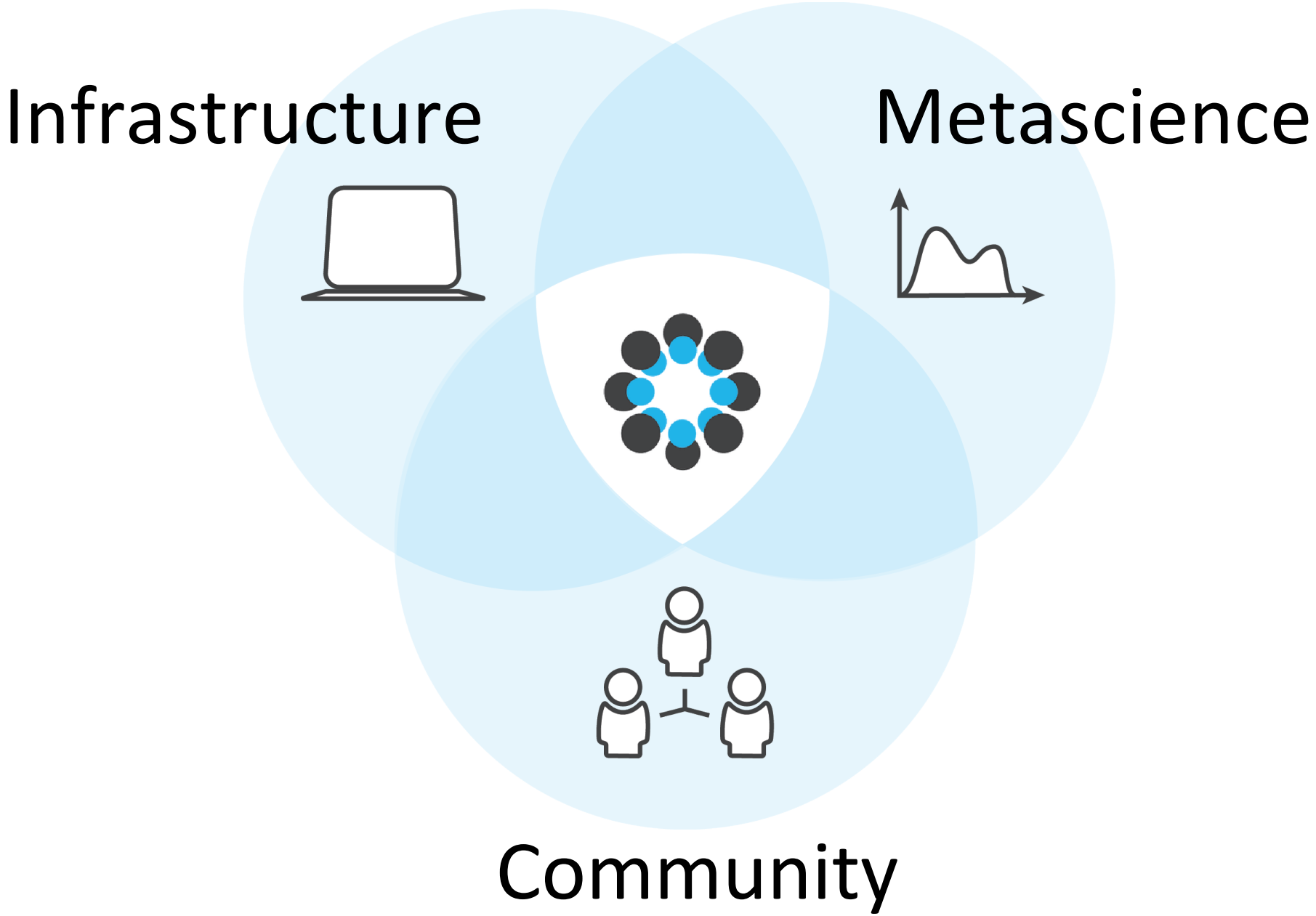
Improving the Openness, Integrity, and Reproducibility of Scientific Research

Sara Bowman

Center for Open Science

http://cos.io/

Mission: Improve openness, integrity, and reproducibility of scientific research


Infrastructure
Metascience
Community

Organic Process Research & Development

Editorial

pubs.acs.org/OPRD

Editorial Reproducibility of Results

There have recently been several meetings to discuss the reproducibility and accuracy of scientific results, particularly clinical trials and toxicology data, but this subject is a matter of concern for all published science. When scientists and engineers publish their work, it is expected that those who try to repeat that work will get broadly similar results if they follow the same procedures. This is why ACS journals insist on detailed experimental procedures being provided and OPR&D expects these procedures to be part of the full paper, not just the Supporting Information.

I can remember from my work as a student and postdoctoral fellow (OK, it was over 40 years ago!) sometimes being unable to repeat my own results and then, on further investigation, realizing that I had changed a vital part of the experiment; a different source of reagent, slight change in conditions, or changed timings of key steps such rate of addition had been used. So the critical parameters, as a development chemist would say, need to be controlled and reported in any experimental write-up. The temptation when writing up synthetic chemistry is to report the best yield ever obtained rather than an average of the probably few experiments on the same reaction. So it is hardly surprising that other experimenters fail to match the yield.

Most development chemists will have experienced difficulty repeating a procedure from a patent, from a scientific paper, or even from a write-up provided by a colleague in the same organization and then having to work out, assuming the original procedure was written up in good faith, what was so different as to make the process nonreproducible. It would be interesting to do a survey and find out from [illegible] percentage of literature reactions [illegible] reproduce and how many yiel[illegible] overstated.

education, so the academic world needs to place more emphasis on these issues. Those publishing work where students have carried out the experimental part (i.e., most research) need to be more aware of the true data in the laboratory notebooks or their electronic equivalent and whether that data has been accurately transposed by the student into the experimental part of the paper.

Electronic notebooks could, for synthetic work, provide templates where students need to record specific data, taking a lead from industry to ensure that all critical parameters are noted and that accurate analysis (another area where industry usually leads over academia in the organic chemistry arena) is provided for all isolated products. Hopefully as these noted books become more widespread, the accuracy of data should increase.

For those chemists wanting reproducible synthetic procedures on multigram and kilo scales, those in this journal are amongst the best, having been repeated many times by different co-workers as part of the scale-up process. And the work-ups are the best and most environmentally friendly of all!

I wish you success in repeating any literature procedure, and just to be on the safe side, I also wish you good luck.

Trevor Laird, Editor

AUTHOR INFORMATION

Notes

Views expressed in this editorial are those of the author and not necessarily the views of the ACS.

NATURE NEWS BLOG

Reliability of 'new drug target' claims called into question

05 Sep 2011 | 14:59 BST | Posted by Brian Owens | Category: Biology & Biotechnology

Cross posted from Nature Reviews Drug Discovery on behalf of Asher Mullard.

Bayer halts nearly two-thirds of its target-validation projects because in-house experimental findings fail to match up with published literature claims, finds a first-of-a-kind analysis on data irreproducibility.

An unspoken industry rule alleges that at least 50% of published studies from academic laboratories cannot be repeated in an industrial setting, wrote venture capitalist Bruce Booth in a recent blog post. A first-of-its-kind analysis of Bayer's internal efforts to validate 'new drug target' claims now not only supports this view but suggests that 50% may be an underestimate; the company's in-house experimental data do not match literature claims in 65% of target-validation projects, leading to project discontinuation.

IVERSATION

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4 August 2014, 6.21am BST

When 'exciting' trumps 'honest', traditional academic journals encourage bad science

One more corner, then I'll answer your questions. campuspartymexico, CC BY

Imagine you're a scientist. You're interested in testing the hypothesis that playing violent video games makes people more likely to be violent in real life. This is a straightforward theory, but there are still many, many different ways you could test it. First you have to decide which games count as "violent". Does Super Mario Brothers count because you kill Goombas? Or do you only count "realistic" games like Call of [illegible] have to decide how to measure violent [illegible] violence is rare and difficult to measure, so [illegible] need to look at **lower-level "aggressive" acts** [illegible]?

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CORRESPONDENCE

Believe it or not: how much can we rely on published data on potential drug targets?

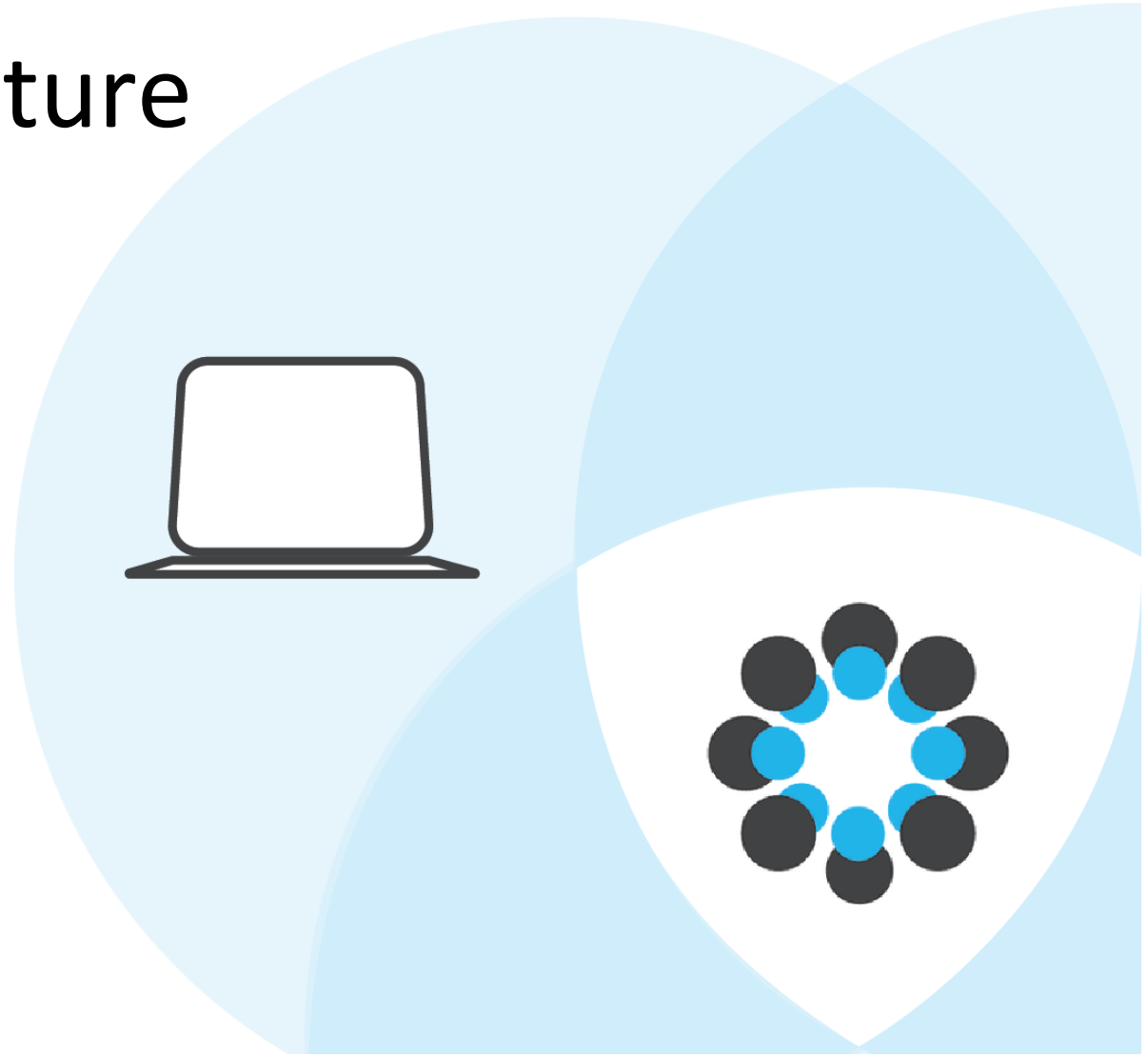
Florian Prinz, Thomas Schlange and Khusru Asadullah

Many landmark findings in preclinical oncology research are not reproducible, in part because of inadequate cell lines and animal models.

Raise standards for preclinical cancer research

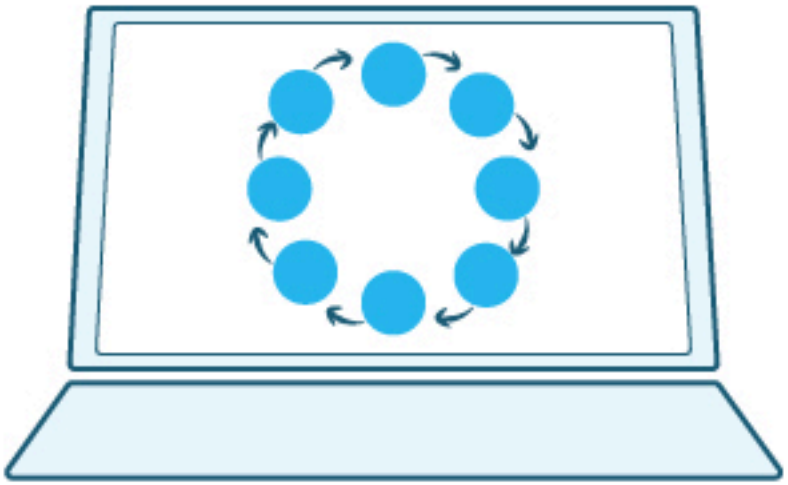
C. **Glenn Begley** and **Lee M. Ellis** propose how methods, publications and incentives must change if patients are to benefit.

Infrastructure



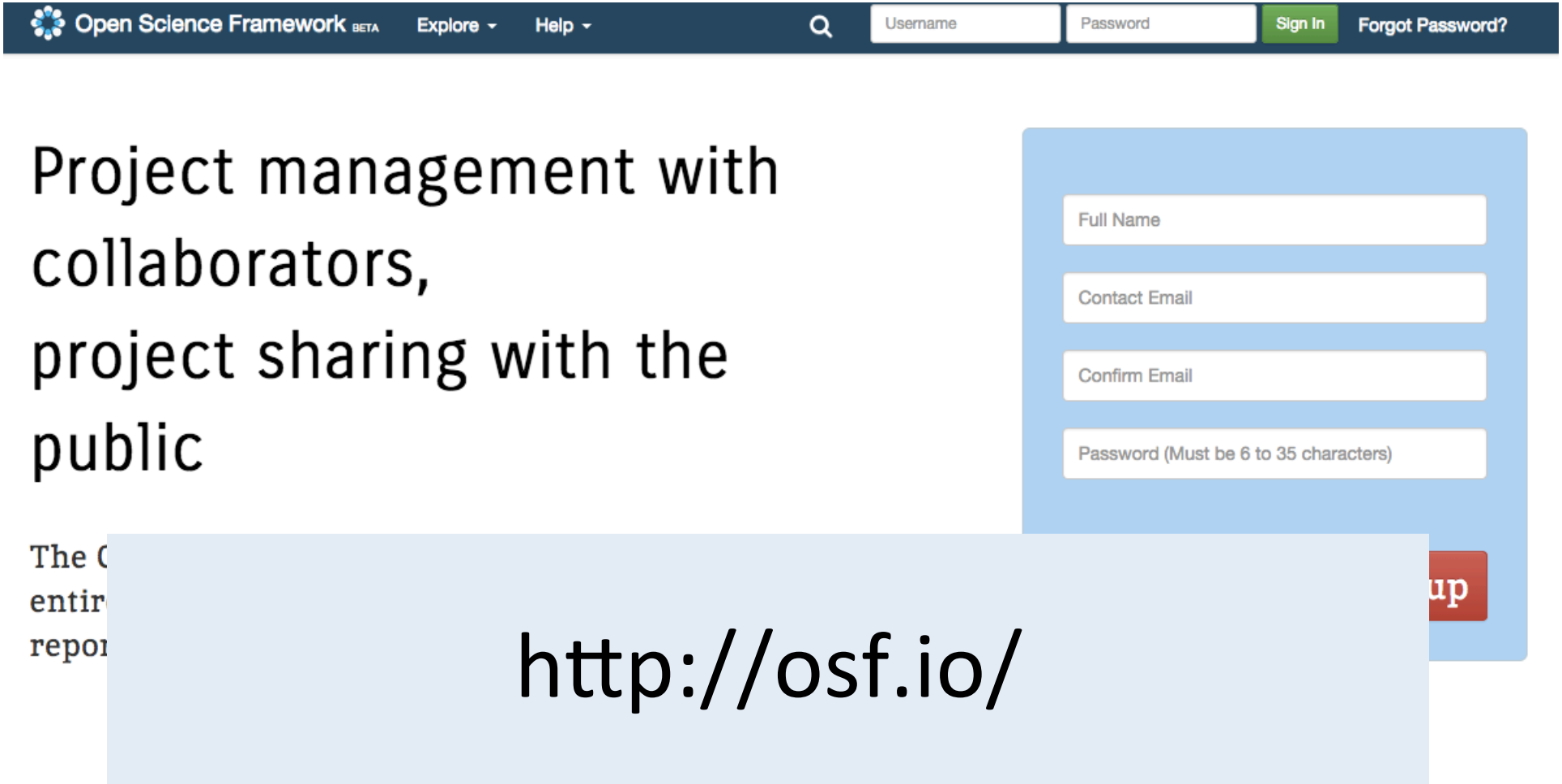
Open Science Framework

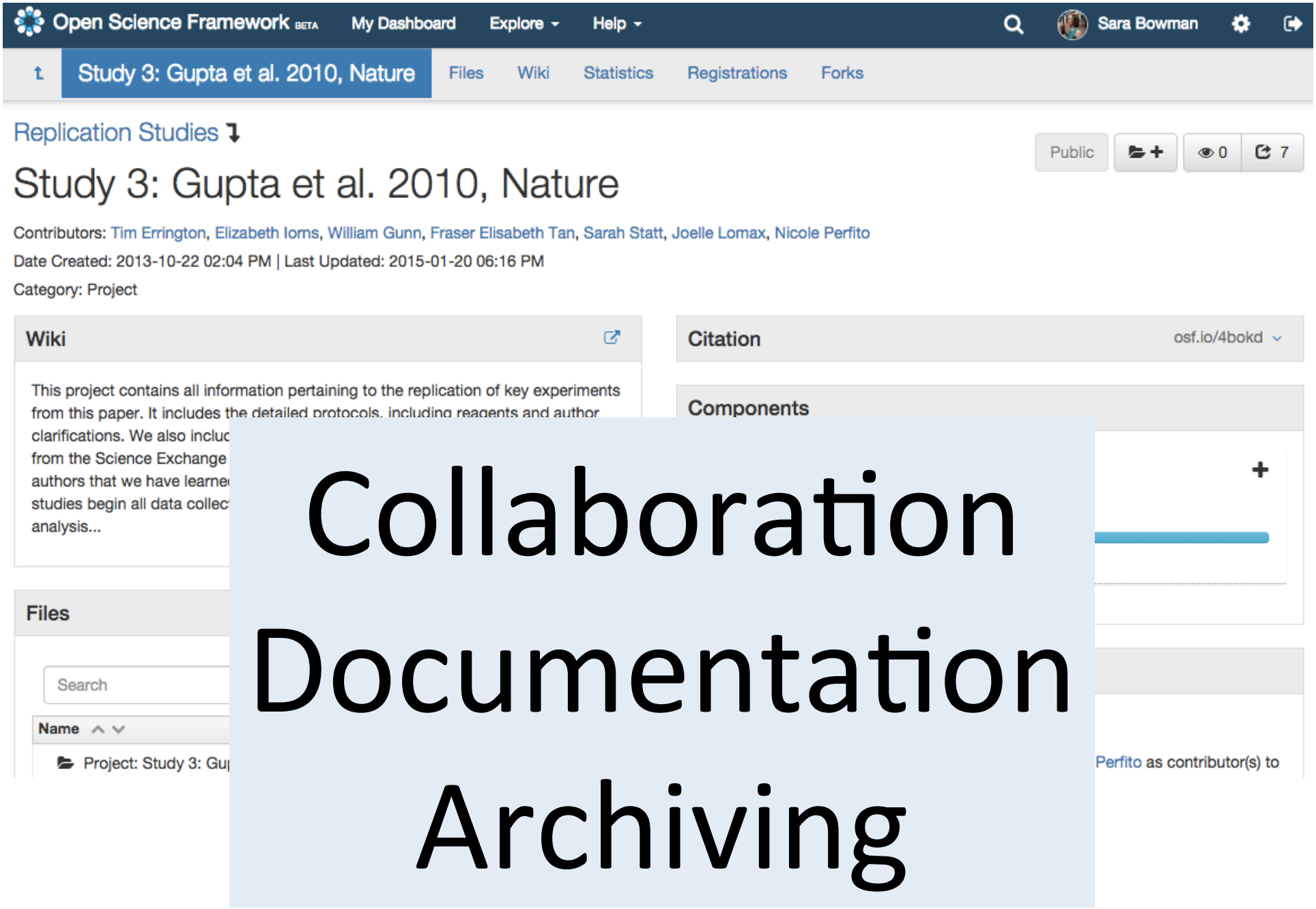
http://osf.io



The OSF supports the entire research lifecycle: planning, execution, reporting, archiving, and discovery.

Open Science Framework




Open Science Framework BETA
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Study 3: Gupta et al. 2010, Nature
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Contributors: Tim Errington, Elizabeth Iorns, William Gunn, Fraser Elisabeth Tan, Sarah Statt, Joelle Lomax, Nicole Perfito
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Category: Project
Wiki
This project contains all information pertaining to the replication of key experiments
from this paper. It includes the detailed protocols, including reagents and author
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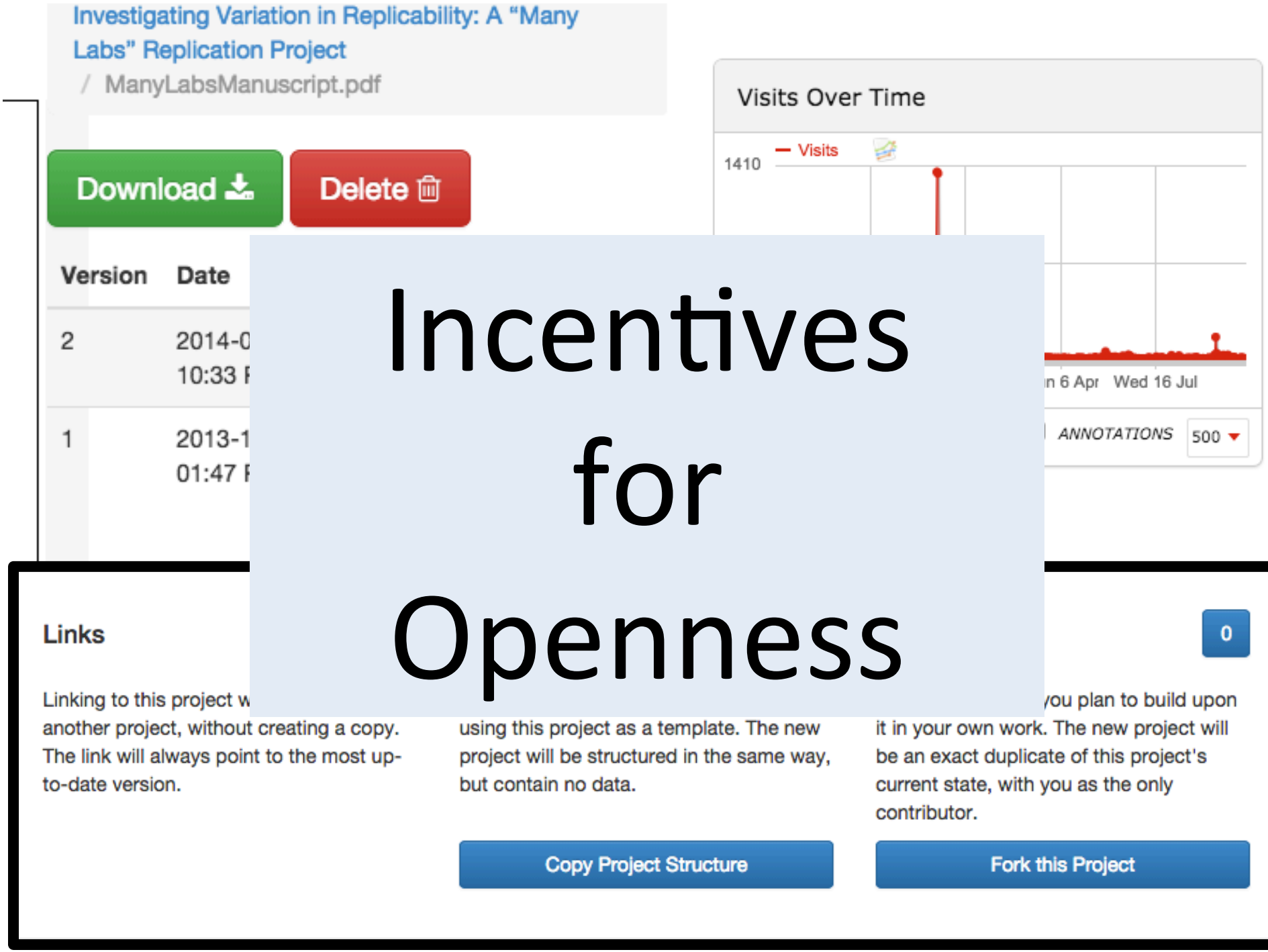
4 contributions

Merges Public-Private Workflows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Citation: osf.io/

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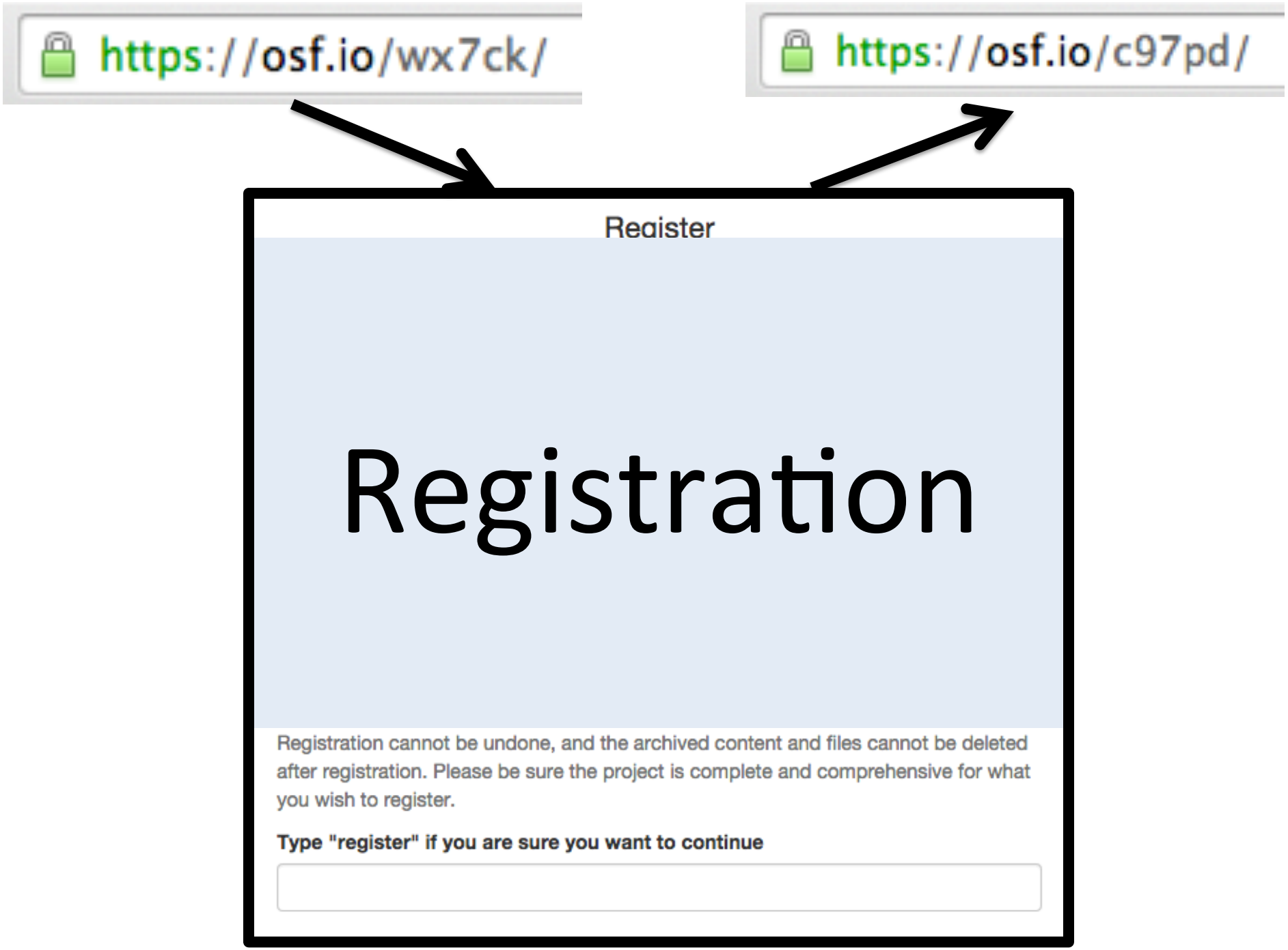
Klein, R. A., Rat… M. J., Bocian, K., et al. …abs" Replication Project. I…

MLA

Klein, R. A., Rat… M. J., Bocian, K., et al. …eplication Project."

Chicago

Klein, R. A., Ratliff, K. A., Vianello, M., Adams, R. B., Bahník, , Bernstein, M. J., Bocian, K., et al. "Investigating Variation in Replicability: A "Many Labs" Replication Project." Open Science Framework (2014). osf.io/wx7ck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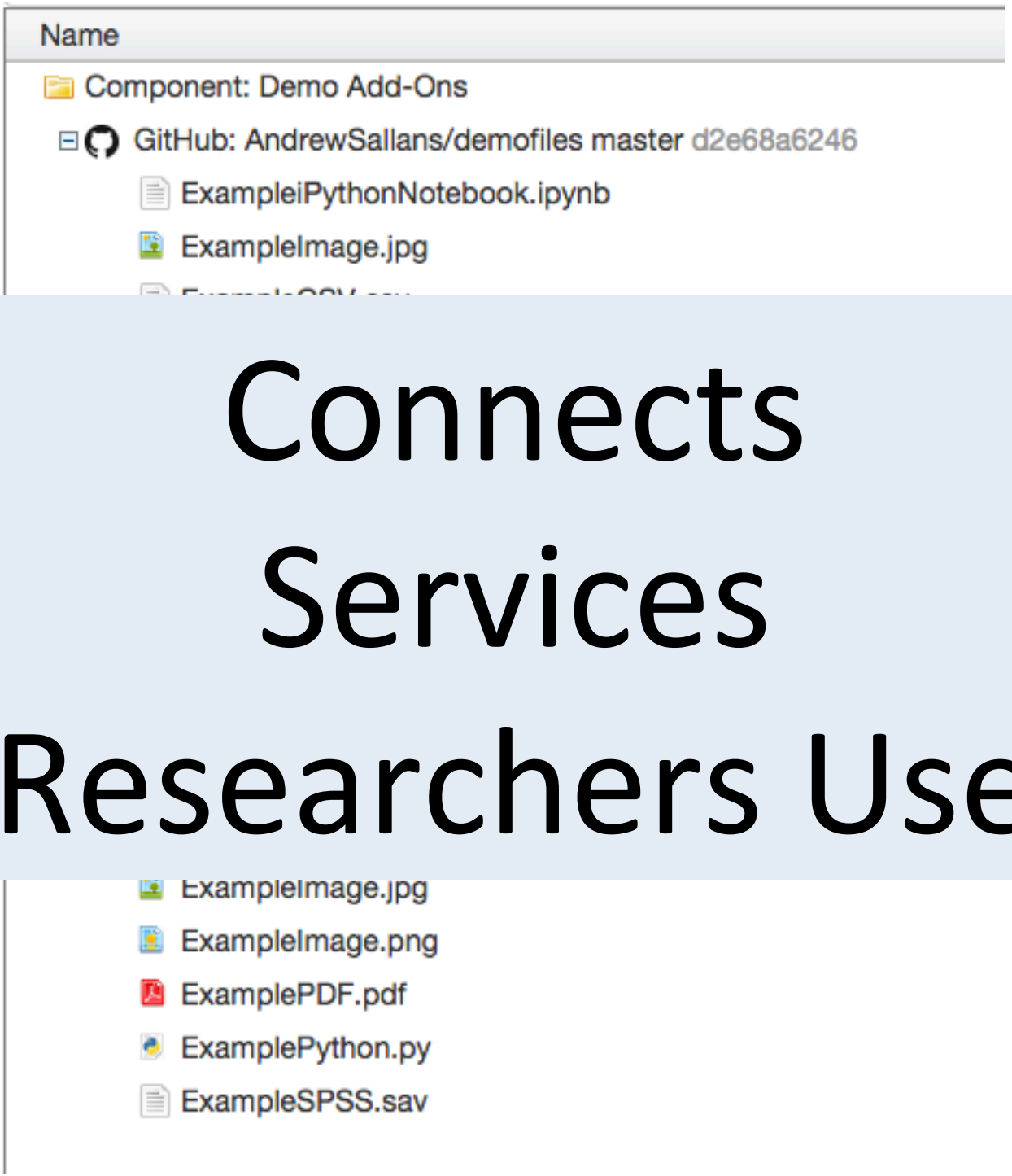
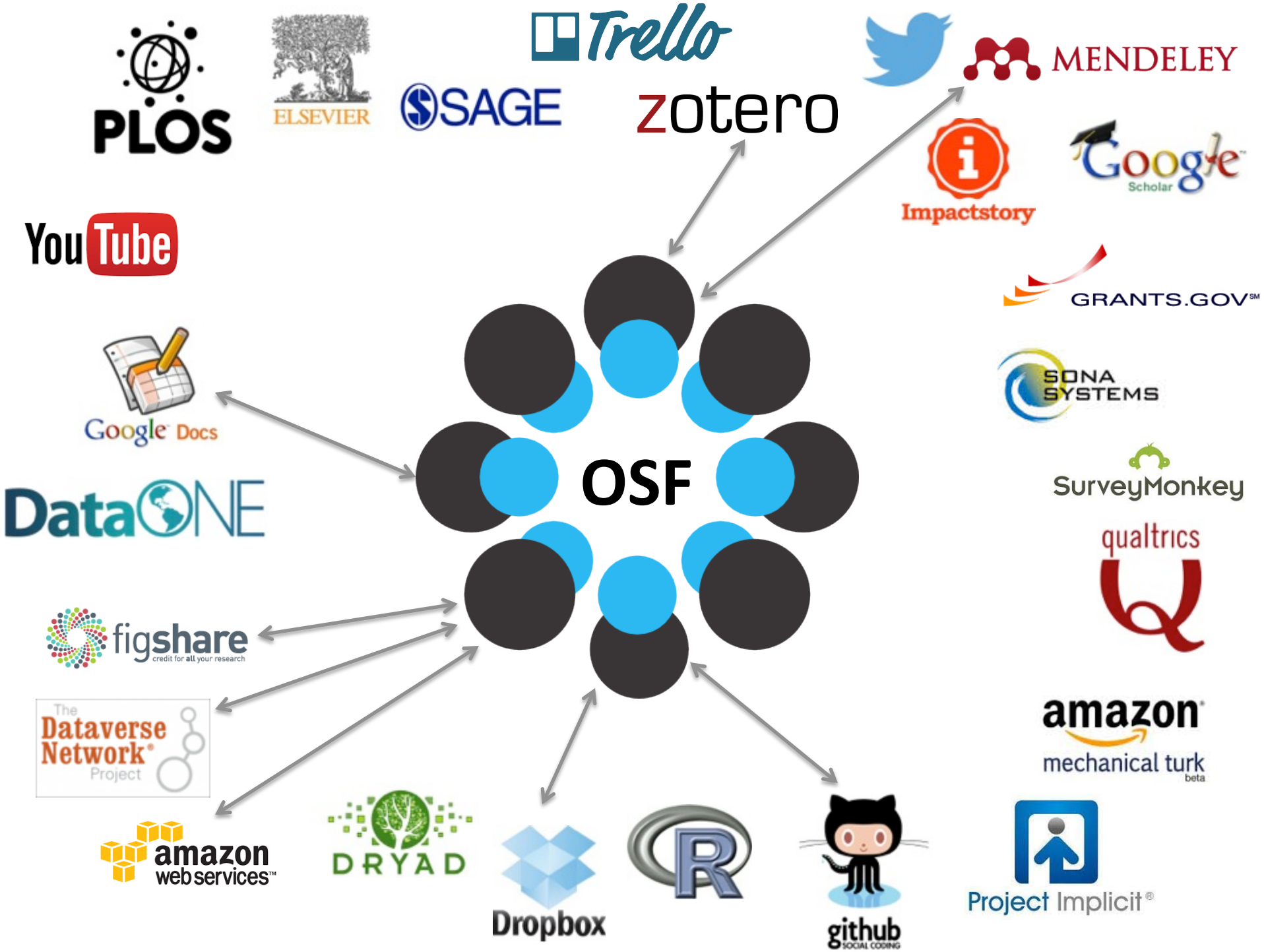


Connects Services Researchers Use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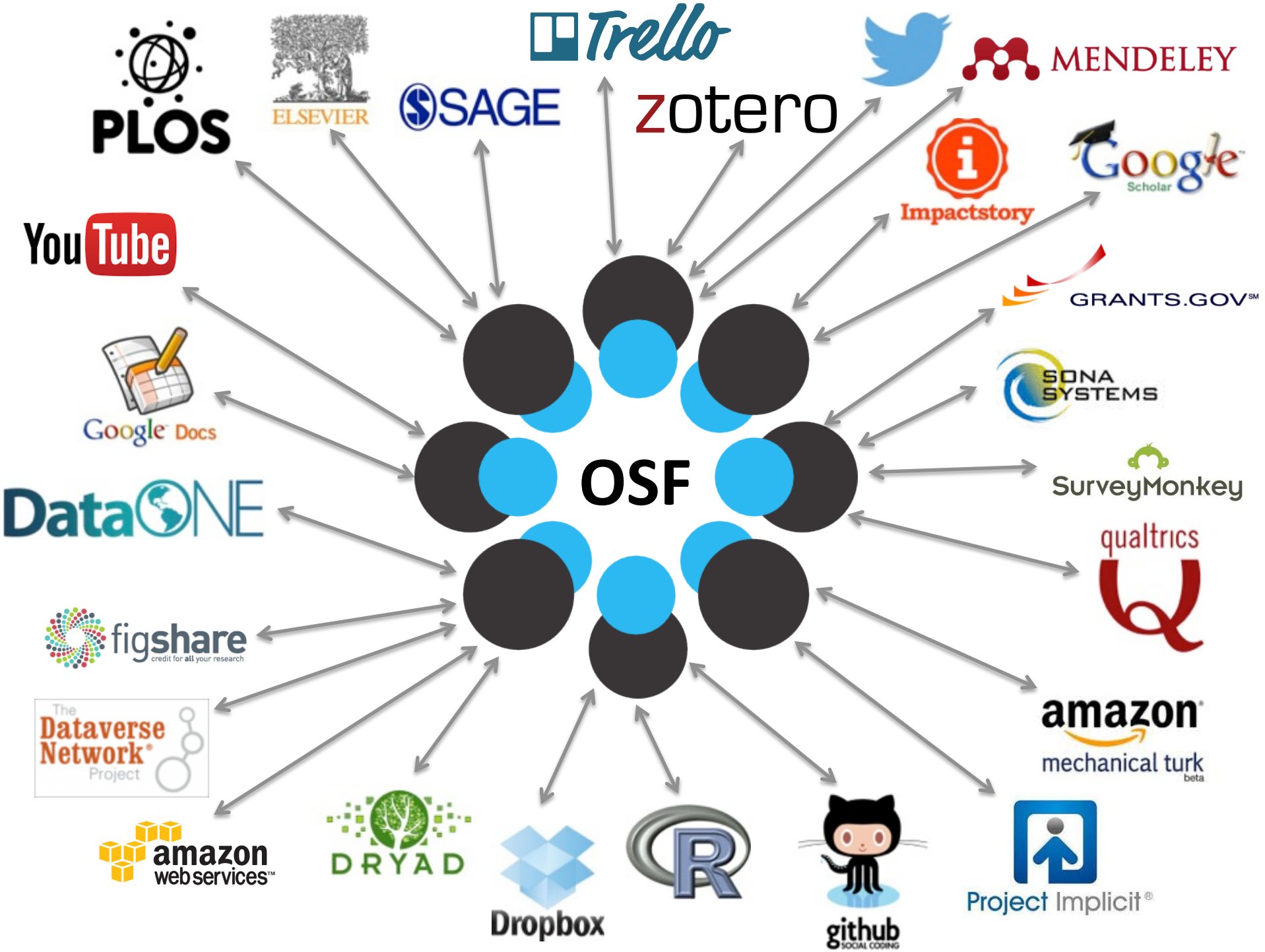
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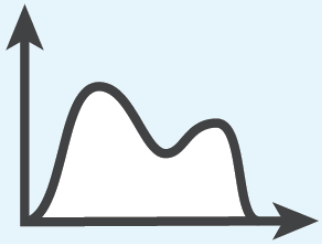

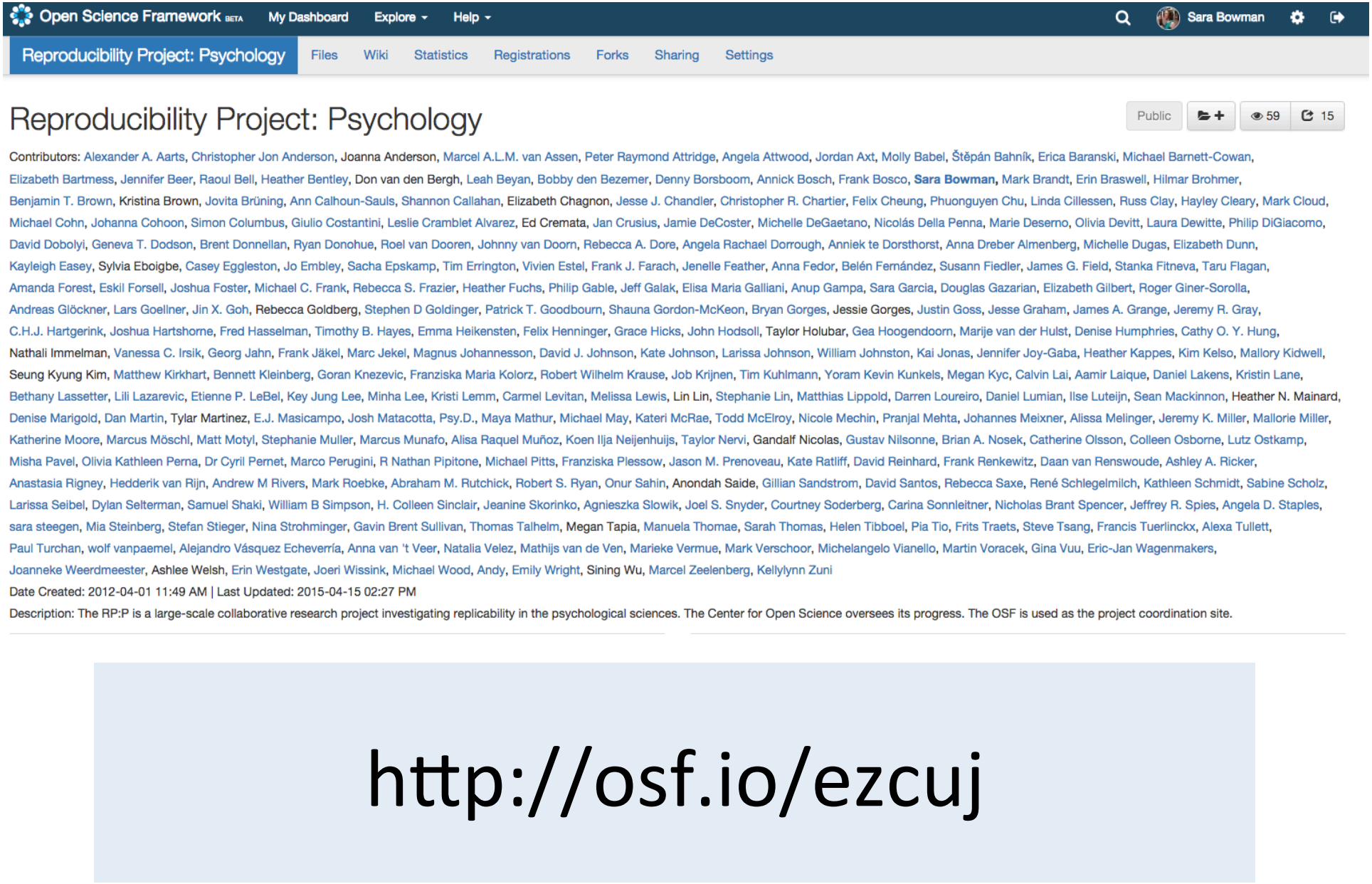

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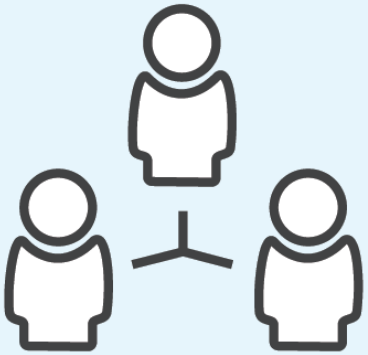
REPRODUCIBILITY PROJECT

Cancer Biology

The Reproducibility Project: Cancer Biology is a collaboration between the Center for Open Science and Science Exchange to independently replicate selected results from 50 papers in cancer biology. For each paper a Registered Report detailing the proposed experimental designs and protocols for the replications is peer reviewed and published prior to data

COS CENTER FOR OPEN SCIENCE

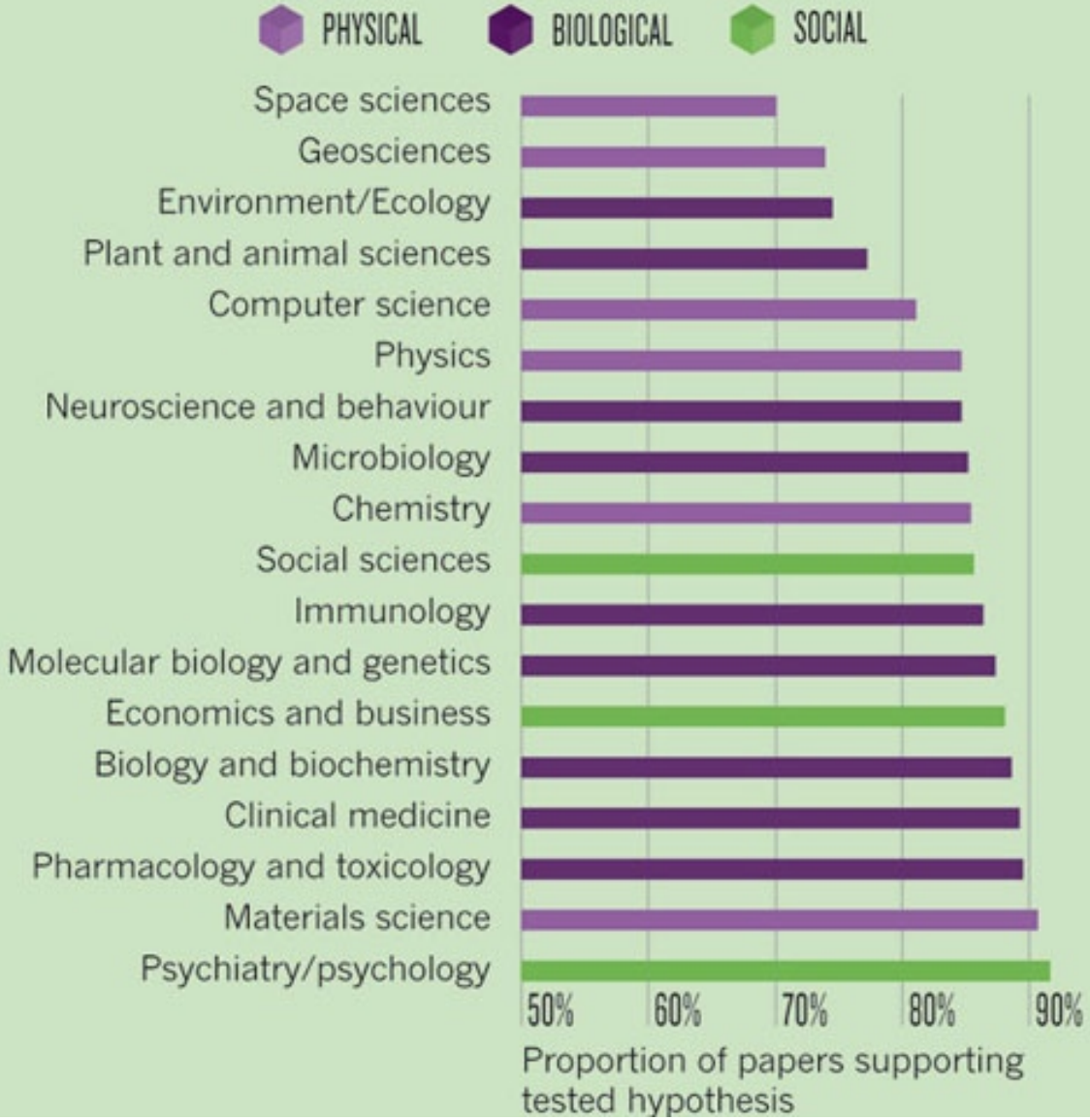
Science EXCHANGE

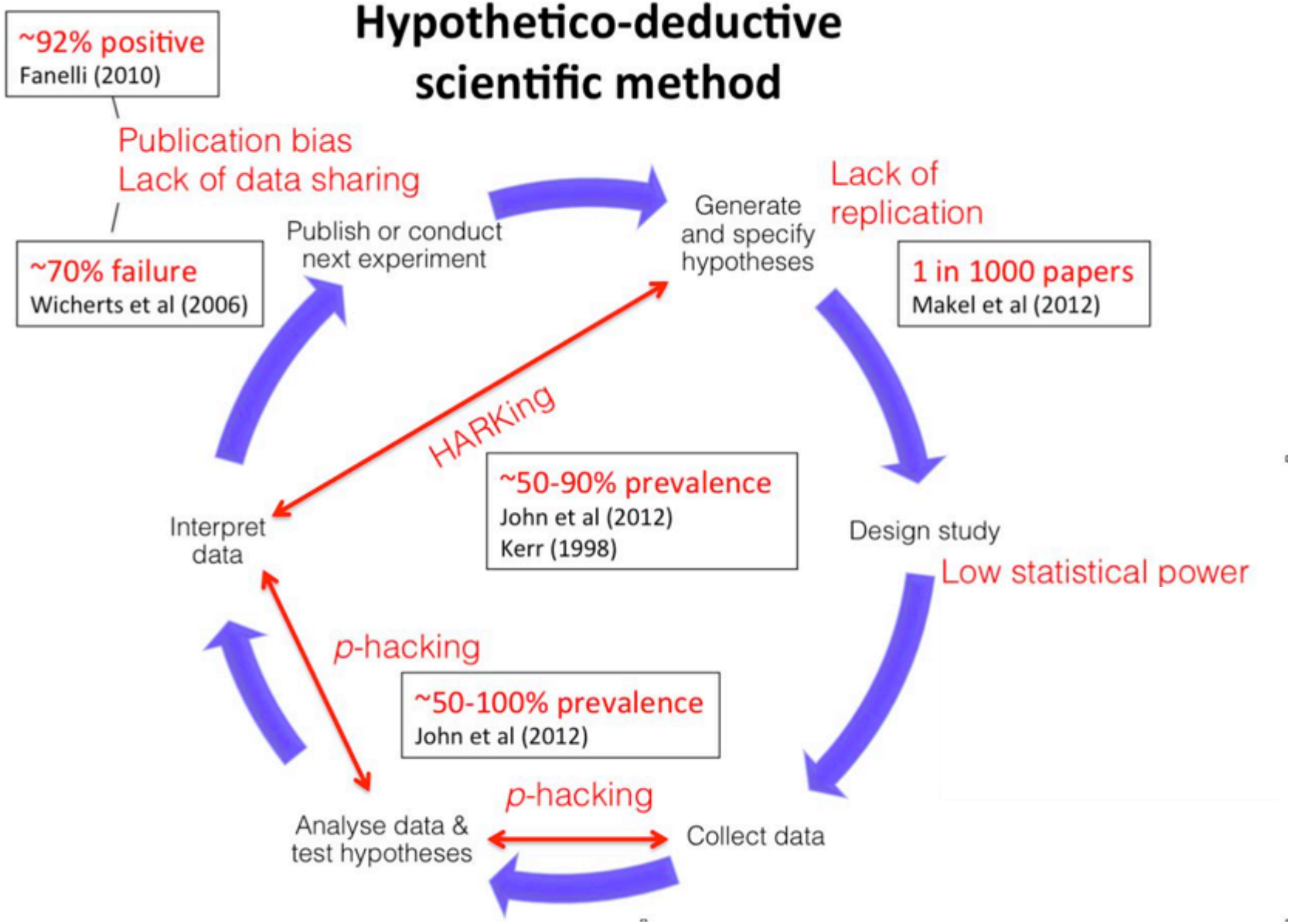


Community

ACCENTUATE THE POSITIVE

A literature analysis across disciplines reveals a tendency to publish only 'positive' studies — those that support the tested hypothesis. Psychiatry and psychology are the worst offenders.

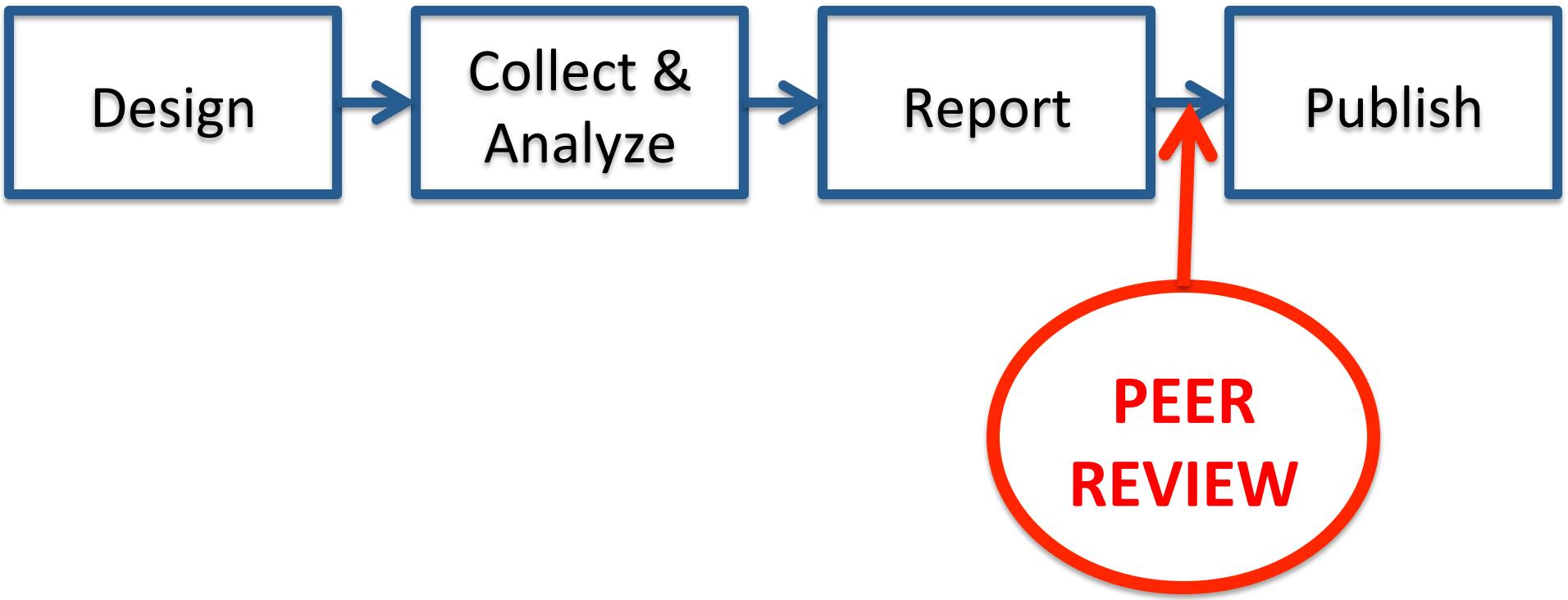




Read more: osf.io/8mpji

Registered Reports

Registered Reports



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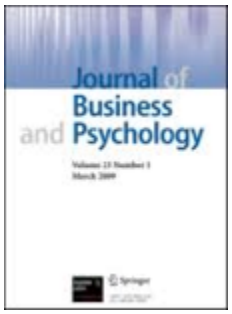
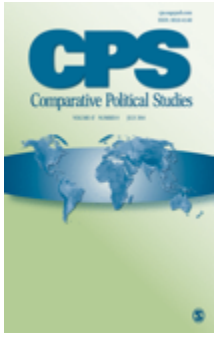
Who Publishes Registered Reports?

AIMS Neuroscience





eLIFE

(just to name a few)

See the full list and compare features: osf.io/8mpji

Badges to Acknowledge Open Practices

Making Behaviors Visible Promotes Adoption

http://osf.io/tvyxz

Badges to Acknowledge Open Practices

- Digitally-shareable data are publicly available on an open-access repository (e.g., university repository or one at www.re3data.org or www.databib.org)
- A codebook is included with sufficient description for an independent researcher to reproduce the reported analyses and results. Data from the same project that are not needed to reproduce the reported results can be kept private without losing eligibility for the Open Data badge.

Badges to Acknowledge Open Practices

- Digitally-shareable materials are publicly available on an open-access repository
- Infrastructure, equipment, biological materials, or other components that cannot be shared digitally are described in sufficient detail for an independent researcher to understand how to reproduce the procedure
- Sufficient explanation for an independent researcher to understand how the materials relate to the reported methodology

Badges to Acknowledge Open Practices

- A public date-time stamped registration is in an institutional registration system (e.g., ClinicalTrials.gov, Open Science Framework)
- Registration pre-dates realization of the outcomes
- Registered design and analysis plan corresponds directly to reported design and analysis
- Full disclosure of results following the registered plan

Open Data
Open Materials
Preregistered

Click here for more information

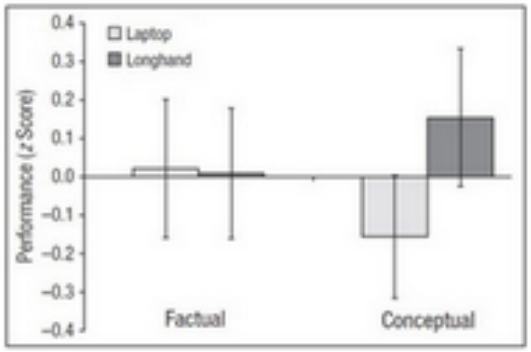
This Week in *Psychological Science* (TWiPS)

The links below take you to the journal via the APS website. If not already logged in, you will be redirected to log-in using your last name **(Nosek)** and Member ID **(16341)**.

Call for Editor Nominations
Psychological Science in the Public Interest

The Pen Is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking

Pam A. Mueller and Daniel M. Oppenheimer



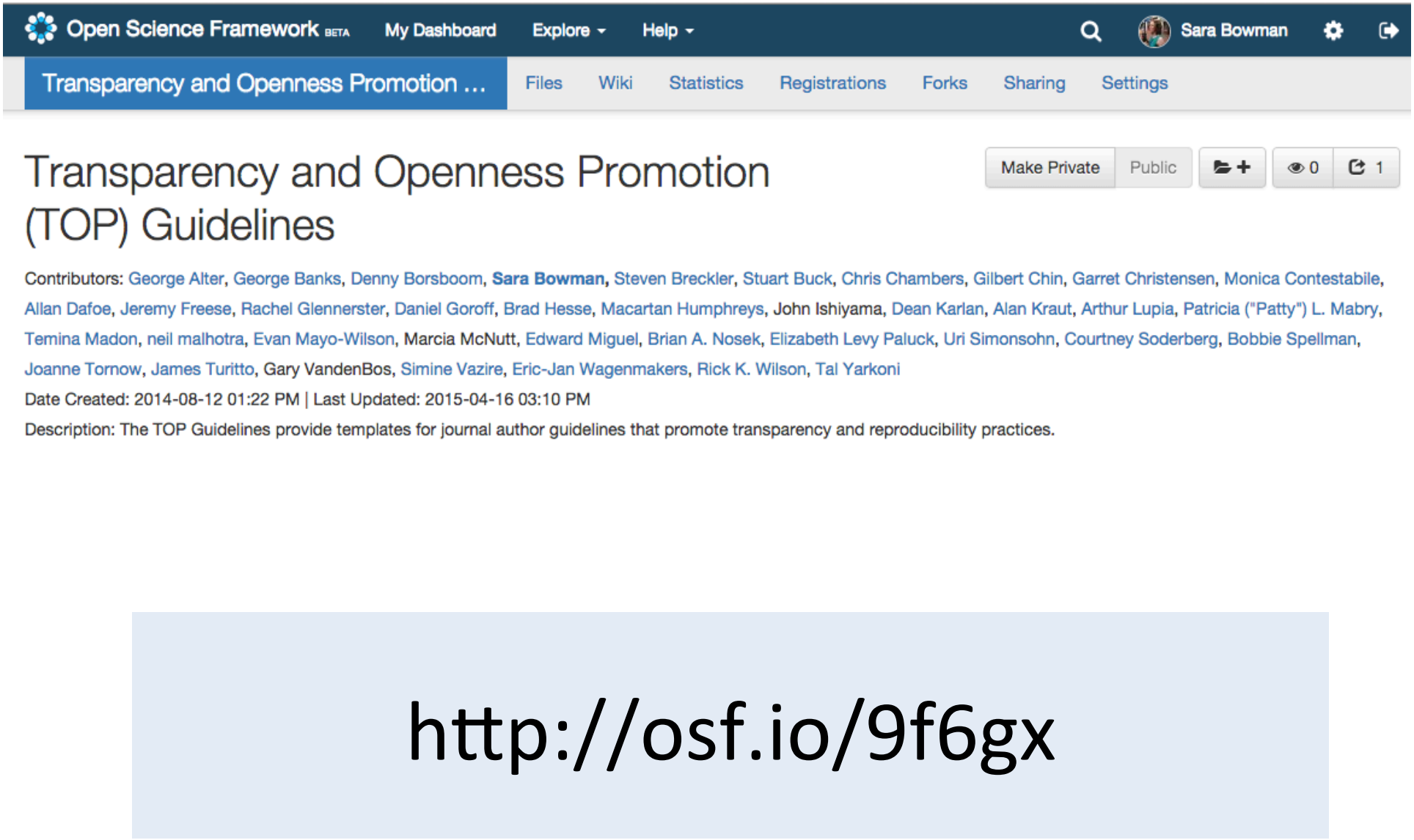
It's becoming more and more common for students to type their notes on laptops rather than writing them out in longhand. In the first of several studies, the authors examined the effects of laptop note taking by having participants take notes on a TED talk using a laptop computer or a notepad. Thirty minutes later, the participants answered factual-recall and conceptual-application questions about the lecture. Those who took notes on laptops performed worse on conceptual-application questions -- but not on factual-recall questions. Follow-up studies indicated that although people with laptops take more notes, they tend to copy the information verbatim and therefore process the information less than do longhand note takers.

Gratitude: A Tool for Reducing Economic Impatience

David DeSteno, Ye Li, Leah Dickens, and Jennifer S. Lerner

It is well-known that people are generally impatient and prefer immediate rewards to future rewards. To examine whether certain emotions could reduce people's economic impatience, researchers asked participants to recall events that made them feel

Transparency and Openness Promotion (TOP) Guidelines



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Questions?

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