



Cornell University  
Library

## **arXiv @ 20: Collaboration Agenda for Research and Innovation** **October 2011**

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In celebration of the arXiv's 20<sup>th</sup> anniversary, on September 23, 2011 Cornell University Library (CUL) hosted a meeting at Cornell with the representatives from several publishers and societies that are interested in Cornell's sustainability planning efforts. Also invited to the meeting were three faculty members from Cornell, representing the needs of the scientific community, the key impetus behind the discussion. The goal of the forum was to discuss the feasibility and desirability of establishing a research and innovation collaboration in support of arXiv. This effort is envisioned to entail a separate funding stream from the operational budget, which includes resources for the routine and core services currently provided by the arXiv team (including essential updates). This report provides a synopsis of the discussion and recommends next steps for continuing this dialogue. The meeting participants are motivated to strengthen communication and collaboration to ensure that arXiv continues to evolve to meet the needs of the global scientific community. Appendix A includes the meeting agenda and Appendix B includes a list of participants.

### **arXiv @20: Sustainability Initiative**

Founded by Paul Ginsparg in August 1991, arXiv.org is internationally acknowledged as a pioneering and successful digital archive and open-access distribution service for research articles. The e-print repository has transformed the scholarly communication infrastructure of multiple fields of physics and plays an increasingly prominent role in a unified set of global resources for physics, mathematics, computer science, and related disciplines. arXiv currently holds over 700,000 e-prints and is visited by 400,000 distinct users per week. Since 2001, the service has been operated by Cornell University Library. Ginsparg has turned arXiv fully over to the Library, although he will continue to serve on the scientific advisory board, which provides advice and guidance to CUL about arXiv, especially regarding moderation policies and procedures.

CUL seeks to ensure the sustainability of the arXiv e-print repository by transitioning the service from an exclusive initiative of CUL to a collaboratively governed and community-supported resource. To that end, in January 2010 CUL launched an interim institutional support model, a voluntary and collaborative business model to engage institutions that benefit most from its services. The arXiv team is in the process of developing a long-term governance and sustainability plan. Stewardship of open access academic resources such as arXiv involves not

only covering the operational costs, but also continuing to enhance their value based on the needs of the user community and the evolving patterns and modes of scholarly communication. The sustainability initiative aims to create a business plan to secure funds and resources in order to enhance arXiv's value based on the needs of the user community. This goal includes assessing and improving the arXiv infrastructure, including IT architecture, staffing, user support, managerial and advisory roles, and communication.

In addition to creating a stable and robust operational base, CUL is committed to advancing arXiv as an innovative, user-centered, and embedded online academic resource. arXiv's baseline operating budget does not include expenses for research and innovation. Although there is a blurry line between maintenance and development, it is useful to separate these two categories in order to identify operational expenses in support of core service. One of the purposes of the meeting was to articulate a common agenda that will bring scientists, arXiv staff, publishers, and societies together in creating a funding pool to support the investigation and execution of research ideas that will advance arXiv.

Information about the arXiv sustainability initiative is available at <http://arxiv.org/help/support>

## **Collaboration Agenda**

After an introduction to the arXiv sustainability initiative, each participating publisher and society representative took turns in presenting their ideas in regard to potential research and development areas followed by a group discussion. The examples discussed during the meeting illustrated the challenges associated with separating operational streamlining issues, which are critical for arXiv, from a research and development domain. Because the ultimate goal of the meeting was to explore a common research and development agenda, the following section summarizes the outcomes of the meeting without associating the discussion with any particular meeting participant.

### **1. Cross Linking & Persistent Identifiers**

Providing robust and reliable links among different versions of research papers (published, pre-print, post-print, revised, etc.) was at the center of the discussion. The participants agreed that it was important to view publishing as a rich process with diverse stages of research and communication needs. Scholars continue to rely on various versions of works in support of different purposes. For instance, pre-print has an important role in timely circulation of ideas whereas a peer reviewed published article continues to be essential in promotion and tenure reviews in several disciplines.

Crosslinking between arXiv and published versions of the papers will allow scholarly record to be reliably documented. The linking needs to be perceived as a bi-directional aspiration – both from arXiv to the final version and from a published article to alternative versions including preprint. Also important is linking supplementary materials that accompany papers, whether they are on the publisher website or residing on arXiv.

One challenge to consistency is variation across disciplines and publishers. For instance, currently astronomy and condensed matter articles include final author versions in arXiv (except for conference proceedings). Another example is the Institute of Mathematical Statistics, which after asking authors' permission, provides post-prints on arXiv without further author intervention (even when the preprint version was not submitted on arXiv).

#### **ACTION AGENDA FOR CONSIDERATION:**

- Agree on a strategy to further explore the cross linking & persistent identifiers issues from the perspectives of scientists, arXiv, and publishers/societies (e.g., sponsor a study, convene a working group, etc.).
- arXiv team needs to maintain a page with API information in order to allow application developers' access to all of the arXiv data, search and linking facilities with an easy-to-use programmatic interface. Currently, there is no single page that documents all APIs and data feeds. This page will be in place by April 2012.

## **2. Lifecycle of Research Materials & Version Control**

arXiv documents the lifecycle of the research process through series of article versions, not all but many of which are published in peer-reviewed journals at some point in their cycle. arXiv captures the evolution of a research article by recording and presenting a date-stamped sequence of different versions, each with a persistent identifier. However, not all published articles are subsequently deposited in the repository. How can we accurately identify the arXiv version that is most closely related to the published version, or track double journal references? A related issue is the persistency of IDs assigned to works. Expanding on the CrossRef service, one of the common goals for the meeting participants is to foster standards, technologies, and policies that would allow a greater level of linking to represent the lifecycle of research materials.

arXiv provides both journal reference and DOI (Digital Object Identifier) fields to record the relationship to versions of the article published in a journal. The majority of this data is received from INSPIRE and ADS via automatic feeds, but this does not provide consistent coverage for mathematics and other subjects. Authors who wish to indicate that an article is

published in a journal may also update the fields themselves using the comment field and this is an important source of data, especially in fields not covered by INSPIRE and ADS. It is in the authors' and publishers' best interest to close the loop by connecting various versions of a work (published and pre-print).

As we consider strategies to address version control and linking issues, we need to factor in the disciplinary differences, rewards, and incentives. For instance in math, each article is considered a building block whereas in other field there is less effort taken to correct errors or update article. In certain field such as biomedicine, it is important to indicate the final published version due to liability issues.

Published materials are not always fixed in content and form and they may go through changes. They can be corrected, enhanced, or retracted. Supplementary information may accompany e-prints in arXiv or published versions but not always both. How do we systematically record and disseminate such information? CrossMark promotes the use of the version of record copy of published content as certified by the publisher and notifies readers of changes to content in a consistent way, regardless of who publishes it or where on the web it is stored.

#### **ACTION AGENDA FOR CONSIDERATION:**

- Version control is a complex challenge with a broad scope and is of interest to the scholarly publishing community in general. Some of the discussion threads within this topic, such as CrossMark, are ambitious aspirations that require standards groups' engagement. The arXiv team believes that arXiv's current simple system of versioning meets the needs of majority of users within arXiv. The team will discuss this issue with the arXiv Scientific Advisory Board and consider the virtues of augmenting the description versions with a restricted vocabulary of "status" (e.g. preprint, postprint, etc.).

### **3. Supplementary Material Support**

There is an increasing interest in enabling the deposit of supplementary materials such as images and data sets at the point of depositing a paper. We need to work toward creating an operational system that fully supports and enables interactions among different information objects. This service area is evolving and has technical, archival, and service implications for both publishers/societies and arXiv. Supplementary materials and data can accompany both arXiv preprints and published articles, coordination is desirable to prevent gaps and inconsistencies between versions.

#### **ACTION AGENDA FOR CONSIDERATION:**

- This is yet another dynamic and contemporary front. One of the short-term goals in the arXiv team's list is to look into the need for identifiers for supplementary materials to support data citation (such as the DataCite initiative: <http://datacite.org>).
- There was not sufficient time during this meeting to discuss the plans of the participating publishers and societies in regard to supporting supplementary data. Is there a role for arXiv in filling that gap with support from publishers and societies?

#### **4. Author Authentication and Verification**

Name ambiguity and attribution are critical problems both for pre-print archives and publishers. The ORCID Initiative (<http://orcid.org>) represents a community effort to establish an open, independent registry that is adopted and embraced as the industry's de facto standard. The goal is to resolve the systemic name ambiguity by assigning unique identifiers linkable to an individual's research output.

#### **ACTION AGENDA FOR CONSIDERATION:**

- Simeon Warner represents CUL in the ORCID initiative as a member of the Board of Directors and the Business Working Group. The deployment of the Invenio system (to be completed in early 2013) will allow CUL to improve arXiv author and affiliation metadata in support of author disambiguation and linking.

#### **5. Statistics**

Several publishers/societies expressed interest in having a system in place to share aggregate arXiv usage data that can complement COUNTER statistics.<sup>1</sup> arXiv does not release article level download data. The national and institutional research output assessment initiatives that quantify productivity are of concern for many scientists. All the parties at this meeting agreed that we need to interpret usage statistics responsibly. One of the possible scenarios is using techniques such as text mining and information visualization to understand the trends and field growth patterns without revealing information that can be used for quantifying and tracking the productivity of individual scientists or institutions. There was a perceived need among the group to promote the physical sciences, versus other areas of scientific research with higher levels of usage and faster publication cycles such as the life sciences.

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<sup>1</sup> COUNTER (Counting Online Usage of Networked Electronic Resources) is an international initiative serving librarians, publishers and intermediaries by setting standards that facilitate the recording and reporting of online usage statistics in a consistent, credible and compatible way (<http://www.projectcounter.org>).

#### **ACTION AGENDA FOR CONSIDERATION:**

- The idea of exploring visualization or other ‘distance reading’ techniques is indeed intriguing and may be of interest to a graduate student or a post-doc as a research topic.

### **6. Automated Metadata Exchange**

Several participants expressed the desire to streamline the submission process by increasing metadata exchange, including for any associated supplementary materials and erratum. Automated metadata exchange is already happening between arXiv and several publishers and societies. A related issue is sharing taxonomies for the benefit of the research community.

#### **ACTION AGENDA FOR CONSIDERATION:**

- arXiv has a system in place for sharing metadata and we welcome any suggestions to improve our services. The simplest and most complete interface to arXiv metadata, updated daily with newly announced articles, is the OAI-PMH feed documented at <http://arxiv.org/help/oa>.

### **7. Streamlining Submission Process**

Peer review process is getting increasingly trickier both in means of identifying potential reviewers and also relying on their timely and expert input. How can we work together to help with the over-stressed peer review system? For instance, trackbacks are useful for reviewers. APS mentioned that one of the ideas they have considered was for papers to be nominated for journal publishing by reviewing arXiv pre-print submissions.

#### **ACTION AGENDA FOR CONSIDERATION:**

- This is an exploration domain that we’ll keep in our list – but an ambitious one that will require quite a bit of work and re-envisioning.

### **8. Building a Trusted Partnership**

The meeting participants expressed interest in enhancing communication and maintaining a reliable channel for consistent information sharing. arXiv needs to maintain its status as a neutral place – for scientists, by scientists. There was consensus that this core value does not conflict with forming a close collaboration with publishers and societies. The commonality among all the participants is their interest in understanding and meeting the needs of the scientific community. The meeting concluded with the participants expressing interest in establishing a partnership with an associated budget and moving our agenda into practice by

taking on projects such as addressing the cross-linking challenge. It was also noted that arXiv's research and innovation agenda needs to rely on various financial sources, including grant funding and collaborations with international partners.

**ACTION AGENDA FOR CONSIDERATION:**

- By November 1, 2011, please express your interest in continuing this dialogue and confirm your organization's key lead. Also, comment on the potential collaboration topics summarized in this document to help us set priorities so that our future exchanges will be more focused. We welcome corrections and additions to this summary.
- Cornell expects to release an interim governance structure for arXiv in April 2012. The outcomes will create an infrastructure to continue and systematize arXiv's collaboration with a range of partners including publishers and societies. The arXiv team will schedule an update meeting for January 2012 to discuss the status of the governance planning work and to develop recommendations for concrete next steps.
- This meeting brought together the publishers and societies that contacted Cornell expressing interest in contributing to the sustainability initiative. Cornell will make an effort to bring in other significant international publisher/society partners to this discussion, at least to keep them informed of this dialogue.

Oya Y. Rieger, October 17, 2011

## Appendix A: Meeting Agenda

### arXiv's 20th Anniversary Celebration September 23, 2011

- 9:30am-1:00pm: **Meeting with Publisher/Society Representatives**  
*Physical Sciences Building, Room 301*
  - 9:30am - Welcome and introductions
  - 9:45am - "arXiv at 20"  
Update on the sustainability initiative  
Brief history of arXiv collaborations with publishers and societies
  - 10:15am - Publisher/Society perspectives on arXiv  
5-minute perspectives from each group in regard to potential research and development areas (such a links to underlying research data or multimedia content, innovative connections between arXiv and submitted/published articles, archiving for long-term retention, etc.)  
  
[includes a coffee break]
  - 11:30am-1:00pm - Review of emerging collaboration ideas and discussion of next steps  
  
[lunch available noon-2pm]
  
- 3:30pm-4:30pm: **Paul Ginsparg, "arXiv at 20: The Price for Success"**  
*Physical Sciences Building, Room 120*
  
- 4:30pm-6:00pm: **Reception**  
*Physical Sciences Building, Baker Portico Atrium*



## Appendix B: Meeting Participants

Matteo Cavalleri  
Associate Editor  
Wiley-Blackwell

David Clark  
Senior Vice President  
Elsevier

Mark Doyle  
Assistant Director, Journal Information Systems  
American Physical Society

Edward Dunne  
Senior Editor, Book Program  
American Mathematical Society

Günther Eichhorn  
Director, Abstracting and Indexing  
Springer

Lucia Muñoz Franco  
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Elsevier

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