COMPUTER SOFTWARE REVIEWS

SERVERS

The Chemistry Preprint Server: An Experiment in Scientific Communication

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The Chemistry Preprint Server. The Chemistry Preprint Server (CPS)[1] is a major new initiative in scientific communication for the chemistry community. It is a freely available and permanent web archive and distribution medium for preprints in the field of chemistry—a preprint being defined as a research article which has been made publicly available prior to publication in a peer-reviewed journal. The form of the preprint may range from an initial draft to a complete article which has been submitted for publication. The CPS is the first preprint server to cover the entire field of chemistry. It was modeled on the very successful arXiv preprint server[2] for mathematics and high energy physics, hosted until recently by the Los Alamos National Laboratory. The arXiv server will soon move to Cornell University in New York State, U.S.A.[3]

Background. In the field of chemistry, the duration of the peer-review process can be lengthy—often extending to 1 year or more. Authors have shown a desire to speed up publication of their research with some communities exchanging preprints of research articles before formally publishing the work.[4] The CPS was launched as an experimental service in the belief that preprint servers have many advantages for researchers in the chemistry community.[5,6] Articles may be posted to the CPS at any stage during the research process. As the research progresses, the original version of the article may be revised any number of times. A comprehensive review on preprints and preprint servers has been written in *Searcher* magazine.[7]

Other advantages of preprint servers include the following: rapid dissemination of information via the Internet; articles are stored in electronic format improving future archiving of scientific data; articles are accepted very quickly encouraging faster communication of information between science and industry; multimedia and other supporting files may be uploaded alongside the main article; all articles submitted to the CPS immediately create a discussion group where users may review the article online.

Concerns regarding the introduction of chemistry preprint servers include those of poor-quality research without any formal peer-review before acceptance.[8,9] In other words, "How do you extract the signal from the noise?" This question has long been debated—often by those with a vested interest and rarely by chemists themselves. But, perhaps the biggest concern is that of the prior-publication policies of publishers. There is confusion over which publishers will accept preprinted articles for publication. Elsevier Science, the Royal Society of Chemistry, Nature, and many physics publishers will accept them—however, the American Chemical Society will not.[10]

It is important to note that this problem arises from the policy as stipulated by an individual publisher and not from a legal perspective. To submit an article to the CPS, the author must retain copyright to the article. In most cases this copyright is transferred to the publisher upon publication of the article. Typically, a paper that had been published previously would therefore not be accepted to the CPS. Furthermore, every article that is uploaded to the CPS is given a unique citation reference and time stamp.[11]

Provision of the CPS. In August 2000 ChemWeb.com launched the CPS as an experiment in scientific communication for the worldwide chemistry community.[12] Its success will be determined by its acceptance within the scientific community. From the outset, an advisory board was set up for the CPS so that its independent status is maintained. The advisory board also ensures that the server develops and adapts to meet the needs of the chemical community. Some of the community's most respected names have shown their support for the CPS by becoming founder members of the advisory board.[13]

Operation of the CPS. To access the CPS a user would log-in with his or her ChemWeb.com member-name and password. To submit a preprint an author uploads the main article, any number of supplementary files, and also the "meta-data" for the preprint. Essentially, the meta-data comprises the identifying information for the article that can never be modified. The author can submit the preprint to any of 10 chemistry classifications. The main article may be submitted in a wide variety of electronic formats, all of which are automatically converted to PDF on the server. This article is screened by a CPS "editor" to ensure that it contains genuine chemistry content. However, there is no formal peer-review for acceptance of articles to the CPS.

The author may revise the original article any number of times as the research progresses; there is a strict version control in place on the CPS. Finally, it is also possible for an author to redirect the final preprint to the corresponding article at the publisher's website, if and when the preprint is subsequently published. Every article accepted to the CPS is given a citation reference, supporting the position of the CPS as a permanent web archive. This takes the form: CPS: category/YYMMNNN. Articles are also given a "friendly URL": http://preprint.chemweb.com/category/YYMMNNN taking any user directly to the article.

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For ease of use there are comprehensive searching facilities available on the CPS. It is possible to perform both "quick" and "advanced" searches within a particular chemistry classification or across all fields. Each article forms its own online discussion group—where users can comment on the content of the article. This helps to give some indication of the quality of the article and so could be considered as a form of peer-review. Another feature is automatic notification, by e-mail, when a relevant article is accepted to the CPS. A user can be alerted when an article is uploaded to a particular classification, that contains a particular phrase, or even when a new thread is added into a discussion group. Requests for e-mail alerts are saved in a user's individual profile.

Developments Since Launch. In early 2001 authors were given the option to submit their preprint to an additional "conference proceedings" classification. Conference proceedings may range from a list of abstracts to a detailed report. This was as a result of requests by the community. In August 2001 the CPS was registered as a compliant data provider of the Open Archives Initiative (OAI).[14] The general purpose of the OAI is to set standards for the transfer of information between different web servers. This means that users of remote preprint servers or search engines will be able to search preprints hosted on the CPS. Conversely, users of the CPS will also be able to gain access to relevant information hosted on other OAI-compliant servers.

Current Situation. At this time (December 2001) 358 preprints have been uploaded to the CPS covering all areas of chemistry, from computational and physical chemistry to biochemistry. Over 40% of all submissions have been made to the physical chemistry classification. A possible explanation may be the popularity of the arXiv preprint server and the overlap between its "chemical physics" and the CPS "physical chemistry" categories. It is also interesting to analyze the geographical breakdown of submissions to the CPS. To date, submissions have been made from more than 50 different countries—the largest number being from the U.S. Significant numbers have also come from U.K., Western and Eastern Europe, Russia, and India.

Other encouraging usage statistics for the CPS include the following:

- Each of the top 20 "most viewed" preprints has been viewed by more than 700 individuals.
- The top "most viewed" article has to date had more than 2800 viewings.
- The CPS is currently attracting more than 100 000 page impressions every month.
- Use of the online discussion groups is continuing to grow.

Conclusions and Possible Future Enhancements. It is important to note that the Chemistry Preprint Server is still very much an experiment. However, usage analysis of the service during its first year of operation indicates that it is receiving a very positive response.[15] As the CPS becomes better known within the academic and industrial communities, the number of submitted papers will continue to grow. This growth was further enhanced when the CPS achieved compliance with the Open Archives Initiative. This supports the position of the CPS as a community-based service. Future possible enhancements include the automatic submission of preprints to journals. In this scheme, an author would be able to select a peer-reviewed journal (on a publisher-neutral basis) to which to submit the preprint, if and when the article is complete. The CPS will develop and adapt to meet the needs of the chemical community.

REFERENCES AND NOTES

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(3) Los Alamos Loses Physics Archive as Preprint Pioneer Heads East. *Nature*, Webdebates. http://www.nature.com/nature/debates/e-access/articles/butler2.html.
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