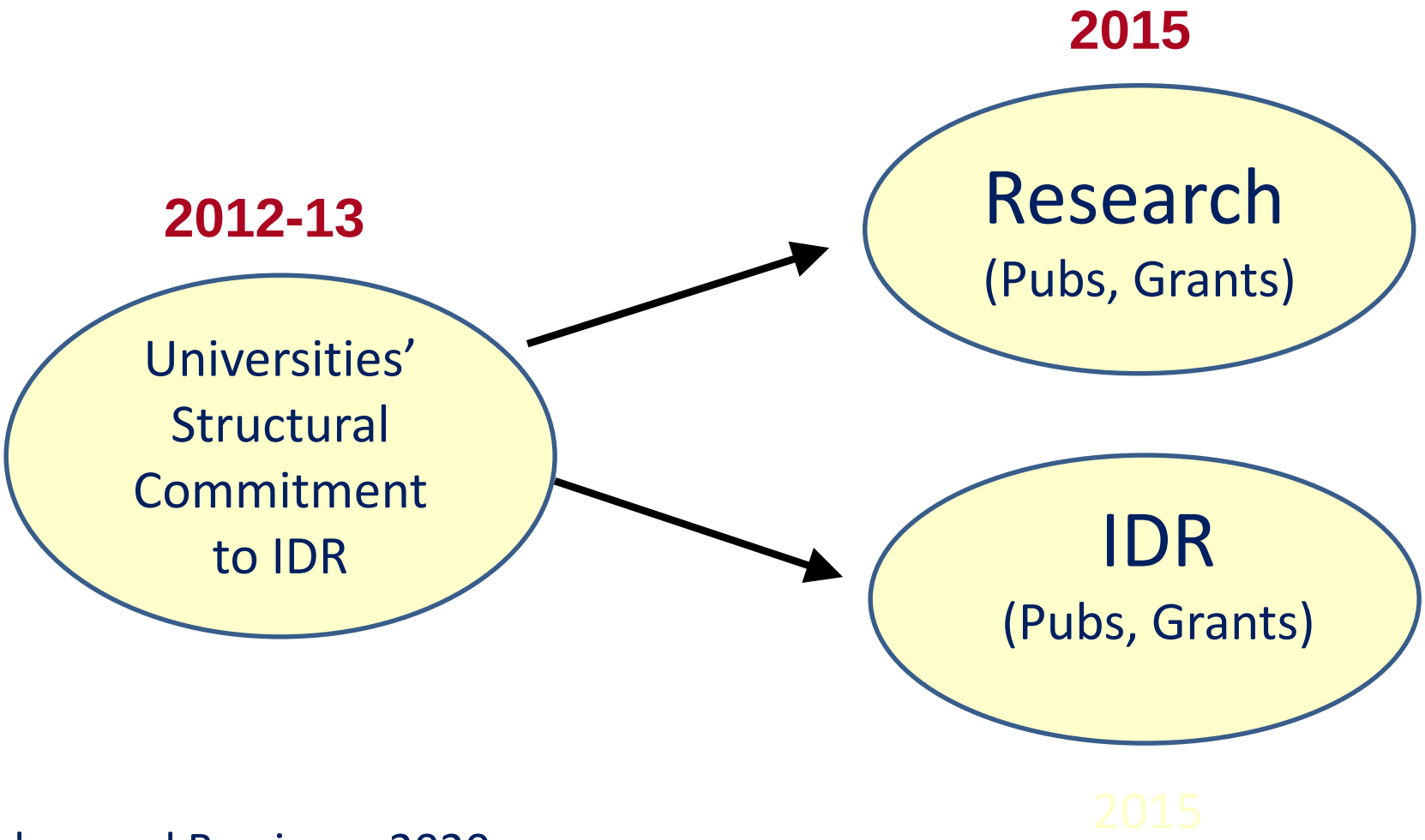
Structural Commitment to IDR

Do universities' structural commitments to IDR actually bolster research, and IDR in particular?

Conceptual Model



Leahey and Barringer 2020

Results

Structural commitment to IDR has large effect on research activity, especially IDR:

- moderate positive effect on # ID pubs
- large positive effect on ID NIH grants (#, $)…but no effect on ID NSF grants.

Why NIH, but not NSF?

- NSF grants are typically awarded to single PIs or multi-university teams, so they're less dependent upon a single university's infrastructure

- NIH grants tend to be institutional grants that involve multiple (and often ID) departments at the same university, so they're more dependent upon a single university's infrastructure

Supporting data:

- NIH: 2.6% of grants contain "center" in title
- NSF: 1.3% of grants contain "center" in title

What about quality?

University's structural commitment to IDR has no effect on measures of research quality:

- # Highly Cited Researchers
- # articles in *Nature* and *Science*
- receipt of Nobel Prize or Fields Medal
- # members of the NAS
- # prestigious external awards won

→ Universities seeking to promote high-impact research may need to move beyond structural commitments to IDR.

Pulling in NCSES data

Barringer, Sondra, Erin Leahey, and Karina Salazar (2020).
"What Catalyzes Universities' Commitment to Interdisciplinary Research?"
Research in Higher Education 61: 679–705.

We examine precursors of university's commitment to IDR using:

- Survey of Earned Doctorates (SED)
- Higher Education R&D Expenditures Survey (HERD)
- Integrated Postsecondary Education Data System (IPEDS)
- NSF & NIH award data

Top-down administrative efforts promote structural commitment to IDR, but so do bottom-up efforts by faculty – especially the number of interdisciplinary PhDs they graduate.

IDR's impacts, in sum:

Individuals and teams

Benefits: Increased visibility

Challenges: Lower productivity

Risks: Greater variability in visibility

Organizations

Benefits: Increased IDR activity (pubs & NIH awards)

Thank you!

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