



Center for Open Science

IMPACT REPORT 2020

Maximizing the impact of science together.

COS Mission

Our mission is to increase the openness, integrity, and reproducibility of research.

But we don't do this alone. COS partners with stakeholders across the research community to advance the infrastructure, methods, norms, incentives, and policies shaping the future of research to achieve the greatest impact on improving credibility and accelerating discovery.



Letter from the Executive Director

“Show me” not “trust me”: Science doesn’t ask for trust, it earns trust with transparency.

The credibility of science has center stage in 2020. A raging pandemic. Partisan interests. Economic and health consequences. Misinformation everywhere. An amplified desire for certainty on what will happen and how to address it.

In this climate, all public health and economic research will be politicized. All findings are understood through a political lens. When the findings are against partisan interests, the scientists are accused of reporting the outcomes they want and avoiding the ones they don't. When the findings are aligned with partisan interests, they are accepted immediately and uncertainty ignored.

Politicization can seem like a black hole inexorably sucking in the scientific community and making the science just another source of information—its credibility based on agreement with one's pre-existing ideology.

All is not lost. Science has a protective force against the forces of politicization, transparency.

Transparency is a fundamental differentiator for establishing credibility of scientific claims. Transparency means that for a scientific claim, anyone could examine the methodology used, data generated, and process of drawing conclusions to verify or challenge the claim. Peddlers of misinformation offer no such opportunity. Their credibility hinges on superficial cues and reinforcing existing beliefs.

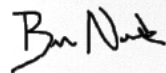
Science is trustworthy because it does not trust itself. Transparency is a replacement for trust. Transparency fosters self-correction when there are errors and increases confidence when there are not.

Transparency is critical for maintaining science's credibility and earning public trust. The events of 2020 make clear the urgency and potential consequences of losing that credibility and trust.

The Center for Open Science is profoundly grateful for all of the collaborators, partners, and supporters who have helped advance its mission to increase openness, integrity, and reproducibility of research. Despite the practical, economic, and health challenges, 2020 was a remarkable year for open science. This impact report provides some highlights and sets the stage for an even better 2021.

Thank you for your support of rigor and transparency to enhance credibility and accelerate discovery of knowledge, solutions, and cures.

With gratitude,



Brian Nosek

Executive Director and Co-founder
Center for Open Science



Open science infrastructure, tools, and services

Strengthening research
at each stage of the
research lifecycle

Research serves humanity most effectively when its outcomes are credible and reproducible. Credibility is maximized when rigor and transparency is applied during planning, conducting, reporting, and discovery of research.



Click to watch a 5-minute overview of COS's mission to open the entire research lifecycle, and the solutions available for stakeholders at each stage.

Sharing findings, data, code, and materials enables discovery for reuse and accessibility for review and extension. More than 260,000 researchers use [OSF](#) to collaborate and share their research, and about 4 million researchers discovered content on OSF for their own research in 2020 alone.

2020 by the numbers:



PLANNING

New registrations
created on OSF



CONDUCTING

Number of new files
shared publicly



REPORTING

Papers shared via
Preprint services

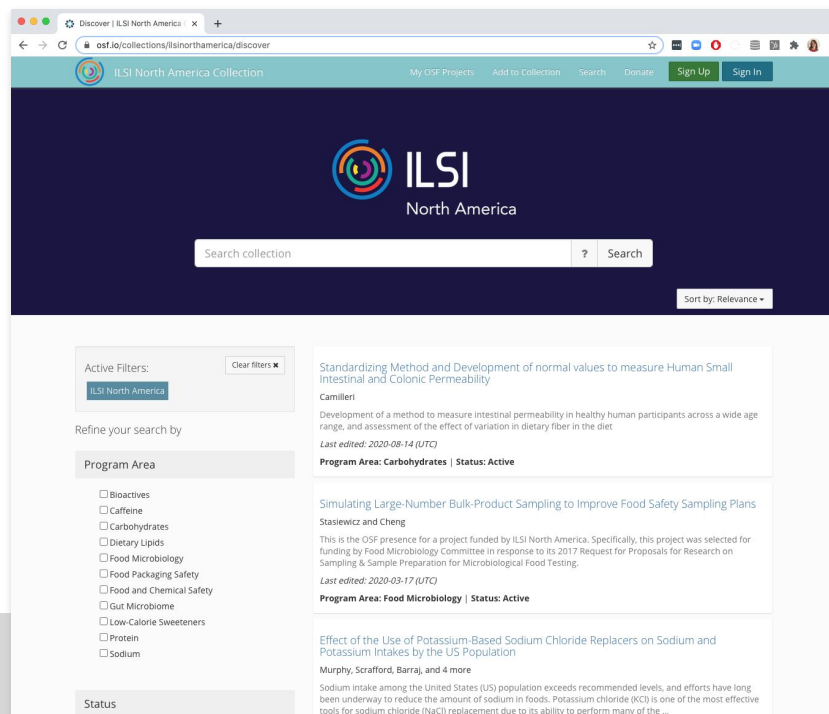


DISCOVERY

Number of files
downloaded

Infrastructure for culture change

Researchers and stakeholders around the world rely on trusted infrastructure and workflows to enable their efforts to conduct rigorous, transparent research. COS provides open-source, public goods infrastructure and customizable solutions for groups to cultivate culture change in their own communities.



Read how groups like [ILSI North America](#) are using [OSF Collections](#) to improve the visibility of the scope and rigor of studies conducted by their funded investigators.

Branded Registries

This year COS launched [Branded Registries](#), a new interface built on the OSF Registries infrastructure that empowers any research group, funder, or journal to create a research registry and support reproducible methods for their community of practice, awardees, or authors. Each branded registry provides customized preregistration templates and workflows, allowing scientific communities to facilitate rigor among their researchers with the infrastructure tailored to their field.



“Preregistration has enormous potential to enhance rigor, reproducibility and transparency of science, leading to research that moves more rapidly and successfully across the continuum from basic to clinical science. Registration is the norm in clinical research, and implementing preregistration for research in the biomedical sciences, especially in preclinical studies, can have the same benefits. Imagine if funders asked for preregistration plans — especially for hypothesis-driven preclinical research. Preregistration as the norm could increase the statistical value of experiments, decrease the practice of hypothesizing after results are known or HARKing, while saving time and resources by preventing researchers testing hypotheses others have already tried and failed to prove. Thus preregistration, implemented transparently and appropriately, can help to advance scientific discovery in biomedical research.”

Maryrose Franko

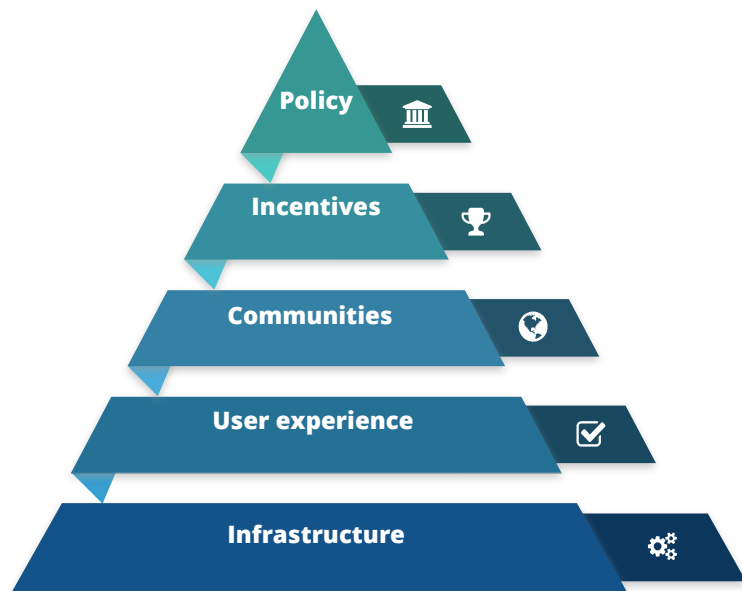
Health Research Alliance

COS Board Chair

Infrastructure for research culture change

Branded Registries, and COS's other infrastructure products, is one component of our integrated strategy for changing research cultures.

*Learn more about Rigor and Transparency initiatives for funders and publishers at osf.io/ktsur, or visit cos.io/rti to request more information.



Make it required

TOP Factor elevates visibility of journal and funder transparency policies. Comparative data rewards progressive policymakers and encourages slower actors to join the reform movement.



Make it rewarding

Journals and funders collaborate to realign incentives with Rigor and Transparency initiatives using Registered Reports.*



Make it normative

Custom branded registries enable communities to cultivate preregistration norms and improve rigor.



Make it easy

OSF Registries streamlines the registration process with easy-to-use workflows.



Make it possible

OSF enables preregistration. New registration formats this year broaden inclusion of research methodologies such as qualitative research, secondary data analysis, longitudinal investigations, and systematic reviews, and more.

Communities

Communities enabling open practices

Researchers are more likely to adopt reproducible practices when they are backed by community leadership and support. Learn about the groups, institutions, and funders partnering with COS to equip their researchers with open infrastructure, methods, and training.



NII Japan

The [National Institute of Informatics](#) (NII) consulted with COS to adapt OSF's open source code to scale and launch the Japanese research data management platform [GakuNin RDM](#) (GRDM) to adhere to regulatory and compliance requirements for the region. The data management and preservation infrastructure is built using OSF, enhanced by customizations for integration with domestic scholarly platforms and Japanese institutional repositories that enable open sharing, discovery, rigor, and innovation among Japanese and Malaysian researchers. NII engineers and RDM operators collaborated with the open source development team at COS to consult on a local deployment of OSF, customizations, and training to support shared goals of openness, transparency and reproducibility of research around the globe.



“GRDM is continuously developing as an OSS for research promotion and research integrity based on Open Science Framework (OSF). From 2019 to 2020, 19 institutions have already adopted GRDM in the demonstration phase, with plans to start the production operation in 2021. NII RDC is also recommended for use in research data management in major competitive grants by the government and increases the number of institutions using the service.”

Yusuke Komiyama

National Institute of Informatics

Focused Ultrasound

The [Focused Ultrasound Foundation](#) launched [FocUS Archive](#) on OSF Preprints in 2017 to accelerate open research sharing in the field of ultrasound treatments and technology. But their commitment to accelerating scientific progress didn't stop there. In late 2020, they will launch the Focused Ultrasound Foundation Collection on OSF Collections to aggregate the data, materials, and outcomes of their grantees' work. The collection provides easy-to-use submission and discovery interfaces to foster sharing and reuse.



"The Focused Ultrasound Foundation embraces open science practices with our research community because we fundamentally believe implementation of those practices result in research products that have better rigor, reproducibility, and increase the threshold of quality research. Additionally, our use of OSF Preprints and OSF Collections not only help with the quality of the research, but accelerates the timeline this research is available to the larger community. Better discoverability. As a medical research funder, we're always trying to figure out how to get from bench to bedside both as fast and as safe as possible, and open science practices helps us do that. It's all about the patients."

Emily White

Focused Ultrasound

Ghent University

[Ghent University](#) supports transparent and rigorous research among its institutional researchers with the OSF Institutions interface. Ghent researchers take advantage of [OSF Institutions](#)' streamlined data management structure, preregistration workflows, collaboration features, and more to generate and share high-impact research.

In addition to supporting almost 200 Ghent-affiliated users, over 800 projects, and 200 registrations, the university has partnered with COS to integrate one of the most popular cloud storage providers with OSF, OneDrive for Business, used by institutions and researchers around the world. This storage service will be available as an OSF storage add-on in Q1 2021 to all OSF users. Shared, open infrastructure dramatically extends the impact of infrastructure investments.



"Open Science is, and has been for many years, an important component of Ghent University's research strategy. It is also highly valued by a significant and ever growing segment of our research community. We became a member of OSF Institutions a couple of years ago to support our researchers in their efforts to share research workflows and outputs for validation and reuse purposes, and to help identify our own open science champions. Going forward, we want to continue to expand our OSF Institutions user base, in order to grow our organisation's open science community and further strengthen transparent, reproducible, and collaborative research practices across disciplines."

Myriam Mertens

Ghent University

AfricArXiv

[AfricArXiv](#) began as a pan-African cross-disciplinary preprint platform in 2018, and furthered its commitment in 2020 by launching a [roadmap](#) with new opportunities to support open, rigorous, and reproducible research practices. The new project encompasses training training events, collaborative initiatives for the African research diaspora, and incentives for greater openness and transparency in pan-African scholarship.



“Through partnerships like the one established with COS, we hope to establish an independent, efficient, sustainable and decentralized research repository that serves as an interoperable platform for contributions by African researchers, and for all scientists who work in an African context, with the goal to increase discoverability of African research.”

Johanssen Obanda

AfricArXiv

EGAP

COS celebrated the integration of the Evidence in Governance and Politics (EGAP) registry with [OSF Registries](#). The [EGAP registry](#) provides social scientists an interface to discover existing work, submit a registration of their own, or begin conducting rigorous research using the connected OSF infrastructure as a project workspace.



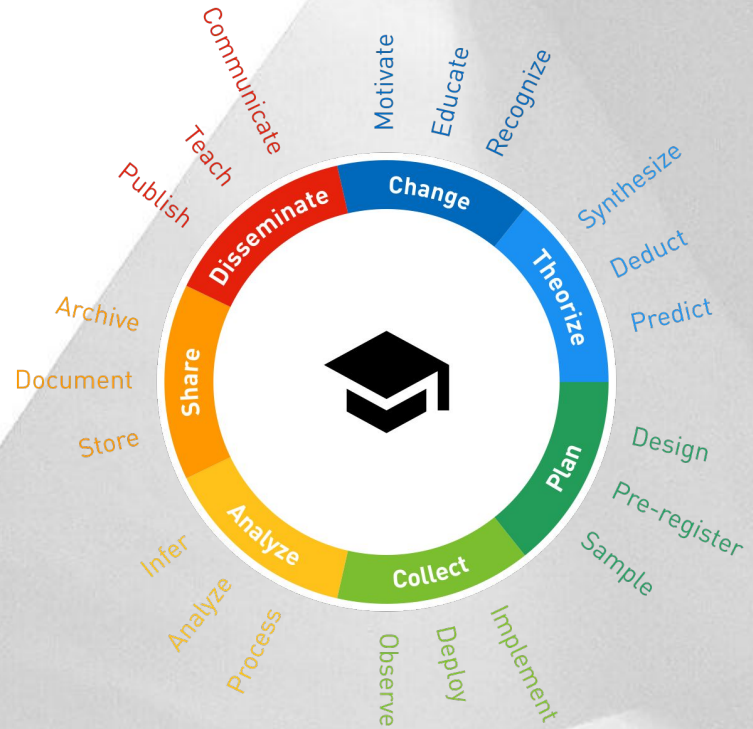
"Over the past several years, the EGAP Registry has been gaining momentum and more awareness by researchers studying subjects related to governance, institutions, politics, and accountability. Simultaneously, OSF offers a flexible registration infrastructure that can support any registry and leverage OSF's other features for the research life cycle. By making the two systems work together, we aim to reduce the time researchers spend entering duplicate information while increasing the sharing of accurate and transparent information on research projects."

Matthew Lisiecki

EGAP

Open Scholarship Knowledge Base

Open science advocates and volunteers around the world and across disciplines came together to compile, curate, edit, and review open education resources that ultimately launched the [Open Scholarship Knowledge Base](#) (OSKB) in August 2020. The volunteer-led initiative, backed by COS, is a growing body of education and training materials covering the what, why, and how of open scholarship.



STEM Education Resource Hub

Education research volunteers coalesced in June 2020 to begin work on the [STEM Education Resource Hub](#). The STEM Hub provides education researchers with connection to all COS services and grassroots organizing to nurture the education community toward open, reproducible research. The Hub will catalyze innovation in education research through community-led events and support for collaboration on research, training, and culture change.



“The Education group was formed to support students and teachers alike to find open access materials for their needs. Access to all types of materials is especially critical for countries that use internet blockades to limit information to their citizens. We welcome everyone to contribute and use the hub!”

Erin Buchanan

Harrisburg University of Science and Technology

Many Labs 5

More than 170 researchers collaborated on Many Labs 5, the final “Many Labs” project that comprised 11 papers and the entire Fall issue of *Advances in Methods and Practices in Psychological Science*. Led by Charlie Ebersole, a postdoc at the University of Virginia, the study investigated whether conducting formal peer review by experts in advance could improve replicability of earlier findings that mostly failed to replicate in the Reproducibility Project: Psychology. The evidence countered critics' claims that prior failures to replicate were due to low power studies that did not meet quality standards. Read the papers [here](#).



The Many Labs 5 leadership team from left to right: Ivan Ropovik, Charlie Ebersole, Katie Corker, Lili Lazarevic, Mallory Kidwell, Martin Corley, Brian Nosek, Joshua Hartshorne. Not pictured: Chris Chartier, Diane-Jo Bart-Plange, Erica Baranski, Hugh Rabagliati, Lauren Skorb, Maya Mathur, Hans IJzerman, Nick Buttrick.

COMMUNITIES ENABLING OPEN PRACTICES

COSGN

Over 120 open science grassroots communities came together online in 2020 to form the Community of Open Scholarship Grassroots Networks (COSGN) creating a meta-network of mostly volunteer networks with broad representation across regions, disciplines, and research scope. Join the [community hub](#) to collaborate and dialog with fellow open science grassroots peers working to disseminate research best practices.



Incentives

Reengineering incentives to support openness and transparency

We shift the research culture toward greater reproducibility by partnering with research stakeholders to realign the norms, incentives, and policies that shape researcher behavior.



413

Journals listed at
topfactor.org

24%

In a pilot test, being assessed via TOP Factor prompted 24% of journals listed to improve their score within 6 weeks.

TOP Factor

Over 400 journals are now represented on [TOP Factor](#) since its launch this year, with more than 200 to be added soon. TOP Factor rates the degree of openness and transparency of journal policies to provide authors with information and to encourage progression toward more assertive transparency policies by journal editors. COS recognizes the journals working to implement policies promoting transparency and reproducibility and alter dysfunctional publishing incentives that reward novelty over rigor.

Taylor & Francis

COS acknowledges publishers like [Taylor & Francis](#) raising the visibility of open practices through efforts like open science badging, an initiative to incentivize and reward transparent behaviors such as data sharing, making materials publicly available, and preregistering research designs.



Open Scholarship Survey

COS unveiled the [Open Scholarship Survey](#) (OSS) to help funders, institutions, and other stakeholders assess the preparedness of their research communities for culture change. The OSS measures opinions, behaviors, and perceived incentives around open practices such as open access, preprints, preregistration, replication and sharing data, materials, and code. The OSS is applicable across disciplines, regions, and career stage, enabling stakeholders to receive comparative data about the state of their community versus peer institutions or disciplines.



“In 2019 the Center for Open Science (COS) conducted an open science survey of HHMI scientists on behalf of HHMI. This close collaboration was important to HHMI, because the survey results influenced the design and communication of HHMI’s new open access policy. The COS survey gave HHMI scientists a voice in shaping this important policy and contributed to a remarkably positive reception when the policy was announced on October 1, 2020.”

Bodo Stern

HHMI

Research Transparency Initiatives

Publishers, funders, and research groups can now use COS [Research Transparency Initiative](#) (RTI) consulting services as they pursue culture change toward rigor and transparency. The RTI project assists stakeholders in designing and administering culture change initiatives, particularly partnerships between funders and journals to reduce publication bias, promote rigor and replication, and increase credibility. And, with a recent award from NSF, COS is evaluating the effectiveness of these initiatives in spurring culture change.



“Flu Lab believes that addressing a challenge as formidable as influenza requires greater availability of information and collaboration. As funders, increasing the publication of null and negative results and replication studies is an important part of our efforts to promote transparency and open science principles in the influenza research community. We are pleased to partner with Center for Open Science, which shares our values and a willingness to experiment with new programs and approaches.”

Julie Schafer

Flu Lab

Research

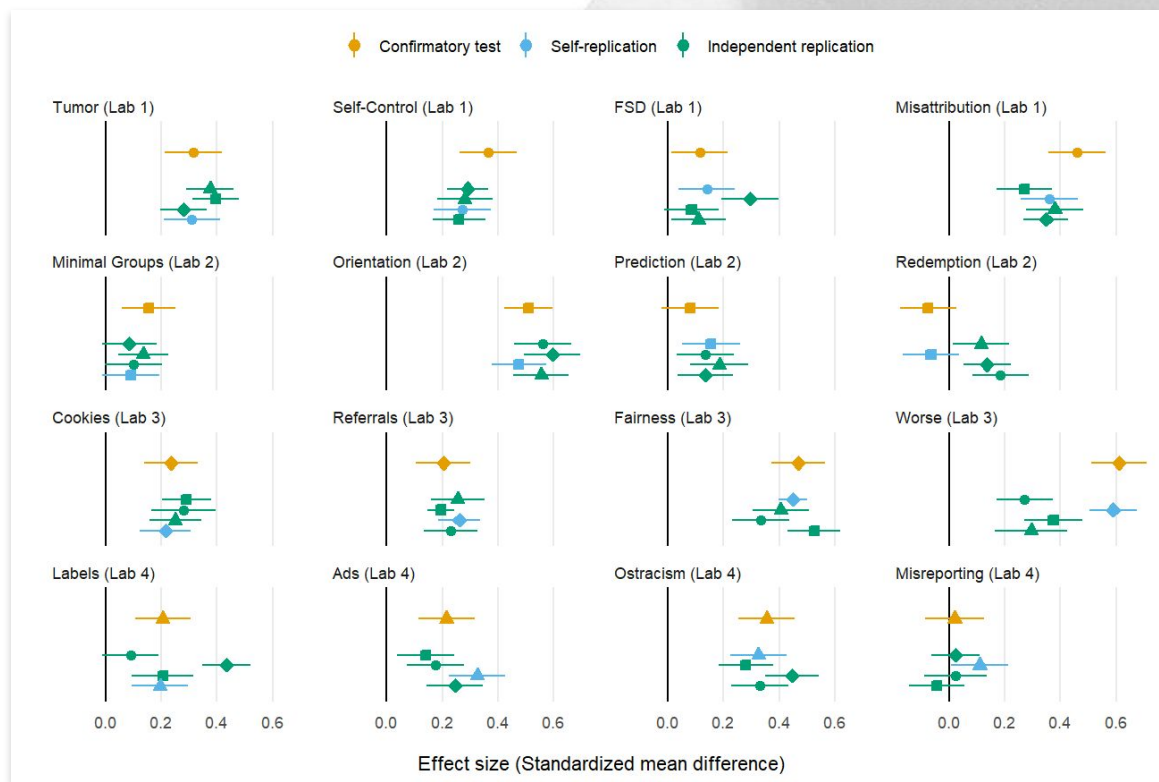
Evaluations and interventions
to improve research

We collaborate with labs, funders, and research groups to evaluate science and the scientific process. Studying how research is done surfaces deficiencies and spurs methodological innovation.



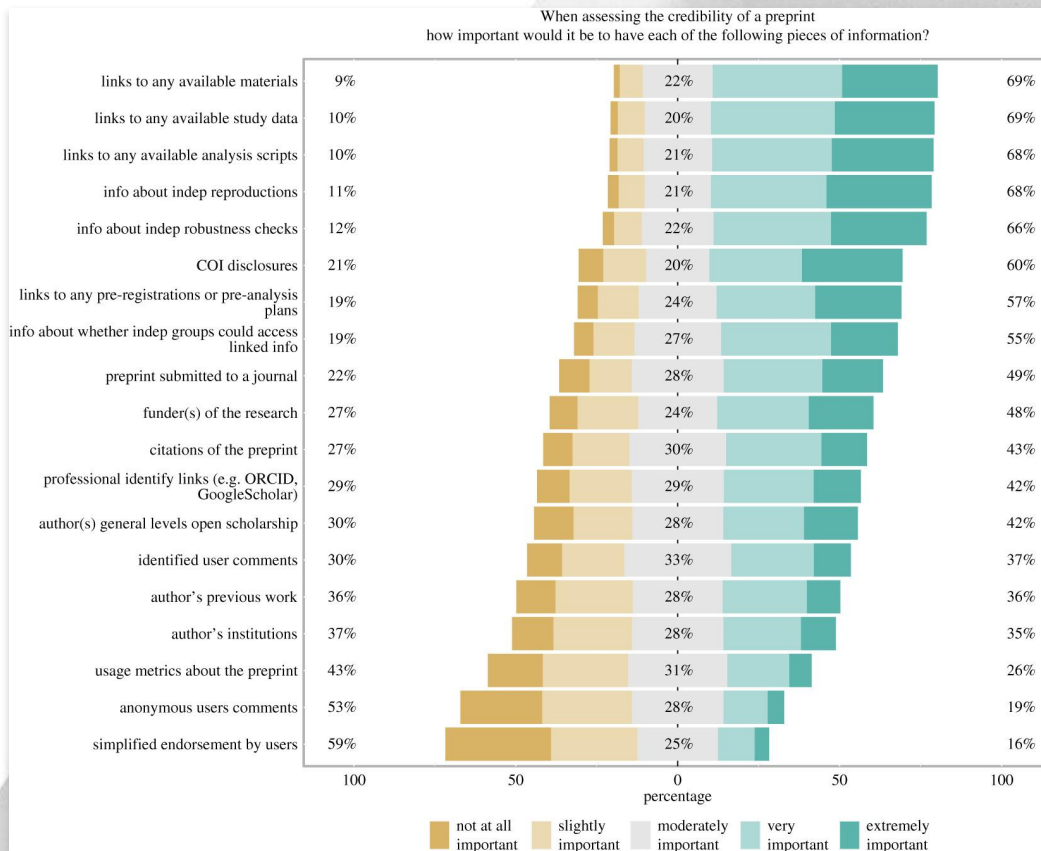
High Replicability of Newly-Discovered Social-behavioral Findings is Achievable

A prospective replication study of 16 novel experimental findings released as a preprint in September 2020 provides evidence that transparent and rigorous procedures are associated with high replicability. View the preprint [here](#).



Credibility of preprints: an interdisciplinary survey of researchers

Preprints services can accelerate scholarly communication and improve accessibility, but do researchers find them credible enough to use? A survey of 3,759 researchers across disciplines identified the signals preprint servers can implement—such as cues for available data, materials, and code—to help researchers better assess credibility and trust in preprints. See the paper [here](#).



Metascience: the emerging field of research on the scientific process

Metascience continued to mature as a disciplinary community in 2020, and produced new mechanisms for collaboration and innovation, including the [Metascience research collection](#) and [Metascience registry](#).

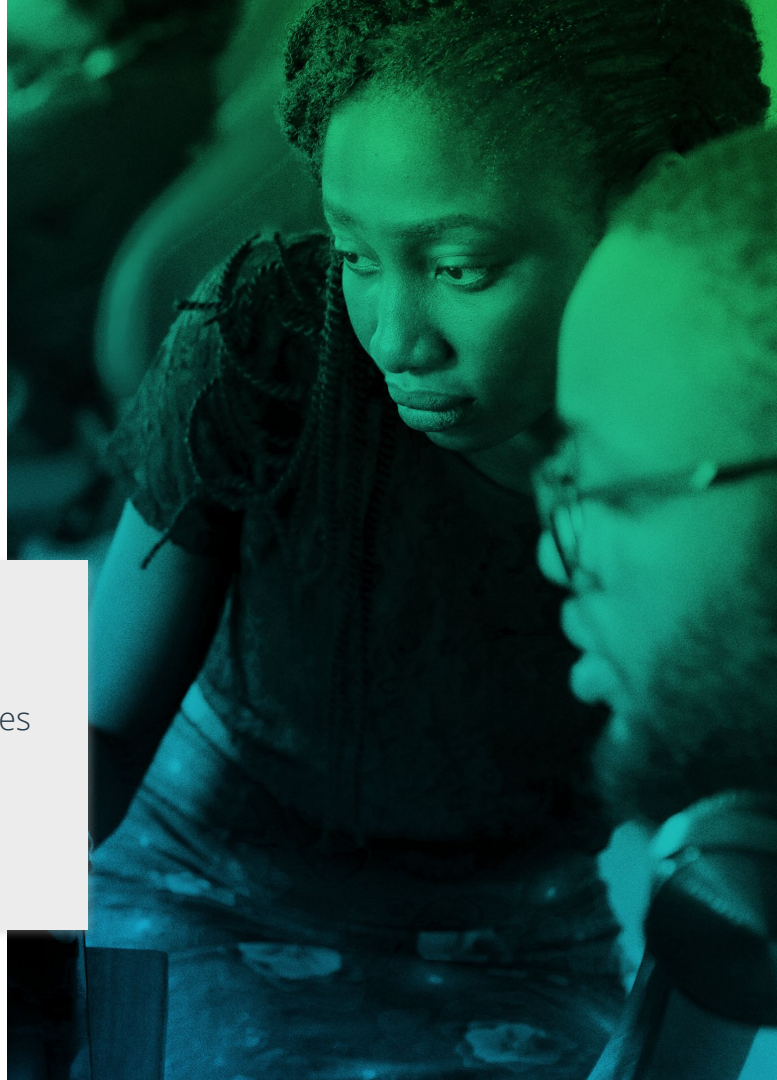


View the entire collection of speaker videos from the Metascience 2019 Symposium [here](#).

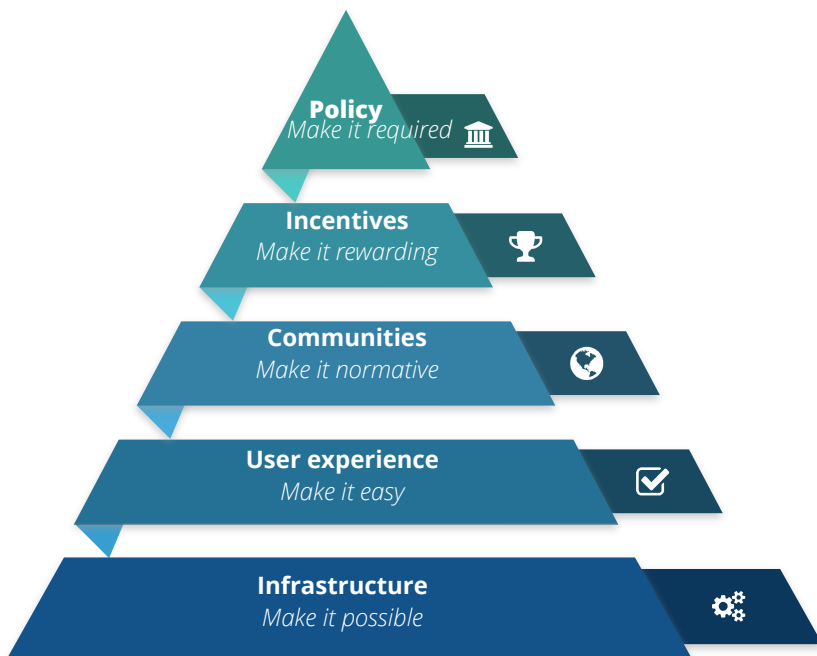
Enacting change in the research culture

Stewards of science for a
better world

Shifting the research culture toward greater reproducibility requires a comprehensive and progressive strategy at every tier.



All researchers and stakeholders play a part in maximizing scientific impact and changing research culture when they engage with and promote open and transparent behaviors, norms, and incentives across the research lifecycle.



Get started:



Researchers



Institutions



Policy makers



Publishers



Funders



Donors

COS could not accomplish its mission without the collective support of individual donors, philanthropic foundations, and research funders. Visit cos.io/supporters to learn more about the financial partners that furthered COS's open science initiatives in 2020.



"As psychology moved into facing the crisis of confidence based on unreplicable findings, it was great to have tools being developed for the community by the Center for Open Science. Our ability to show the strides that researchers in psychology are making to validate and increase rigor in our science is a major contribution to not only psychology but the broader sciences."

Pam Davis-Kean
University of Michigan
COS 2020 Benefactor



"As a trustee of the John Templeton Foundation and of a family foundation, I've championed the Center for Open Science mission, which is moving science toward enhanced standards of transparency, integrity, archival accessibility of research materials, and, therefore, of reproducibility and credibility."

David Myers
Hope College
COS 2020 Benefactor

The Center for Open Science
is a 501(c)(3) nonprofit
organization.

We work to catalyze grassroots community efforts to change research norms and help provide solutions, such as the OSF, an open-source, public goods infrastructure, to help stakeholders recalibrate reward systems.

Visit cos.io/finances to learn more about our nonprofit status, sustainable business model, and revenue reporting.





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