

Science Commons: Making the Web Work for Science

Why We're Here

Web technology has brought tremendous efficiency gains for commerce, yet in the world of scientific research, we are failing to leverage its most basic capabilities. As a result, scientists waste time and resources following blind alleys and duplicating research -- vastly reducing the chances that their efforts will yield solutions to the urgent scientific problems we face.

What We Do

Science Commons develops free solutions for faster, more efficient web-enabled scientific research. We are building a toolkit of policy, contracts, and technology to make discovery easier by design.

Our method is to target three key areas where barriers to research are most common: in accessing literature, obtaining materials, and making use of online data. Our mission is to create an open science culture that accelerates the "research cycle" -- the continuous production and reuse of knowledge that is at the heart of scientific method.

Science Commons is working toward a future where web technologies make scientific research exponentially more fruitful. Existing approaches are not creating the radical acceleration of scientific achievement made possible by the advances in technology. Most scientific literature and data remain locked behind walls of cost, copyright, contract, and obscurity. Biological research materials are hard to find and harder to access. The Web doesn't yet provide sufficient support for modern, networked scientific research. Current initiatives that accelerate only one piece of the research cycle are making real, but painfully slow, progress.

Science Commons represents a new approach -- one with the potential to create this radical acceleration. We identify barriers to research, craft policy and contracts to lower these barriers, and develop web technology that both implements the contracts and makes the research data and materials easy to find and use. Acting as an independent facilitator, we reach out to stakeholders from every part of the scientific ecosystem.

We bring to our work significant, unique expertise and experience in negotiating standard-form agreements among disparate communities, merging legal and technical solutions, and developing technologies to unlock the value of information.

Science Commons is currently pursuing three interconnected initiatives, implementing them in a unified form within the field of neuroscience. We are testing the hypothesis that the solution to one problem represents inputs to the next, and that a holistic approach can help us substantially reduce friction in the research cycle and make effective use of the Web to transform scientific research.

Our Work

The Science Commons approach is based on the core understanding that the most significant barriers to research are not only legal and technical, but also cultural and economic. Our proposals for knowledge-sharing are designed to be adaptable, flexible, and fully compatible with commercial innovation. They are crafted to offer benefits to diverse stakeholders -- a challenge that demands both interdisciplinary and practical investigation.

A Focused Approach

Through the relationships we've built with universities, institutions, and scientists from multiple disciplines, we determined that the maximum benefits of the Science Commons approach could best be realized if we started by focusing on one area of science, expanding our scope as we lay the necessary groundwork in all disciplines. The Science Commons approach requires the creation of a microcosm of the scientific ecosystem: funders of research, scientists, institutions, professional associations, technologists, lawyers, technology transfer officers, publishers, and more. When each group of stakeholders is represented and implements elements of the approach, we can begin to realize the true opportunities afforded by the network.

After careful consideration, we chose to begin with neuroscience. It is an area where the slowdown in research has dramatic and tragic consequences, and an area where our work can have enormous impact. It is also an area where Science Commons has gained the participation of key stakeholders: private research funders in Huntington's Disease and other neurodegenerative disorders, prominent research scientists from US National Institutes of Health-funded projects, leaders from the Society for Neuroscience, the World Wide Web Consortium, Millennium Pharmaceuticals, the iBridge Network of technology transfer, and "open access" publishers BioMed Central, Hindawi, and PLoS One.

Science Commons is currently implementing work in scholarly publishing, biological materials transfer, and novel technical approaches for data sharing based on "Semantic Web" and "Web 2.0" design principles. This includes:

- * Promoting the use of flexible "Creative Commons" licenses in scientific publishing (350+ peer-reviewed journals have adopted these licenses)
- * Providing a free tool to make it easy for scientists to retain author's rights and "mark" the research for reuse (MIT, Carnegie Mellon University, and SPARC have implemented this technology)
- * Developing and releasing a legal protocol to enable the integration of scientific databases (Uniprot has implemented this protocol)
- * Offering free standardized materials transfer agreements (MTAs) to give scientists "one-click" access to physical materials (iBridge Network and Addgene.org offer these agreements)
- * Creating an open source data-integration platform for the life sciences, which gives researchers easy access to "open" content (the platform will soon include award-winning gene-analytic software from Millennium Pharmaceuticals)

The beneficiaries of this first set of tools -- our customers -- are laboratory scientists and the foundations that fund research. We will be closely monitoring the impact of our approach on the overall efficiency of research in neuroscience and in particular the increased impact of funds invested in research. We expect to expand our scope into neglected diseases (WHO priority disease and "orphan" disease) as our funding levels increase. We have begun to engage with the technical experts negotiating the next phase of the Convention on Biological Diversity as a prelude to this expansion.

Global Impact

Science Commons is also pursuing a simultaneous strategy of engagement at the global policy level. We can achieve change disease by disease with our approach, generating empirical evidence of the benefits of an open approach to science, but no comprehensive effort would be complete without engaging in policy discussions with world governments and science unions.

We are collaborating with the Committee on Data and Technology for Science and Technology (CODATA), an interdisciplinary Scientific Committee of the International Council for Science (ICSU), to build the Global Information Commons for Science Initiative (GICSI). GICSI is a multi-stakeholder initiative arising from the second phase of the World Summit on the Information Society in Tunis in November 2005.

Our other partners in the GICSI include the International Council for Scientific and Technical Information (ICSTI), the International Network for the Availability of Scientific Publications (INASP), World Data Centers (WDC), the International Council for Science (ICSU), the InterAcademy Panel on International Issues (IAP), the Academies of Science in Developing Countries (TWAS), the Organization for Economic Co-operation and Development (OECD), and the United Nations Economic, Scientific, and Cultural Organization (UNESCO).

Science Commons is continuing this work through a series of conferences on building a global cyberinfrastructure for science. We held the first Information Commons for Science conference in October 2006 at the National Academies in Washington, DC, with broad representation across the sciences, economics, and scientific research arms of the US government. Our next step was the Designing Cyberinfrastructure conference in late January 2007, also held at the National Academies, and cosponsored by the National Science Foundation, the Council on Competitiveness, the Committee for Economic Development, and the University of Michigan.

We are also working with CODATA and the Global Biodiversity Information Facility (GBIF) on a protocol for database licensing that establishes the key elements of "open access" data sharing. As part of the release strategy, we are reaching out to members of the existing community to achieve harmonization on the licenses and definitions, and have agreement with the Open Knowledge Foundation and the Talis Developer Network.

Our Results to Date

Science Commons is having a measurable impact. Users of our copyright tools include the Public Library of Science, BioMed Central, Hindawi, Nature Publishing Group, Springer, MIT, and Carnegie Mellon University, with more than 350 peer-reviewed journals now participating. The world's largest database of public information on protein biology, Uniprot, uses our protocol for sharing data. We've forged partnerships for data licensing with the Open Knowledge Foundation and the Talis Developer Network -- ensuring the "freedom to integrate" scientific databases. Several of the world's leading pharmaceutical companies are installing our web technologies so they can easily make use of "open" content. And through our work with the iBridge Network and Addgene.org, scientists have "one-click" access to more than 5,000 DNA-based research materials using our standardized, computer-readable contracts.

Science Commons is connecting with diverse stakeholders through debates and discussions on accelerating the progress of science worldwide. Our data policy work has played a key role in the creation of the Global Information Commons for Science Initiative (GICSI), and we continue to build consensus behind open knowledge-sharing solutions through our participation in the Information Society, the Convention on Biological Diversity, and bilateral and multilateral negotiations for pharmaceutical data sharing.