

The Center for Open Science: Promoting openness in the scientific community

The Center for Open Science (COS) believes that some of the biggest scientific challenges we face today could be solved if research was progressed more quickly and disseminated more widely. Striving for a culture of openness where methodology and results are shared across disciplines, COS provides support, tools and training for researchers, institutions, funders and publishers. Through their work, they aim to make scientific research and data available for all, accelerating progress in areas such as disease, poverty, education, social justice and the environment.

The Center for Open Science (COS) celebrated its fourth anniversary earlier this year. In that time, the organisation has established itself as a key player in the fight for a culture change in the scientific community, advocating openness, integrity and reproducibility of research. Since its inception, more than 5,000 journals have signed the transparency and openness promotion guidelines, and the Open Science Framework now hosts more than 67,000 projects. Likewise, hundreds of visitors rely on COS to source collaborations and learn how to implement open science products and processes.

In this interview with co-founder Jeff Spies, *Research Features* found out a bit more about the story behind the COS's core mission, its current projects and what the future might look like if more of the community engaged with open science.

Hi Jeff! Can you briefly tell us about the heritage and background of the Center for Open Science (COS)?

Brian Nosek and I (co-founders of COS) had both wanted to create a system like the Open Science Framework (OSF) for a while. I had wanted to back in 2004, before joining Brian's lab, but was told it would kill my career – I should focus on publishing and save this sort of tool development for post-tenure. Brian had submitted two proposals to the National Institutes for Health in 2006 and 2007 to create a virtual laboratory (<https://osf.io/784rn/>) and participant pool (<https://osf.io/3v2wy/>) with features that promoted the sharing of research data and materials. However, neither of these were funded.

When I joined Brian's lab, I started developing the OSF as a side project and then, after deciding to kill my academic career, as part of my dissertation project. ▶

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Around the same time, we started the Reproducibility Project: Psychology, a large-scale effort evaluating the rate of replicability in psychology, managed on the OSF. Enter the Laura and John Arnold Foundation, and COS was born.

Can you tell us what projects you are particularly passionate about at COS?

Openness is key to increasing research efficiency by enhancing research quality, reproducibility, replicability, extension, quality, inclusivity and diversity. We need high quality research to solve some of the big challenges we face, like curing diseases, and we need as many and as diverse a group of people as possible to work on them. We also need rapid dissemination of research.

Academic researchers make critical contributions to these problems, both directly and indirectly. But the primary incentive for academic researchers is publication, and that has created inefficiencies, e.g., delayed dissemination, inaccuracy, lack of reproducibility and replicability and exclusion. There are many people that could be making a contribution to the research enterprise, but cannot because they or their institutions cannot afford the access fees or because of restrictive licensing. More than that, the publication is only a sliver of the actual research process – we need access to the whole of the research lifecycle.

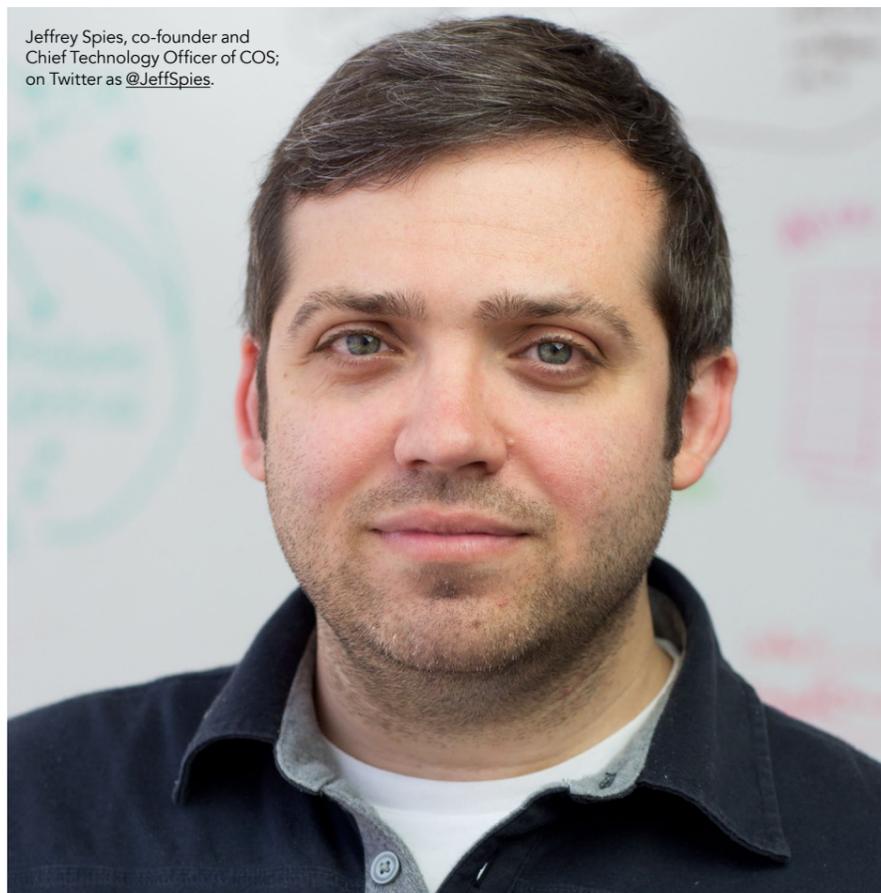
Can you tell us about your individual role at the COS and the role of the board?

Over time, roles have shifted – early on, I was involved in just about everything. As the team has expanded and the amount of work we have committed to has increased, we have all had to become more focused. What has not changed in my role is being responsible for technical strategy, product vision, software architecture, external partner/funder development and the management of research and development (now called COS Labs).

As our website states: ‘Our board represents the research and technology communities and provides COS with valuable advice for meeting its mission.’ You can read more about it at <https://cos.io/about/our-board/>.

Can you tell us a bit more about open science? How did you become interested and an advocate of open science?

I like solving problems. It started off with an interest in using artificial intelligence to



Jeffrey Spies, co-founder and Chief Technology Officer of COS; on Twitter as @JeffSpies.

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solve problems – evolutionary computation, behaviour-based robotics, artificial life. Via these paradigms, I was doing research using neural network modelling. That led to work in quantitative psychology while in a joint PhD programme with computer science. Fairly early on in those studies it became clear that there were even broader problems to solve with regards to the research process itself – and here I am.

COS has a strategic plan which outlines its mission to increase openness, integrity and reproducibility of research with five interdependent activities: metascience, infrastructure, training, incentives and community – can you explain how these relate to fulfilling COS’s mission?

Metascience is acquiring evidence to encourage change, infrastructure is building technology to enable change, training is

disseminating knowledge to enact change, incentives provide reasons to embrace change and community is fostering connections and inclusion to propagate change. I do think a multi-pronged (i.e., cross-strategy, cross-stakeholder, cross-discipline, cross-lifecycle) and open, community-focused approach is required.

What impact has COS had since its establishment?

I will be most satisfied when, perhaps after a few more years of our work, we (or ideally others) can bring forth empirical data to answer that question. But I will just cite a few numbers that I am particularly proud of: researchers have created over 67,000 projects, 21,000 are public. We have had more than 5.1 million downloads on the OSF. We have had over 11,000 registrations – a paradigm not well understood or



Staff hard at work in COS's office in downtown Charlottesville, VA.

incentivised in most disciplines. A total of 70 journals now offer the registered reports format and 6,700 preprints have been uploaded to OSF Preprints or one of our 15 community-supported preprint servers. This aggregates with another 2.1 million preprints collected by SHARE, a project I co-direct with Judy Ruttenberg at the Association of Research Libraries. COS has 194 Ambassadors helping us scale our work.

Where in the world has benefitted most from the work at COS?

Over the last year, we have had some use of the OSF in every country in the world. The numbers do seem to align with what might be expected based upon what we know of ‘output’ across the world, as measured by the number of publications or number of citations of those publications. However, our numbers do diverge in some important ways. For example, usage from Brazil, Indonesia and India is higher than in some of the expected top ten locations in the world.

How does the COS correlate with the open access movement? How can readers get involved and support this?

As Peter Suber defines it, open access removes both price and permission barriers from literature. At COS, we advocate going further than open access: open workflow, i.e. opening text but also materials, data, analyses, software, etc. The OSF, for example, is meant to support an open workflow approach rather than focusing on just one or a few components of the research lifecycle.

In terms of getting involved, all of our work is free and open. Our code is on Github <http://github.com/centerforopenscience>, services described at <http://cos.io> and the OSF is freely available at <http://osf.io>. Readers can get in touch with us at contact@cos.io.

How does COS differ from other open science organisations?

There are certainly others doing great work that we share similarities with. It seems that our uniqueness comes from our multi-pronged approach – ideally helping to connect the more focused work others are doing that we would never be able to do. For example, with our technology, we support community partners who want to run preprint servers. Those people are much closer to their communities – they know the people, speak their language and understand their challenges. It does not make sense for us to be in every community, but we can support the people already there.

What needs to happen to continue to promote and support the open science movement, making research accessible to all levels of people worldwide?

Across the board, we need a change in incentives so that scholarly values can be aligned with scholarly practices, and this needs to come from and be supported by universities, funders, societies and journals. Until incentives and culture changes, increased resourcing to support endeavours worldwide would accelerate change.

The Laura and John Arnold Foundation was key to the establishment of COS in 2013 – how else does the COS campaign for more generous funders and partners to support COS in its mission?

We are extremely appreciative of the Laura and John Arnold Foundation’s generosity. Beyond the funders active in the ecosystem, our team is pursuing new opportunities and grants that come to our attention. Much of that work – pre-proposal or pre-engagement – is done by Melanie Benjamin, our donor and funder relations lead. Her and other members of the team have been working

hard at making it easy and compelling for others to donate as well (see more at <https://cos.io/donate-to-cos/>).

What does the future hold for open science and COS?

The question of whether or not change will occur such that open is the default in science/scholarship is not a matter of if but when. The future for those working to promote openness is working towards a when that is sooner rather than later. Openness will accelerate solutions to problems having to do with health, social justice and the environment – solutions that many people are actively waiting for as their lives or well-being depend on it.

• To find out more information about the fantastic work of COS, please visit their website at www.cos.io.



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