University Open Source Program Offices

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ITHAKA S+R

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Introduction

Open Source Program Offices (OSPOs) are dedicated units that coordinate and nurture open source software adoption across the organization. In the past two decades, as companies recognized that open source software "was not just a viable option but a critical path for technology innovation," OSPOs became relatively common in large corporations, especially in the tech sector.[1] OSPOs are often initially focused on corporate compliance with the terms of open source software the company licensed, but at large companies, their mission often grows in complexity over time. Well-established corporate OSPOs are now likely to support the development of and contributions to open source software, provide education and training to employees and, in some cases, external communities, undertake outreach and community engagement, and develop strategies and policies for open source activities across the organization. Mature OSPOs function as "the center of gravity for an organizations' open source operations and structures."[2] Directly or indirectly, OSPOs are associated with increased adoption of open source software (OSS), improved quality and speed of software development and interoperability between systems, reduced costs, and revenue growth.[3] OSPOs also make significant contributions to

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[1] Chris Aniszczyk, "The Evolution of the Open Source Program Office (OSPO): An OSPO Maturity Model Featuring Case Studies From Bloomberg, Comcast, and Porcshe," *Linux Foundation*, 2022, https://www.linuxfoundation.org/research/the-evolution-of-the-open-source-program-office-ospo; Stephen Hendrick and Ana Jimenez, "The 2024 State of OSPOs and Open Source Management," *Linux Foundation*, 2024, https://www.linuxfoundation.org/research/ospo-2024. Chris Aniszczyk, Jeff McAffer, Will Norris, and Andrew Spyker, "Creating an Open Source Program," *Linux Foundation*, accessed June 13, 2023, https://www.linuxfoundation.org/resources/open-source-guides/creating-an-open-source-program.

[2] "Announcing the Open Source Program Office (OSPO) Definition," *TODO Group / Talk Openly, Develop Openly*, August 17, 2020, https://todogroup.org/blog/ospo-definition/.

[3] Mariam Guizani, Aileen Abril Castro-Guzman, Anita Sarma, and Igor Steinmacher, "Rules of Engagement: Why and How Companies Participate in OSS," arXiv:2303.08266, *arXiv*, March 14, 2023, http://arxiv.org/abs/2303.08266; Henry Chesbrough, "Measuring the Economic Value of Open Source: A Survey and a Preliminary Analysis," *Linux Foundation*, 2023, https://project.linuxfoundation.org/hubfs/LF%20Research/Measuring%20the%20Economic%20Value%20of%20Open%20Source%20-%20Report.pdf; "Announcing OSPO Survey 2022 Results," *TODO Group*, accessed June 13, 2023, https://todogroup.org/blog/ospo-survey-2022-results/; Nithya Ruff, "The Rise of the Open Source Program Offices

the health and sustainability of the wider open source ecosystems through advocacy and educational work, and by helping to maintain widely used open source software.

Over the past decade, as the importance of software as a research output, essential component of reproducible science, and community infrastructure for open science has grown, so has the recognition that "open source software is a unique kind of scientific output that, unlike other research products, requires ongoing care, funding, and dedicated resources to thrive and function."[4] While universities are enterprise users of open source software and have a long history of successfully incubating it, the infrastructure required to support open source research software and to coordinate open source activities across campus is not well developed. This infrastructure gap has reduced the impact and hampered the sustainability of open source software built by and for researchers. As a result, several major funders of scientific research and individual open source projects, including the National Science Foundation, the Chan Zuckerberg Initiative, and the Alfred P. Sloan Foundation are now funding projects designed to build and support this infrastructure.[5]

These university OSPOs—the first of their kind in the United States—are an experiment in building institutional capacity to foster norms, practices, training, policies, and incentive structures that will support a vibrant open source culture among research communities.

In support of this goal, the Sloan Foundation has awarded grants to 12 universities to open university-based OSPOs. These university OSPOs—the first of their kind in the United States—are an experiment in building institutional capacity to foster norms, practices, training, policies, and incentive structures that will support a vibrant open source culture among

(OSPO)," in *Open Source Law, Policy and Practice*, ed. Amanda Brock (Oxford University Press, 2022), 0, https://doi.org/10.1093/oso/9780198862345.003.0019.

[4] Kate Hertweck, Carly Strasser, Dario Taraborelli, "Insights and Impact From Five Cycles of Essential Open Source Software for Science," *Chan Zuckerberg Initiative*, July 16, 2024, https://doi.org/10.5281/zenodo.11201216.

[5] Carly Strasser et al., "Ten Simple Rules for Funding Scientific Open Source Software," *PLOS Computational Biology* 18, no. 11 (2022) https://doi.org/10.1371/journal.pcbi.1010627.

research communities. The Sloan Foundation engaged Ithaka S+R to evaluate the cohort as a whole, and our research has been guided by several questions:[6]

- What strategies are these institutions using to promote OSS software?
- What challenges are they encountering?
- Is it possible to identify common traits associated with success and sustainability or institutional readiness?

To answer these and other research questions, we conducted extensive interviews with multiple individuals at each of the 12 institutions that have received funding from Sloan. Our goal is to understand the growth curve of OSPOs in university settings and how they function within that environment.

Our analysis is focused on university OSPOs as offices—how they interact with software cultures and practices in an academic environment and how they can support the larger strategic goals, mission, and values of universities. As a result, this report does not capture the perspectives of any of the individual OSPOs in the study or report on their individual progress.[7]

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[6] While research for this report was underway, Sloan also provided support to the University of California and University of Texas systems to create system-wide OSPOs. Our reporting limits its analysis to the 12 university-based OSPOs.

[7] Many university OSPOs have described their progress. For example: Sayeed Choudhury, "Guide to Setting Up University Open Source Program Offices (OSPOs)," *Coalition for Networked Information*, December 2022, https://www.cni.org/topics/ci/guide-to-set-up-university-open-source-programs-office-ospo; Stephanie Lieggi and Sayeed Choudhury, "OSPOs in Academia: Increasing the Impact of Educational Institutions and Open Source Communities," *Linux Foundation*, April 17, 2024, https://www.youtube.com/watch?v=UQeydwNPOVE; Ekaterina Holdener and Daniel Shown, "Building Software Engineering Capacity through a University Open Source Program Office," *FSE: Companion Proceedings of the 32nd ACM International Conference on the Foundations of Software Engineering,* Association for Computing Machinery (July 10, 2024): 659–60, https://doi.org/10.1145/3663529.3663866; Bill Branan, et al, "Three Levels of Academic Open Source Support Structures," *Coalition for Networked Information*, December 2022, https://www.cni.org/topics/ci/three-levels-of-academic-open-source-support-structures.

Key findings

- Consolidating the human infrastructure for open source is an essential first step for university OSPOs, requiring significant investments in identifying campus open source practitioners and building communities to support open source activities that cut across institutional silos.
- Several OSPOs are finding ways to contribute to their institutions' core mission by providing experiential learning opportunities for students.
- Changing researchers' practices around open source software is a long-term challenge complicated by tensions between the values that motivate open source communities and the incentive structures within academic departments and priorities of individual researchers.
- The university OSPOs that have spent down their initial grant funding are often successful in finding short-term access to internal funding that allows them to remain open. However, the long-term sustainability of OSPOs is uncertain, especially as federal funding for universities and open science is threatened.

Methodology

Over the past two years, we interviewed multiple individuals from each of the 12 universities that have received funding from the Sloan Foundation to create OSPOs on campus (see appendix A for a list of institutions). We spoke with several distinct groups of people, including OSPO directors and staff, senior administrative leaders, students interns and employees, and faculty and students who had used OSPO services or resources. We deployed different interview methodologies for each group. We spoke with OSPO directors and staff using a semi-structured interview format to create a level of consistency across interviews, and ensure coverage of high priority topics, while providing opportunities to tailor questions to specific institutional contexts, as well as space for participants to provide unsolicited perspectives. These interviews were recorded and

subsequently transcribed verbatim. Our conversations with the principal investigators (typically senior administrators such as library deans) were less formal listening sessions, designed to elicit broad and sometimes unexpected context to the OSPO's role at the university rather than the specific, relatively standardized information about activities and workflows that took up much of our interviews with OSPO staff and student employees. We used focus groups, a widely used format for assessing users' needs and opinions about new or experimental services, to speak with individuals who had drawn on OSPO resources or expertise. Neither the listening sessions nor the focus groups were recorded: instead, an Ithaka S+R staff member took detailed notes throughout the conversation. All together, we spoke with 52 individuals, most of them more than once—giving us a broad and diverse perspective on each of the OSPOs. Our first round of interviews was conducted in the fall of 2024 (with a few spilling over into early 2025) and the second in the spring of 2025.

In preparation for analysis, all project transcripts and notes for the interviews were coded in Nvivo. Codes were developed using a grounded theory approach. Four Ithaka S+R staff members contributed to developing and refining the coding system to ensure inter-coder reliability.

Direct quotations cited in this report have occasionally been lightly edited for clarity. To protect anonymity, no individuals or institutions are named in the report, and we have avoided sharing details from our interviews that might identify either individuals or their institution to the greatest possible extent. However, there are only 12 institutions supporting Sloan-funded OSPOs, each of which has publicly acknowledged their award and maintains at least a minimal public presence, which may permit re-identification in some cases despite our best efforts. To help flesh out our analysis, we have made use of websites, press releases, and other publicly available reporting on the OSPOs in this report without anonymizing them.

The findings in this report represent the perspective of Ithaka S+R, not those of any of the individuals with whom we spoke, nor of any of their institutions. We encourage readers to seek out the publications and other public statements they have made about their work. We are deeply grateful to all of the individuals who were interviewed for this project, and to our advisory committee: Deborah Bryant, Policy Advisor, Open Source Initiative; Namjoo Choi, Associate Professor of Information Sciences, University of Kentucky; Heather Joseph, Executive Director, SPARC; and,

Patrick Masson, Executive Director, Apereo Foundation. Final responsibility for the report and its findings rests with the authors.

Adapting OSPOs to higher education

University OSPOs are small, often staffed by a single full-time employee who serves as the OSPO director. The professional backgrounds of OSPO directors vary. Several have worked primarily in higher education either as faculty or administrative staff and were usually internal hires, but individuals who have worked primarily in the private sector are also well represented. The directors are usually supported by an advisory committee or a senior administrator, and they often employ students as part-time support staff. They further extend their reach by collaborating with other university offices, but nevertheless have limited capacity to meet the broad range of open source users and use cases on a large university campus.

OSPOs are typically situated within libraries, research centers or institutes, or academic units. While all of the Sloan-funded OSPOs share similar missions and have engaged in similar types of activities, the OSPO directors and staff with whom we spoke frequently reflected on how their place in the org chart shaped their work and priorities, and provided them with unique opportunities and challenges. Few felt that they would have clearly benefited from changing locations, though there are a couple of instances of OSPOs at least contemplating a move as they mature.

For example, several staff at library-based OSPOs believed that the cultural values of libraries made them a good home. As one remarked, being in their library is an asset because “open is kind of what we’re about. So, we can talk about open source, but we can also talk about open data, and we also talk about open access. There are so many different flavors of open: the OSPO fits very naturally into those conversations.” OSPO staff nestled within research centers or the research office more often described their mission specifically around open science. OSPOs hosted by colleges of engineering or computer

science departments had ample opportunities to embed themselves within domain or disciplinary values and projects.

The location of an OSPO has implications for outreach strategies as well. OSPO staff located in research offices or centers report benefiting from close proximity to researchers who are likely to use or be interested in open source software. They also believe that being embedded in a dedicated research unit allows them to focus their resources on those aspects of open source software that "scientists and scholars care about"—namely using software to conduct their research—rather than focus on funding compliance issues that may alienate researchers. OSPOs located in research offices may also find it relatively easy to build strong relationships with their senior research officer. We heard repeatedly from OSPO directors, regardless of their reporting lines, that support from the senior research officer is important to their future sustainability. Several OSPOs located in libraries or academic units described the senior research officer as the "most well-placed [person] in the administration to support the OSPO," but had found it difficult to catch their attention.

Like OSPOs located in research units, those housed in academic units have ready access to and credibility with faculty in disciplines that are perceived as highly likely to benefit from the expertise of an OSPO. They also have ready access to both undergraduate and graduate students, and OSPO staff have seized opportunities to become involved in instruction or provide formal experiential learning experiences. Students with programming and software development skills are a key source of labor at many OSPOs: OSPOs located in computer science departments are in an enviable position for recruiting them.

> Locating an OSPO in an academic unit or a research center could create the perception that its services and expertise are valuable or available to only a limited number of faculty and students.

On the other hand, locating an OSPO in an academic unit or a research center could create the perception that its services and expertise are valuable or available to only a limited number of faculty and students. One such director noted that "we're kind of tucked away, right? It's harder to find out about us. So, we have to be very proactive about going and

working with other departments and other schools within the university." Libraries—which serve researchers and students from all disciplines and majors—may have the advantage of being readily perceived as inclusive spaces.

Cross-unit collaboration

Open source activities are spread across campus and stakeholders, and the OSPO's primary role is to build connections. Regardless of where they sit in the organizational reporting structure, OSPOs have created working ties to other university offices. The exact constellation of offices involved varies somewhat, but internal collaborations between libraries, research offices, IT, medical schools, research computing, tech transfer offices and innovation hubs—even, in one case, with extension schools—have helped OSPOs increase their service capacity and amplify their impact across diverse constituencies.

These collaborations, if sustained, could form the basis for an institutional open source infrastructure, with the OSPO serving as a facilitator to researchers, students, and staff as they move across it. One OSPO director speculated that in such an environment, the OSPO as an office may be replaced by the OSPO as a method. "It's like bringing Agile to a company. When you first bring Agile methodology to a company, you have someone that's an advocate for it, teaches it. Everyone develops systems, uses them, and then it becomes like, 'oh we just do this.'"

OSPO activities

Changing academic culture and practices to support open science is difficult long-term work. As useful barometers of the scale of investment required to make change at this level, consider the resources currently committed to normalizing data sharing or legitimizing open access publication, and the slow progress the academy has made towards these goals. Building institutional cultures conducive to using, developing, and sustaining open source research software will almost certainly require a similarly sustained investment of resources and advocacy.

Given this context, it is premature to assess the success of university OSPOs. However, one area in which OSPOs have made significant progress is in strengthening the human infrastructure of open source on campus. This foundation building, though difficult to put in numbers, will continue to reap rewards as relationships facilitated by OPSPOs mature and multiply across campus.

Mapping campus OSS use

One of the first challenges many OSPOs faced was identifying researchers who might benefit from their services. Open source software users are dispersed across campus, but the decentralized nature of university campuses—and especially of research labs and cultures—make it difficult for OSPOs to identify and reach out to them. In response, at the University of Wisconsin the OSPO conducted a campus wide survey "to gauge the usage of open source tools among members of the university community, identify open source projects under development, and to collect feedback on improving the open source environment."[8] Other OSPOs have also launched surveys or created online project registries of open source projects on campus.[9]

The surveys further several OSPO goals, and next generation OSPOs would be wise to consider duplicating these efforts. Mapping open source usage provides critical information that helps OSPOs build contact lists, identify potential collaborators, and better understand their needs. A survey is also an outreach tool that, in the words of one interviewee, "puts us in people's minds" and raises awareness that the institution is invested in open source. Survey results can also help make open source more visible to the senior administrators whose support could determine the fate of the OSPO.

Community building

The sustainability of open source software depends on a dispersed community of users and contributors. Unsurprisingly, OSPOs have made significant investments in various kinds of community building, which interviewees repeatedly described as a core responsibility. The concept of community was one area where some OSPO personnel saw an important distinction between the mission of a corporate OSPO and a university OSPO. As one interviewee remarked, in corporate OSPOs, community

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[8] "2024 Open Source Survey Results," University of Wisconsin-Madison, accessed July 28, 2025, https://uw-madison-dsi.github.io/open_source_survey_results/.

[9] "Project Registry," The GW Open Source Program Office, The George Washington University, accessed July 28, 2025, https://ospo.gwu.edu/project-registry; https://opensource.stanford.edu/projects-registry; "Georgia Tech OSPO Explorer," Georgia Tech, accessed July 28, 2025, https://gt-ospo.github.io/oss-project-explorer/; Juanita Gomez et al., "Recipe for Discovery: A Framework for Systematic Open Source Project Identification," arXiv:2506.18359, *arXiv*, June 23, 2025, https://doi.org/10.48550/arXiv.2506.18359.

building is a means to support the software, while a university OSPO is there to serve a community of people interested in open source.

Most OSPOs had engaged early and often in building relationships with internal communities. A staff member at one of the few that had not made this an initial priority described it as a mistake: “It would have been good for us to reach out to all of them very early on to say, ‘Hey, we have this OSPO. What are your concerns? What are you doing? Is there anything we can help with or anything we can learn from you?’ Basically, identifying who your key stakeholders and collaborators are very early on, I think is very important to your success.”

While OSPO staff recognize the potential value of connecting with businesses and other external partners, these connections have been slow to develop for some institutions. Several interviewees framed external outreach as a secondary priority in comparison to connecting people and resources within the university. Several interviewees believed that getting their own house in order was a necessary prerequisite to creating private sector connections in particular. As one put it, "right now our focus is the internal and making sure that we have the right processes, capabilities, and relationships in place... I feel like we are much better prepared to look outward when we have a good understanding of the things that are already being asked for within [our] community. Then we can make those connections and tie things together more effectively."

Building an internal community is difficult due to the silos that fragment large research universities. A library dean described their institution as having “no arteries that lead to the same heart.” The OSPO’s goal was to create those arteries, but doing so required going “to each school, each department, each student group, etc.” Nevertheless, OSPOs generally reported making good progress building open source communities and connections on campus. Their success is possible, in part, because campus “open source practitioners are very hungry for a community to collaborate with, because that’s what open source is about.”

OSPOs are using a range of tools to help foster community. Hosting events and in-person meetups is the most common method. Others include creating outreach scripts specific to particular campus groups, developing plans for a “research match” program supported by small grants to faculty collaborators, and “literally going door to door to introduce themselves.” Several OSPOs that have the resources to expand staff capacity have chosen to hire dedicated community builders, whose work resembles that

of the community managers common in open source communities outside the academy.

University OSPOs are also building community with each other through CURIOSS (Community for University and Research Institution OSPOs), another Sloan-funded initiative.[10] CURIOSS was mentioned repeatedly by OSPO personnel as an invaluable resource. CURIOSS provides a forum for OSPOs to share resources—for example, the open source survey instrument developed by the University of Wisconsin, or code that allows users to identify GitHub repositories and users from their university—and discuss problems and insights that arise in the course of their work. One interviewee described CURIOSS as a model for open source, a place where they could collaborate as producers, contributors, and maintainers, while a staff member of a newly organized OSPO appreciated the opportunity to learn from the experiences of colleagues at more mature OSPOs.

Knowledge sharing

A second major component of OSPOs' work has been focused on facilitating the flow of information and knowledge among open source users. Once again, workshops—focused on coding, licensing, or other aspects of open source development—are a common way that OSPOs are working to build the knowledge base to support open source on campus. Similarly, some OSPOs are supporting student hackathons, hosting conferences, and offering prizes to undergraduates to incentivize their engagement with open source software.

> At many institutions, OSPOs appear to be making their greatest impact with students.

OSPOs have also become very active in teaching and learning, and at many institutions, OSPOs appear to be making their greatest impact with students. Some OSPOs are providing internships and hourly work for graduate students, and, more often, undergraduates. Their contributions are meaningful; indeed one senior administrator told us that "students are providing the operational power of OSPO, so students have been very important." Even so, the primary goal of hiring students is to provide experiential learning or mentorship. The students we spoke with were

[10] CURIOSS, accessed July 28, 2025, https://curioss.org/.

extremely positive about their experiences working at the OSPOs and valued the career skills they gained.

Some of the OSPOs point to their educational work as one of their most important successes. At Saint Louis University, OSPO staff teach for-credit courses in the computer science department.[11] In this innovative initiative, undergraduate students enrolled in the computer science capstone course work with graduate student project leads who are enrolled in a separate, graduate-level course on open source product development.
Both classes are taught by OSPO staff. The model has been successful enough that other OSPOs are exploring adopting it.

The integration of OSPOs into undergraduate and graduate education is the most visible change they are making as they shift from corporate to academic settings. Teaching is, of course, a core university function, and taking a role in instruction does align OSPOs with the broader mission of their institutions. However, the grafting of pedagogy onto the OSPO can also create tensions. Students are integral to university OSPOs—both as users and sources of labor—but training and mentoring students puts large demands on OSPO staff that can compete with other activities that might have larger and more durable institutional impacts. Student engagement has been a challenge at some institutions, but on the whole this is an area where OSPOs have experienced early successes.

Software development

For the most part, university OSPOs have been wary of committing significant resources to software development. At some institutions, this is a strategic decision: if the primary role of the OSPO is to connect people and resources, engaging in software development work is a distraction and poor use of limited resources. University OSPOs have avoided duplicating existing services, and at several universities, software developers are accessible through other units or via grant funding. However, not all institutions have existing development capacity, and more than one OSPO expressed concern that any OSPO staff involved in software development would be quickly overwhelmed.

Students, in their capacity as workers, interns, and learners, are an

[11] "Experiential Learning Programs," Open Source with SLU, Saint Louis University, accessed July 28, 2025, https://oss-slu.github.io/programs/experiential_learning.

exception to the hesitancy to commit resources to software development: at some campuses students do engage in coding work for the OSPO and its users. At least one OSPO provides funding for faculty to bring students into open source projects. Others are hiring students to work on code for projects the OSPO wants to develop or to patch and maintain extant software. Often, particularly in regards to undergraduate students, OSPOs engage students primarily as learners: their development work is a more or less formal experiential learning opportunity. Nevertheless, student contributions to the work of OSPOs can be significant. Some OSPOs are heavily invested in student workers: one individual estimated that half of the personnel costs of their OSPO were spent on student workers.

Challenges

Reaching researchers

University service providers of all kinds perennially struggle with outreach. The decentralization of universities fragments lines of communication and isolates resources. The core goal of most OSPOs is to connect and coordinate, but despite their successes, outreach remains a Sisyphean task.

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Researchers can be particularly difficult to reach: even the initial step of making them aware that the OSPO exists requires effort, luck, and persistence. This difficulty is compounded by the novelty of the office—few researchers are likely to be familiar with the term or be readily able to understand how it could be an asset to their work. An even greater challenge is that research cultures and incentive structures are poorly aligned with sustained interaction with open source software.[12] Researchers who have developed open source software have usually done so to further their personal work rather than for its own sake. They have little incentive or interest in investing time in the software beyond what is

[12] "Academic Open Source Workshop at CHAOSSCon Europe 2025," CURIOSS, February 27, 2025, https://curioss.org/news/2025-02-27-academic-open-source-workshop-chaosscon/.

necessary to support their research agendas.

One common challenge OSPOs face in their transition to academia is the complexity of incentive structures within a university. One individual, whose background was in the private sector, had learned that "academics are different than businesses." Corporations are motivated by profit, creating a common motivation to which employees and offices—including OSPOs—contribute.[13] They also have substantial capacity to control employee behaviors, whereas university researchers are often self-contained individual units, and their interest in open source is not necessarily working toward the same goal as others on campus.

As Sayeed Choudhury, director of the OSPO at Carnegie Mellon has remarked, the centrality of the private sector to the organization of open source software is also visible in the "canonical set of licenses managed by the Open Source Initiative." These licenses are a valuable and essential backbone to support open software, but they have been largely developed "by the private sector, for the private sector." As such, they may not always align with the diverse motives, needs, and priorities of researchers—who often see software as a means rather than an end. For this reason, Choudhury suggests that "if we are to build capacity for supporting open source software the academic community needs to examine these licenses with a balance between academic freedom, reproducibility, open scholarship and risk management."[14]

Researchers' most powerful incentives are promotion, tenure, and recognition by their peers, and the primary products of their work are publications.[15] In contrast, there are few incentives to foster deep

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[13] Nithya Ruff, "The Rise of the Open Source Program Offices (OSPO)," in *Open Source Law, Policy and Practice*, ed. Amanda Brock (Oxford University Press, 2022), https://doi.org/10.1093/oso/9780198862345.003.0019; Emily Omier et al., "The Business Value of the OSPO," *Linux Foundation*, March 2023, https://www.linuxfoundation.org/research/business-value-of-ospo; Hussan Munir and Carl-Erik Mols, "The Rise of Open Source Program Office," *IT Professional* 23, no. 1 (2021): 27–33, https://doi.org/10.1109/MITP.2020.3019961.

[14] Sayeed Choudhury, "Guide to Setting Up University Open Source Program Offices (OSPOs)," *Coalition for Networked Information*, December 2022, https://www.cni.org/topics/ci/guide-to-set-up-university-open-source-programs-office-ospo

[15] Carly Strasser et al., "Ten Simple Rules for Funding Scientific Open Source Software," *PLOS Computational Biology* 18, no. 11 (2022): e1010627, https://doi.org/10.1371/journal.pcbi.1010627; Rebecca Knowles et al., "We Need to Talk about the Lack of Investment in Digital Research Infrastructure," *Nature*

engagement with open source software and thus with an OSPO.[16] The problem with engaging faculty, said one interviewee, is that from their perspective, the question of whether "I spend time contributing to open source or do I just get this project out?" is essentially a rhetorical one.

This could be a source of frustration for OSPO staff, especially those with industry backgrounds. "Faculty are often the barriers," said one staff member, especially in the organizational and administrative work required for successful open source development. Speaking of their encounters with faculty, this person said "If you're creating a product—and you are!—What is that? How do you organize it? How do you maintain it? It doesn't belong in your ex-grad student's repository that you no longer talk to. You actually have to own this stuff and advance it, and that is apparently very unintuitive to them to think about." As a result of this faculty attitude, many open source projects just vanish. For open source to flourish in the academy, researchers will need to develop a shared sense of purpose and mission. As one interviewee remarked, "Open source requires a common mission. You have to all believe that the thing you're doing is important." At present, many researchers would likely not rank open source high on their list of priorities.

> "Open source requires a common mission. You have to all believe that the thing you're doing is important."

The contrast with the corporate sector throws these challenges into sharp relief, but the difficulty of changing academic incentive structures is familiar to observers of efforts to normalize other behaviors related to open science. OSPOs have tried to create their own incentives—primarily in

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Computational Science 1, no. 3 (2021): 169–71, https://doi.org/10.1038/s43588-021-00048-5; KerryAnn O'Meara, "Inside the Panopticon: Studying Academic Reward Systems," in *Higher Education: Handbook of Theory and Research: Volume 26*, ed. John C. Smart and Michael B. Paulsen (Springer Netherlands, 2011), https://doi.org/10.1007/978-94-007-0702-3_5; Danielle B. Rice et al., "Academic Criteria for Promotion and Tenure in Biomedical Sciences Faculties: Cross Sectional Analysis of International Sample of Universities," *BMJ* 369 (June 2020), https://doi.org/10.1136/bmj.m2081.

[16] Cory Merow et al., "Better Incentives Are Needed to Reward Academic Software Development," *Nature Ecology & Evolution* 7, no. 5 (2023): 626–27, https://doi.org/10.1038/s41559-023-02008-w; Eric A. Jensen and Daniel S. Katz, "From Code to Tenure: Valuing Research Software in Academia," *Commonplace*, ahead of print, December 12, 2023, https://doi.org/10.21428/6ffd8432.8f39775d.

the form of small grants or provision of student workers to support faculty research. However, changing researcher's practices will be a long-term project.

Scoping mission to capacity

The open source activities of a research university are vast. With limited capacity, OSPOs have to prioritize. To date, OSPOs have largely avoided significant entanglement with enterprise software and have instead focused on open source software in the domains of teaching, learning, and research. However, the gap between campus needs and OSPO resources requires them to make strategic decisions about where they can have the greatest impact. Moreover, OSPOs are service units, so strategic decision making is complicated by the need to support requests as they come in.

The connective function of OSPOs can help mitigate demands on their time and lower the risk of spreading their focus too thin, and the use of student workers helps extend their capacity. But this does not obviate the need for OSPOs to articulate clear priorities and funding options that work at their scale. We have observed progress in how the mission of the OSPO is defined during the course of this project. In our latest round of interviews, we heard "connecting faculty and students to open source opportunities," "promoting open source in research and teaching," "promoting the value of open source," and "enabling other people to be effective in terms of how they use and deploy open-source software," suggested as mission statements. It is less clear how the OSPOs will translate mission statements into priorities.

While there was consensus that the OSPOs' work with students provided important educational opportunities, a few schools are considering reallocating the staff time required to organize and support internships and other experiential learning opportunities into other activities. We uncovered some evidence that the actual or perceived allocation of significant resources towards students, especially undergraduates, risked branding the OSPOs as a student-oriented service in ways that would make it more difficult to engage with researchers.

Student labor is often the only option OSPOs have if they wish to provide coding to researchers working with or on open source software at any kind of scale. We heard positive comments about the quality of students' work, but opinions did vary. Undergraduate interns, said one OSPO director, did

not always have the technical expertise they needed to actually contribute as developers and required extensive support and mentorship, leading to project delays. Some OSPOs reported that graduate student workers were more likely to have the background to help projects progress, though their coding and project management skills were also uneven. Even graduate students who did have higher skill levels sometimes presented more challenges than undergraduates. "I've found in my experience working with grad students," said an OSPO staffer, that "the percentage of time they're supposed to give me is not respected by their faculty advisor, and their research goals supplant the things that I need them to do. So, I lose priority, and I lose execution." This individual preferred to work with undergraduates, who had more available time for work, and were unlikely to see OSPO projects as a distraction.

Sustainability

To date, none of the Sloan-funded OSPOs have closed shop once their grant funding ended and a couple have secured open-ended direct funding commitments from the university. This is a strong indication that the OSPOs are providing value to their institutions. Even so, most of the OSPOs are still working to identify funding sources that can sustain them over the long term.

The majority of the OSPOs are seeking opportunities to be written into research grants as a service provider, and several are already included in submitted proposals or proposals under development. The soft-money revenue pathway can also double as a form of outreach to researchers, for whom grant funding is a powerful incentive, while providing the revenue to continue funding internships and student workers. For OSPOs that are unlikely to secure internal funds, this is likely the most viable pathway to sustainability. However, it will likely leave them on perpetually shaky financial ground, and it remains difficult to secure capacity building and maintenance funding in a funding system oriented towards novelty and innovation.[17]

A particularly valuable grant opportunity that several OSPOs are exploring is the recent National Science Foundation's Pathways to Open Source

[17] Julian Nowogrodzki, "How to Support Open-Source Software and Stay Sane," *Nature* 571, no. 7763 (2019): 133–34, https://doi.org/10.1038/d41586-019-02046-0; Kate Hertweck, Carly Strasser, Dario Taraborelli, "Insights and Impact From Five Cycles of Essential Open Source Software for Science," *Chan Zuckerberg Initiative*, July 16, 2024, https://doi.org/10.5281/zenodo.11201216.

Ecosystems (POSE) program. Though more strictly research focused than the Sloan Foundation's OSPO grants, POSE shares an interest in building campus open source capacity and infrastructure. Thus far, POSE has survived federal funding cuts to the scientific enterprise, but whether it will weather future cuts remains unknowable.

Industry partnerships are another funding source that several OSPOs are pursuing. As OSPOs are imagining these partnerships, the key value proposition for potential partners is less often about intellectual property than it is about access to students who might one day be recruited as employees. This is another indication of how central students are to many of the OSPOs. Such partnerships have been slow to develop: we are unaware of any OSPO having secured corporate funding for their work. As we described earlier, OSPOs have thus far focused primarily on building internal relationships, so it is possible that business partnerships will come to fruition as they mature. However, cultural factors may also be a barrier. As one OSPO staff member remarked, "entrepreneurship and innovation and iteration" is not part of the "muscle memory" of university culture.

The early success of OSPOs surviving beyond their initial grant funding is encouraging, but their long-term future is still unclear. Having a champion in senior leadership with budgetary authority appears to be the most important factor affecting OSPOs' optimism about their future. Unfortunately, OSPOs that were not founded with strong buy-in from senior administrators have had mixed success in cultivating them after the fact. Attention and support from senior research officers, in particular, stands out as an area where several OSPOs reported difficulties. Continued progress in articulating the value proposition of the OSPOs in relation to larger institutional goals could help with this, but for many OSPOs this is still a work in progress.

Looking forward

Change is slow in academia and with goals as diffuse as those of the OSPOs, difficult to measure. However, there is a clear signal through the noise: though their long-term sustainability remains up in the air, the OSPOs are not folding en masse as their initial grant funding ends. Few,

however, have a clear pathway to sustainable long-term funding. The uncertainty of federal support for higher education generally, and research funding in particular, will make that pathway even more uncertain, and it seems unlikely that institutions will invest internal resources in creating new OSPOs under the present conditions.

At public universities, one workaround could be to establish OSPOs at the system level, something Sloan is experimenting with by supporting the creation of an OSPO within the University of California and University of Texas Systems. System OSPOs have their own unique challenges, among them their distance from campus communities, which will make cultural change and community building even more difficult to achieve. Yet, the open source ecosystem is well adapted to dispersed communities. To date, university OSPOs have generally focused inward, deploying their modest resources towards open source activities at their institution. As we noted, there are good reasons for doing so. One potential advantage of a system-level OSPO is that it might better approximate the dispersed and decentralized nature of the larger open source community than those focused primarily on fostering communities internal to a single institution. In this respect, system or consortial OSPOs may indicate the next step in the adaptation of OSPOs to academic contexts.

Appendix A: Universities with OSPOs supported by the Alfred P. Sloan Foundation

Carnegie Mellon University
George Washington University
Georgia Institute of Technology
Johns Hopkins University
Rochester Institute of Technology
St. Louis University
Stanford University
Syracuse University
University of California, Santa Cruz
University of Texas, Austin
University of Vermont
University of Wisconsin, Madison