mozilla
Science Lab

Mozilla Science Lab
End of Year Report to Sloan Foundation
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The Mozilla Science Lab empowers the scientific community--researchers, coders, funders, and others -- to make research more efficient and reliable by promoting accessibility, openness, and interoperability. Mozilla works to integrate these attributes of the Open Web into scientific practice by increasing access to knowledge, building and enhancing tools to help speed and replicate discovery, and providing educational programs that equip researchers with the skills needed to do open, reproducible science.

In the past year, we have trained thousands of practitioners, shipped working prototypes, and launched a series of events and online platforms to foster community engagement. In addition to direct service to our stakeholders, this first phase of our work enabled us to learn more about what our community needs, how we can best address those gaps, and how we can develop scalable learning pathways for researchers. In particular we have worked with open educational projects like Software Carpentry to train researchers in skills needed to do more efficient research and empower them to build on that knowledge, innovate, and teach. Through that work, we have learned firsthand the need for skills training and mentorship in research if we are going to shift practice. We have also seen the challenges in scaling and making sustainable volunteer efforts, as well as assessing their long-term impact.

The following details our activities of the first phase of our collaboration with the Sloan Foundation, specifically our efforts to connect with the community, build capacity, develop prototypes, work for the Science Lab's sustainability, and a brief update on the Lab's staffing and evolution.

Connecting with the Community
We provide members of the research community with the supports needed to advance open science practice in their communities. In the past year we've built out additional programmatic and technical supports to facilitate this, from advances to our website to running our first global sprint. In 2015, we'll continue this work and explore in earnest models for incentivizing and engaging researchers worldwide to join us in furthering open science.

- **Global Sprint:** This past July, we hosted our first global Mozilla Science Lab sprint. More than 22 cities participated in the sprint (18 official sites with a number of other individuals joining us virtually) for 52-consecutive hours of collaboration on tools, lesson materials, and resources for open science. It was a fantastic way of uniting the open research community around the world to collaborate on projects that further science on the web, and a model we will continue to employ and expand. The outputs from the sprint included
- **New lesson materia**l around data training, from Data Carpentry materials (a spinoff of Software Carpentry) to other capstone lessons for bioinformatics, medical imaging, data visualization and an introduction to Excel.
- **Tools for better teaching**, including IPython Notebook libraries, a package manager for lesson material, and a web-based tool for peer instruction.
- **Tools and technologies for open science** was our largest group, with projects around text mining, 3D printing, open notebook science, the Open Access Button and Astropy.
- A full list of projects can be found here: https://etherpad.mozilla.org/sciencelab-2014summersprint-sites

- **MozFest**: For this year's "science and the web" track at MozFest, we built on the momentum from our July global sprint and constructed the track to include trainings as well as a series of hands-on projects. The track included more than 30 sessions led by more than 65 community members for more than 300 participants. Community members from the IPython Notebook community, GitHub, the School of Data and ROpenSci, as well as sprint projects led by the Met Office, Knight-Mozilla Open News fellows, the New York Public Library and Zooniverse led trainings. For a full list of sessions and a look at the people leading them, visit: http://mozillascience.org/mozscience-at-mozfest/
- **Community Call:** We continue to run monthly public calls around open science, featuring compelling projects, tools, and community members. In 2014, we totaled more than 420 participants, including 230 individuals new to the Software Carpentry and Open Science community.
- **Collaborate:** This past September, we launched a new section of our website called *Collaborate*, building off a project formerly known as *Interdisciplinary Programming*, led by our community manager, Bill Mills. *Collaborate* is a curated list of open source software projects advancing science on the web from both the Science Lab and the broader community. The page integrates GitHub repositories directly into our site and features 20 projects in its first iteration. This pilot will test communication and facilitation strategies to engage researchers in a wide variety of projects (including our own) outside of their primary domain. We are exploring how we can break down silos by conducting diverse open research projects with our community. We will continue to integrate elements of GitHub into Science Lab website in the new year. http://collaborate.mozillascience.org/
- **Forum**: We also recently launched a forum for the Science Lab community, run through Discourse. (http://forum.mozillascience.org/) Since its launch this fall, more than100 active users through 230 posts have participated. In 2015, we will continue to develop and expand this discussion channel as a component of our broader engagement strategy.

Building Capacity for Open Research Practice

Both as a philosophy and as a strategy, the Science Lab meets its respective communities where they are in terms of skills and levels of awareness. Our greatest successes come when we work with community to support and amplify their work. Through our collaboration with Software Carpentry, we understand more about the gaps in training in research settings globally and how Mozilla can address those gaps.

- **Software Carpentry:**
- Since December 2013, we have offered more than 137 workshops, in North America, Europe, Australia, the Middle East, and Africa.
- We have taught more than 4900 researchers and librarians globally.
- Currently, our community includes 251 volunteer instructors, with 200 badged in the past year alone.
- We piloted the first in-person instructor training this past April in Toronto, and have been iterating on the curriculum as well as training additional community members (including the Lab's Bill Mills) to teach as well. Since April, we have offered instructor training at

the University of Virgina, the Genome Assembly Analysis Centre in the UK, the University of Washington, with two more scheduled for early 2015.

- Between in person and online instructor training, we have taught more than 420 participants.
- **Establishing the Software Carpentry Foundation:** Working with several institutional partners and lead instructors, as of October 2014, the Software Carpentry project now resides under an independent foundation. We continue to work closely with other institutional partners and community leads to help give the project's global contributor base more direct involvement with its governance. Mozilla, as well as other partners such as the Software Sustainability Institute and the Lawrence Berkeley National Laboratory, sit on the board. Greg Wilson, formerly of the Science Lab, is serving as the Foundation's first Executive Director. Mozilla remains committed to supporting the project, and will serve not only on the steering committee, but also continue to coordinate Software Carpentry's bootcamps and train-the-trainers programs to support the research community. We see this as a healthy step and successful incubation as we work towards our mission to spread open research practice.

Building Prototypes for Web-based Science Tools

The Science Lab partners with community members and organizations to build technical prototypes that advance science on the web. We place particular priority on finding and developing solutions that make existing tools and technology work together, rather than by starting from scratch. This leverages investments previously made into the technology and speeds adoption through extant communities of practice.

- **Code as a Research Object**: This collaboration with GitHub, figshare, and Zenodo explores technical solutions to create a bridge between the code hosting services (GitHub) and open data repositories (figshare, Zenodo). Alongside the technical prototype, we have also engaged with the community to discuss "best practice" for code reproducibility, including using common metadata standards for repositories, integrating it into their workflow, and working with their diverse stakeholders. In 2015, we will continue work on a JSON-LD specification to enable discoverability across repositories, expand our discussions with the NIH's Big Data to Knowledge Program around software citation, and explore tie-ins with university libraries. More on the project here: http://mozillascience.org/code-as-as-research-object-new-phase/
- **Open Access Button**: Early in 2014, we began work to extend the Open Access Button to help researchers locate publicly available copies of pay-walled literature by linking institutional repositories, pre-print archives, and Open Access publishers. It also is a mechanism to educate authors about Open Access and self-archiving to promote the sharing of critical information. The Open Access Button team has folded code crafted by Mozillian into their redesign, moving them from an advocacy tool to a discoverability mechanism. http://mozillascience.org/open-access-button-project-updates-prototypes-next-steps/
- **Contributorship Badges for Science:** Our next prototyping effort explored the use of digital badges for crediting contributors to scholarly papers for their work. As the research environment becomes more digital, we want to test how we can use this medium to help bring transparency and credit for individuals in the publication process. This work is a collaboration with publishers BioMed Central and the Public Library of Science; the

biomedical research foundation, The Wellcome Trust; the software and technology firm Digital Science; and the registry of unique researcher identifiers, ORCID. You can read more about that project here: http://mozillascience.org/contributorship-badges-a-new-project/

- **Website redesign:** We are also redesigning our site to improve its use and functionality with particular focus on helping new learners from our education programs increase their open science practice and engagement in our work. We are designing it as a hub for community materials, programs, and tools including integrating GitHub, the *Collaborate* platform, a version-control based blogging system, and other social functionality. Our lead developer, Abigail Cabunoc, is leading the efforts for the page that will go live in Q1 of 2015.

Funding

- **Sloan Foundation (Renewal):** This past March we secured a renewal from the Sloan Foundation to help us build capacity internally and hire a community manager (Bill Mills) and lead developer (Abigail Cabunoc). They joined the team in August of 2014, and Arliss Collins, formerly a contract administrative aid with Software Carpentry, joined as a part-time employee to support training and event coordination (including, but not limited to Software Carpentry).
- **Helmsley Charitable Trust:** We have just been awarded a two-year $1.76 million grant from the Helmsley Charitable Trust to build our educational offering at the Science Lab. The funding will support a dedicated data training lead, a train-the-trainer program lead, curriculum designer, part core support and a two-year fellowship program for early career researchers to serve as lead open science trainers.

Sustainability and Evolution

- **Lessons learned and looking forward:** Working with Software Carpentry as the leading educational program of the Science Lab gave us critical insight into a community of instructors as well as the challenges to building scalable, executable training programs based off of volunteers and computing curriculum. In 2015, with support from the Helmsley Charitable Trust, we will explore ways of increasing incentives for trainers at a university level through a new fellowship program, build a train-the-trainers program that engages researchers earlier along in their journey to become practitioners, and enhance our support and curriculum for data management and knowledge sharing. This will enable us to support Software Carpentry and their community as well as focus on efforts that will help learners more broadly and engage them longer term.
- Staff additions: Bill Mills joined us in mid-August as the Science Lab's first community manager. Abigail Cabunoc joined at the same time as our first lead developer, responsible for leading our technical work.
- Staff transitions: Greg Wilson moved from Mozilla to the Software Carpentry Foundation in October 2014, where he serves as the Executive Director. Arliss Collins has transitioned from a contractor for Software Carpentry coordination to a part-time, benefitted employee of the Mozilla Foundation, where she serves as the Science Lab's training coordinator.

Media Coverage:

- Reviewing software and code: an update | PLOS Blogs: http://blogs.plos.org/biologue/2014/01/31/reviewing-software-code-update/
- Mozilla Science Lab, GitHub and Figshare team up to fix the citation of code in academia | The Next Web: http://thenextweb.com/dd/2014/03/17/mozilla-science-lab-github-figshare-team-fix-citation-code-academia/
- GitHub rolls out the red carpet for scientists | InfoWorld: http://www.infoworld.com/article/2608259/development-tools/github-rolls-out-the-red-carpet-for-scientists.html
- 'Boot camps' teach scientists computing skills | Nature: http://www.nature.com/news/boot-camps-teach-scientists-computing-skills-1.15799
- Tackling complexity and scale at eResearch NZ 2014 | International Science Grid: http://www.isgtw.org/feature/tackling-complexity-and-scale-eresearch-nz-2014
- Radio New Zealand: http://www.radionz.co.nz/national/programmes/ninetonoon/audio/2602420/kaitlin-thaney-director-of-the-mozilla-science-lab
- Digital Literacy Is the Key to the Future, But We Still Don't Know What It Means | WIRED: http://www.wired.com/2014/09/digital-literacy-key-future-still-dont-know-means/
- Why we need badges in science | BioMed Central blog: http://blogs.biomedcentral.com/bmcblog/2014/10/07/why-we-need-badges-in-science/
- Could digital badges clarify the roles of co-authors? | Science : http://news.sciencemag.org/scientific-community/2014/11/could-digital-badges-clarify-roles-co-authors