On the Future of Journals: Digital Publishing & Argumentation

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ABSTRACT
The emergence of the internet and the World Wide Web (WWW) have profound implications for the dissemination of scholarly work, particularly in the area of submission, review, and publication of journals. However to date, much of the impact of these new technologies has been on digitising the products of journal publication; *the scholarly processes involved in reviewing journal publications remain unchanged and unsupported*. We are using computer-supported collaborative argumentation (CSCA) tools to rethink and redesign the process of scholarly debate at the heart of journal reviewing. This paper describes the design principles behind our CSCA approach, how they are currently being realised in the context of a specific new journal publication, and discusses some of the issues that this approach raises.

KEYWORDS: argumentation, design rationale, digital journals, electronic publishing, hypermedia, WWW

THE SHIFT FROM PAPER TO DIGITAL MEDIA

The emergence of the internet and electronic publishing have far reaching implications for the way in which knowledge is disseminated and sanctioned within scholarly communities, which since the Gutenberg revolution in printing has been shaped by the affordances of paper. Currently, we are witnessing the beginnings of a shift from paper to digital media in the submission, review and publication of scholarly work. In many journals, it is now standard procedure for reviews and submissions to be transmitted electronically. Sometimes, automated systems are in place for matching reviewers with submissions based on keyword analysis. In a few cases, the final version is even published electronically as a set of HTML files available on the WWW. Thus to date, this shift from paper to digital media has mainly affected the *products* of publication. Various documents are becoming digital and some activities are automated, but the actual *process* of scholarly work has not changed to a great extent.

What remains completely unsupported is the intellectual 'meat' of scholarly publication, the review process itself. This remains a private affair involving a small number of reviewers, and in most paper-based journals, the gap between initial submission and article publication can be dragged out over a year. *The potential of internet technologies for opening up and revitalising the scholarly debate process has yet to be realised.*

ARGUMENTATION: THE HEART OF SCHOLARLY DEBATE

What is the nature of intellectual work in the peer review process? Reviewing a submission involves drawing on certain criteria (e.g. theoretical content; empirical content; presentation quality; appropriateness for the publication) to evaluate the quality of reasoning and evidence provided, to probe for weaknesses, acknowledge strengths, and question background assumptions. In effect, reviewing is an *argumentative* process where reviewers are engaging in an imaginary debate with distant authors who are not present to respond to their analysis. This paper-based review model has shortcomings in that questions go unanswered; confusions go unclarified; criticisms go undefended. The dynamic cut-and-thrust of debate normally found in face-to-face contexts such as workshops or conferences is not supported by the paper-based review processes, nor is it yet being realised in the new electronic media.

We are currently rethinking the review process to use new technologies in order to recapture the best features of a dynamic scholarly debate. This rethinking is guided by existing research into hypertext-based, computer-supported collaborative argumentation. Argumentation research is concerned with developing notations and tools to facilitate public debate and negotiation.

The remainder of this paper will begin by reviewing previous work in argumentation and distilling important design guidelines for creating argumentation tools. Next, we will describe how these guidelines are being followed in the context of a specific new, tool-supported journal publication. Finally, we discuss some of the issues which may be encountered in the new review model and its supporting technology.

COMPUTER-SUPPORTED COLLABORATIVE ARGUMENTATION (CSCA)

CSCA research has focused on designing *notations* to support debate processes [1, 3], creating computational *tools* to support using the notations [4, 6, 9] and understanding the organisational contexts and work *practices* necessary for such notations and tools to succeed [5, 11]. Key lessons have been learned from previous research that point to design guidelines in each of these three areas:

Lesson 1: Avoid elaborate and rigid notations. Much research has focused on finding the "right" notation to support debate. Often, the resulting notations require people to express their thoughts using elaborate sets of provided distinctions such as *positions*, *issues*, *comments*, *pros*, and *cons*. This, however, runs the risk of burdening people with excessive representational overhead by forcing them to categorise and commit their thoughts to rigid notations before they are ready. Empirical findings indicate that people are often unwilling and sometimes even unable to do this [1, 2, 10].

Lesson 2: Computational tools must integrate argumentation with the artifacts being discussed. Early CSCA approaches separated the argumentation from other artifacts (i.e., the papers and drawings being discussed). This separation hindered users from (i) quickly accessing relevant argumentation when it was most needed during problem-solving, and (ii) easily adding new argumentation. Later work has shown that tools must support users to bridge the separation and move seamlessly in both directions between the artifact and argumentation [4, 8].

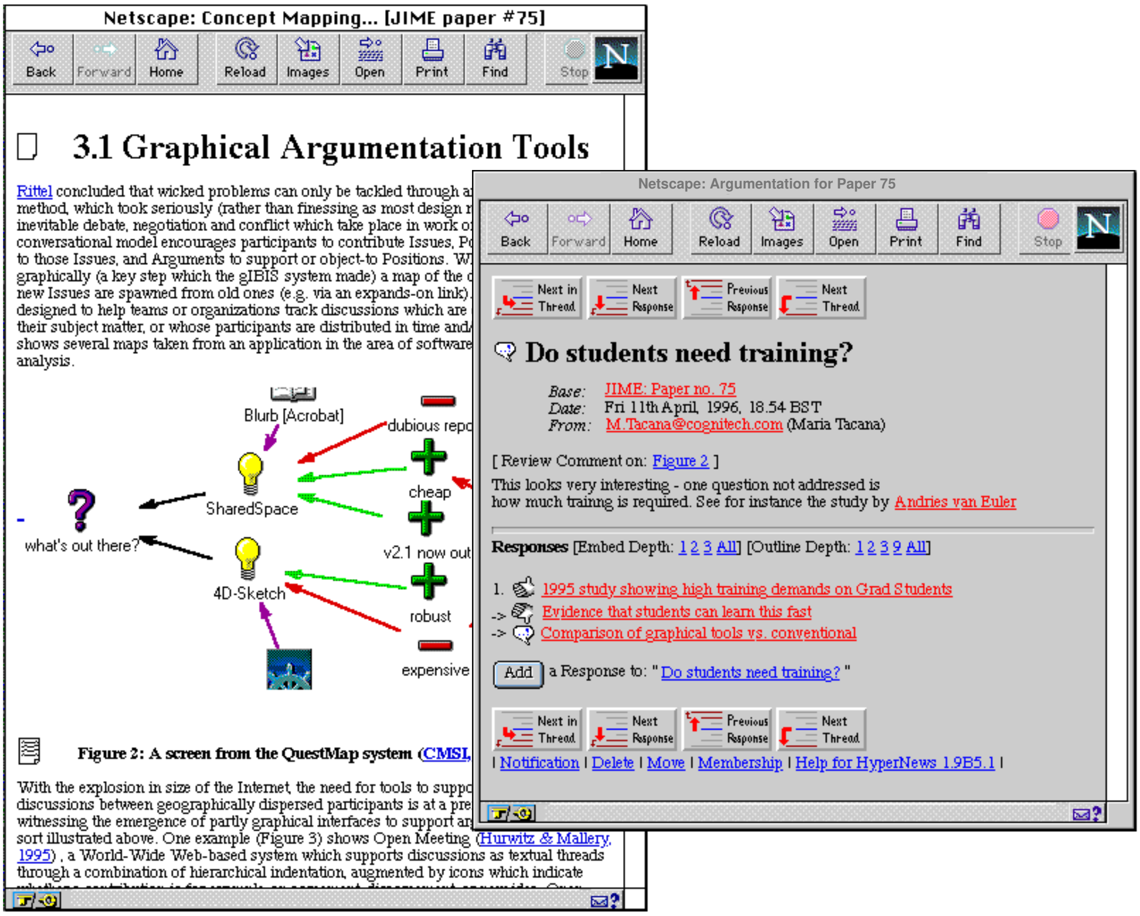

Figure 1: JIME / CSCA Environment. The environment integrates tools for viewing the publication (left window) with tools for adding and manipulating argumentation (right window). This example shows argumentation concerning Figure 2 in the publication.

Lesson 3: Work practices must be redesigned so that argumentation is integral to the task being performed. Empirical studies indicate that people often do not contribute to argumentation because it is perceived as extra work over and above what they are already required to do [5]. Successful argumentation approaches have redesigned work practices to make contributing to argumentation integral to the overall task being performed [11].

A CSCA ENVIRONMENT FOR SCHOLARLY DEBATE

Our goal is to develop a CSCA environment for scholarly review of journal submissions which takes into account these three lessons. This environment is being developed to support the reviewing process of a new scholarly journal, the *Journal for Interactive Multimedia in Education* (JIME).

Figure 1 shows a mock-up of the JIME prototype CSCA environment. The prototype environment is built on top of two existing tools – the Netscape™ browser and the HyperNews system [7]. The paper being reviewed is published in HTML format and can be viewed using a Web browser. Argumentation is added and manipulated using the HyperNews system. As part of this project, we are enhancing these Web-based tools and redesigning the roles of people involved in the reviewing process in accordance with the three design lessons:

Begin with a simple argumentative notation. The notation used to support reviewing in JIME / CSCA has one primary distinction called *comments* ( ). Optionally, debaters may choose to categorise comments as *agreements* ( ) or *disagreements* ( ). Additionally, debaters may elect to include pointers to *evidence* in their comments; evidence can be either plain text (e.g., <*See Conklin and Begeman, 1988*> or a Web hyperlink direct to an online source.

Integrate the publication with the argumentation. Prior to publishing for open debate, JIME submissions will be marked-up to include special argumentation tags. Each major document section and all figures and tables are prefaced with these navigation tags. Blank page tags ( ) change to written page tags ( ) when argumentation is added for that portion of the document. Selecting a tag causes the argumentation associated with that document portion to appear in the HyperNews window. Conversely, from the argumentation tool, debaters can easily migrate back to the publication by selecting the link that is generated when entering a comment or response (Figure 1, right window: "*Comment on Figure 2*").

Make argumentation integral to the review process. The proposed review model for JIME submissions is shown in Figure 2. This model changes the role of participants in the process to directly involve generating and manipulating argumentation. Reviewers return their comments to the editor in the JIME/CSCA argumentative format. The editor pulls together all the reviews to seed the argumentative debate. The publisher marks-up the publication and the initial argumentation to include the special cross-tool navigation tags. The review process is then opened up to a public forum when both the

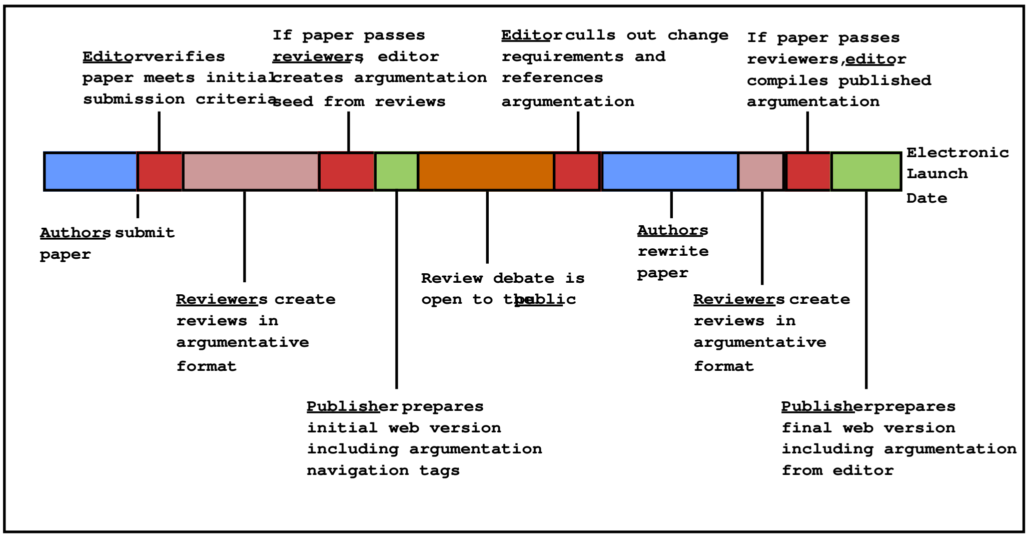

Figure 2: Lifecycle of a JIME article under review.

publication under review and the initial argumentation are published on the Web for further open debate.

DISCUSSION

This project is still in its early design stages and the details of the current interface will undoubtedly change as it undergoes further implementation and user testing. However, we feel it is important to discuss work such as this in its early stages in order to encourage more participation and dialogue between scholars concerning future publishing practices. We believe the review model presented here offers several benefits for opening up and revitalising scholarly debate. However, there remain many open issues to be resolved.

Some issues relate to the user interface for supporting collaborative, Web-based argumentation. For instance, the Web introduces new concurrency challenges regarding timely updating of reviewers' screens with new contributions to the discussion. Additionally, Web-based systems offer impoverished degrees of interactivity compared to what we now expect from direct manipulation interfaces, limiting our ability to take advantage of new developments in graphical argumentation tools.

Another issue raised by our proposed model is the perceived risk which authors may feel when exposing publications to large audiences at the review stage. Submissions will be critiqued by many more reviewers than is currently possible in the conventional review process, and this will take place in a public rather than private forum. The willingness of authors to do this depends greatly upon the professionalism and netiquette exhibited by argumentation contributors. The philosophy behind this model is that perceived risks of this sort will be outweighed by the benefit to authors of quicker and more extensive feedback, resulting ultimately in higher quality publications.

There is also a host of broader issues which are now beginning to be debated within the digital library community. For instance, it is not clear how publishers will recover costs from electronic publishing and whether electronic journals will replace or co-exist with textual journals. These are huge issues which entail rethinking how scholarly knowledge is disseminated, sanctioned and archived.

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