New challenges for scholarly communication in the digital era—changing roles and expectations in the academic community: a conference report

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1. Introduction

This conference, co-sponsored by the Association of Research Libraries, the American Association of University Professors, the American Council of Learned Societies, the Association of American University Presses, and the Coalition for Networked Information, was held March 26–27, 1999, in Washington, D.C. It was organized, in part, as a follow-up to a similar conference held in September 1997, titled *The Specialized Scholarly Monograph in Crisis.* Conference attendees included a mix of approximately 200 academic librarians, faculty members, higher education administrators, publishers, and representatives of scholarly societies from a wide variety of institutions, organizations, and presses in the United States, Canada, and abroad. Many of the papers presented are available on the ARL web page at http://www.arl.org/scomm/ncsc/conf.html.

2. Keynote address

Donald Langenberg, chancellor of the University System of Maryland and a past president of the American Physical Society (APS), presented *Learning in Cyberia* as the keynote address. Speaking as CEO of a system with many campuses and the largest virtual university in the country, Langenberg discussed how these far-flung obligations influenced the Uni-

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versity of Maryland to adopt innovative uses of instructional technology and a statewide electronic library system. In asking what are the lessons to be drawn from these experiences, Langenberg laid out the broad context within which colleges and universities are working. Cyberia is a brave, new, large, and trackless place, rumored to be full of gold and diamonds, but also holding potentially hostile and forbidding territory. In Cyberia, college and university organizational charts are blurred; academic, administrative, and managerial functions are ever more interdependent; and cooperation among groups of institutions accomplishes far more than any single institution working in isolation. "Everything is interconnected," claimed Langenberg.

The physical artifacts of the scholarly communication system have historically shaped higher education. Tremendous numbers of books and journals are still published each year, but the rise of information technology and the merging of computers with the telecommunications industry have increased the demand for new forms of scholarly communication. As an earthquake presents an opportunity to rearrange the crockery in the china closet, technology presents both an opportunity and the necessity to change the system of scholarly communication.

The faculty is the most important strategic investment in scholarly communication. Without faculty, there would be nothing to communicate. But colleges and universities need to devote more time to helping faculty cope with new technologies. Educators are smart and easy to teach, though they may not all be willing to learn. Higher education must stress that research and teaching cannot be separated—they are what faculty members and students do—and that our institutions must emphasize flexibility.

Intellectual property is an unresolved issue that no organization has dealt with effectively. Langenberg noted that the differentiation between and defense of copyright and patents have always been bizarre. Even more today, however, we are presented with the "tragedy of the commons" in which everybody's problem is perceived as nobody's problem. Faculty members send manuscripts to commercial journals, sign away their rights, and force libraries to buy back high-priced subscriptions that they cannot afford. This is pressing libraries to operate in an environment of scarcity in which only the fittest alternative scholarly communication systems can survive in the Darwinian-like struggle. Still, not to attempt a solution is the worst possible course. Langenberg discussed the efforts of the APS to move from print into the digital era. APS journals are the journals of choice internationally—the gold standard for physics journals—and they also provide revenue for APS.

Finally, Langenberg suggested that preservation is probably the most critical of the unresolved issues. Nobody really has a good grasp on how to maintain databases past a 5–10-year time horizon, and the new electronic texts have about as much permanence as the average jelly donut. We are moving from a world in which information was in short supply to a world in which there is a surfeit of information. To be useful, information has to be turned into knowledge and, perhaps even, wisdom. This is what universities attempt to do. Librarians can guide students to learn to evaluate information and discover connections between information and knowledge. None of us has to worry about being replaced by machines!

3. Panel I: Getting ahead in the digital world

The first panel presentation was by Gregory Crane, professor of classics at Tufts University and editor of the Perseus Project, an evolving digital library of resources for the study of the ancient world. Crane's premise was that academia needs at least some faculty who are comfortable and proficient both in their subject field and with the evolving technologies. This group of faculty needs to be immersed in the possibilities of the digital world so as to find new directions for technology-supported research and teaching. As a graduate student, Crane's early work with computers converted him into a programmer—a development anticipated neither by himself nor by his department. But he was lucky, and his institution supported him in what could have been a risky choice, although one that turned out to result in significant contributions to his field. Crane believes that junior faculty members need to spend a year or two early in their careers laying the technological foundations for future contributions and that universities must support their efforts.

A panel of respondents replied to Professor Crane's remarks. The general theme tended to be that although Crane is a superb example of the best of all possible paths to the digital future, and it is hoped that innovators like him will turn up in all fields, this is not likely to happen. The old order is surprisingly resilient; and changing it will be very difficult.

Lester Lefton, professor of psychology and dean of the Columbian School of Arts and Sciences at George Washington University, drew a distinction between the ideal and the real world of retention, promotion, and tenure decisions. He argued that it is unrealistic to suggest that scholarly communication will change significantly. Although it may be a good idea to encourage new faculty to take time to learn technology, scholars are pressured to devote their time to teaching and research. Junior faculty members are encouraged to focus on their areas of expertise, to be narrow, and not to get involved outside their field until after they receive tenure. This leaves little time to learn technology, and the situation is getting worse, not better.

John Ackerman, director of the Cornell University Press, claimed that the "particular historical moment" of the scholarly monograph is gone. The monograph was the product of economic conditions in the 1960s and 1970s. The quantity and price of scholarly information have now far outstripped its capacities. The careers of junior scholars are not the sole responsibility of university presses, and we cannot continue to use the monograph as a certification process. We must think about what kind of system will replace the traditional tenure process and develop a flexible system of certification appropriate to today's world.

Catherine Rudder, executive director of the American Political Science Association, was the next respondent. She too pointed out that we are inhibited by our ingrained ways of thinking about publication and the tenure process. Human change is slower than technological change. We have neither adjusted our notions of tenure to take advantage of technology, nor have we found ways to free faculty time to explore fully the implications of the new technologies. Problems yet to be solved include assessing technological work to give it appropriate credit, finding ways to reduce the financial drain on institutional resources, and ridding ourselves of the print model.

The final panelist was Jennifer Younger, director of libraries at the University of Notre Dame. According to Younger, there is growing recognition of the positive reasons for

advancing digital publications and dissertations, although print still remains a popular and, in many cases, a necessary choice for graduate students at the University of Notre Dame. In support and extension of Crane's call for greater collaboration between senior and junior faculty, Younger mentioned two collaborative efforts among faculty, computing specialists, and librarians: the William and Katherine Devers Program in Dante Studies and an online catalog of Ambrosiana drawings.

4. Panel II: Distance education

The keynote for the second panel, entitled "Libraries and Distance Education: The Power and Challenges of a Distributed Information and Knowledge Environment," was given by Daniel Barron, professor of library and information science at the University of South Carolina. According to Barron, new forms of information technology are presenting scholars, teachers, and librarians with exciting opportunities. Indeed, in his words, "a revolution is taking place in education, one that deals with the philosophy of how one teaches, of the relationship between teacher and student, of the way in which a classroom is structured, and the nature of the curriculum."

Drawing on the ideas of Oblinger and Maruyama, Barron contrasted older learning paradigms and newer ones: lecturing and listening versus active engagement, individual versus group effort, "subjects" versus integration, factual versus problem-centered learning, "sage on the stage" versus "guide on the side," spoken/written versus multimedia resources, RRR (42 hours) versus authentic/portfolio, insular programs versus community collaboration. In moving from an instructor-centered model to a learner-centered model, we are moving from a model of information explained or demonstrated to one of knowledge constructed.

There are serious challenges facing distance education today. Besides the need for an ongoing exploration of delivery alternatives, there needs to be a better assurance of individual rights, academic credibility, appropriate faculty rewards, institutional collaboration, and effective use of information technologies. Moreover, the notions of learning and knowing in the digital age encompass a variety of types of literacy, including reading, information, technology, content, and social literacy. Citing 1998 statistics from the U.S. Department of Commerce, Barron indicated that Americans who own computers are predominately white, upper middle class, and college educated, but that by 2000, 60% of the population will be working in jobs requiring information technology skills. One of the pressing challenges for education in general and distance education in particular is to assure that information technology to support education and information access is fully and equitably distributed to people around the world.

The first response to Barron's presentation was from James Ryan, vice president for outreach and cooperative extension at Pennsylvania State University. Ryan noted that students take online courses because of access, career development, and the convenience of learning anytime, anywhere, but that faculty members currently would like to use information technology to develop on-campus courses. He speculated that, due in part to increased competition from private industries, rapid developments in access provision, and greatly

simplified information technology equipment, this will change in the future, and there will be widespread faculty acceptance of distance education. In his opinion, distance education will be the major activity on most campuses in 5 years, and hence a primary focus now should be on assuring its high quality.

Donald Wagner, professor of political science and director of special programs at the State University of West Georgia, agreed that distance education technologies will become part of our lives, and that the challenge is to offer quality learning experiences. Some of the challenges to distance education faculty are to find good communication platforms for students, to contribute interesting and challenging lectures, to remember that the purpose of distance education is to advance knowledge, to work toward developing institutional policies, and to insist that curriculum development is a faculty responsibility. Faculty should establish rules and procedures for using information technology and for allocating and supporting resources.

Linda Phillips, head of collection development and management at the University of Tennessee at Knoxville, read the paper for Paula Kaufman who was unable to attend. She drew attention to the fact that more and more users are accessing the library remotely, and that this is affecting three important aspects of library service: access to information resources, access to expert assistance, and access to library instruction. The biggest challenge of the three is perhaps providing good instruction to remote users. Phillips concluded by saying that close collaboration among librarians, faculty, and distance educators is necessary to ensure that instructional technologies are successfully integrated into university-wide course requirements.

The last respondent on the distance education panel was Bernard Rous, deputy director of publications and electronic publishing program and director of the Association for Computing Machinery. Rous insisted on the need to bear in mind that technology's invention and development follows the lead of human beings, rather than the other way around. For Rous, one of the biggest challenges facing distance learning is exploiting the asynchronous nature of the Internet to produce quality distance education. Although many Web authoring tools are still print oriented, course preparation software programs are beginning to offer the potential for high quality instructional design.

5. Panel III: What does it mean to publish?

This session used the experience of the physics community with the Los Alamos e-print server to explore a successful model of e-publication that has worked tremendously well for one discipline and to discuss how this experience might or might not apply to other disciplines. Jonathon Bagger, professor of physics and astronomy at Johns Hopkins University, noted that the preprint service emerged from the bottom up—a creature of the physicists themselves—and hence was very precisely matched to the needs of the field. The community of particle physicists is small, about 2,000 worldwide, and active. The community had a tradition of preprint exchange dating back to the mimeograph machine. Although scholars continue to publish in print journals, paper journals have become largely irrelevant to communication in the field, and the old paper exchange was seen as expensive and elitist. In

1990, the e-print revolution completely eliminated printed preprints and produced a system in which all could participate and which was democratic, timely, and inexpensive to run. This free, automated electronic archive has since been expanded to cover most of physics, mathematics, and computer science. Bagger questioned the role of print journals in physics today. He wondered why they are still being published, and why some still subscribe for no apparent reason. Peer review may be a partial answer, he suggested. But in physics the peer review process simply helps readers jump over poor papers and weeds out bad English. The quality of peer review itself is uneven. In Bagger's view, the dual-track system is ripe for change.

Will this work in other fields? Kathy Wilhelm, a graduate student in social history at West Virginia University, raised another concern about electronic publications, in this case dissertations. If universities require students to publish e-dissertations, it may be difficult to later publish the dissertation as a book, which is a matter of some importance in securing a teaching position.

Sanford Thatcher, director of Penn State University Press, noted that preprints were not copyrighted, but that the Los Alamos Archives are copyrighted. He also indicated that practitioners in other disciplines may have concerns not shared by physicists that would make e-prints problematic. Some fields are particularly vulnerable to industrial espionage, or are concerned with patented discoveries, and may feel at risk with such a system. What most troubled him about the e-print server is the way in which it may obscure the value-added contributions of publishers, who contribute to scholarship in many ways.

Robert Bovenschulte, director of the publications division of the American Chemical Society (ACS), voiced similar concerns. He characterized the e-print server as working well for the happy few affected by it, but felt that in some fields, especially medicine, opposition is vehement. Other fields remain cautious. Opinions differ widely among the 28 ACS editors, but apparently they are beginning to shift toward favorable. According to Bovenschulte, chemistry is a much larger and more crowded field than physics, and peer review plays a correspondingly larger role.

6. Panel IV: Economics of scholarly communication

Richard Eckman, secretary of the Andrew W. Mellon Foundation, outlined the experiences of the Foundation in supporting studies and experiments in digital publication. The Foundation assumed they would find disciplinary differences, and that proved to be true, but the differences were not necessarily those they had expected to find. With MIT's *Chicago Journal of Theoretical Computer Science*, response has been and remains slow in coming. The Early American Fiction text project at West Virginia, on the other hand, caught on very quickly, but behaved differently than expected in terms of its position vis-à-vis the similar and expensive product from Chadwyck-Healey. The University of California Press area studies monographs have moved ahead very nicely, but their hoped-for influence on other publishers has not materialized.

Some general lessons have been learned. University press titles have grown in number from 5,600 to 8,500 over the last decade, but there are fewer sales per title, so this area has not really grown. Scale matters. Among publishers, the larger ones are more successful. In

the library community, libraries prefer to buy publications in bundles. New scholarly journals are created all the time. They frequently focus on a subject niche that does not yet have its own title. If the journal is any good, it quickly takes off, but it does not substitute for any older title. SPARC needs to address this issue of substitutability. *The Bryn Mawr Review* took off very nicely. Classicists are a small group, and the press was surprised to find there were more subscribers than there are classicists. But when those subscribers to the free journal were asked if they would pay a $5 subscription fee, the overwhelming response was no. The physics preprints are not yet self-sustaining. Why not? The emerging questions that need answers are less technical than economic:

- How will the costs of producing electronic and traditional publications evolve over time?
- How will they be priced?
- Do we really know what kind of use will be made of electronic journals?

There is little consensus about what we are trying to achieve, but it is possible the cost of both print and electronic will decline. Eckman's encouraging conclusion was that we can shape the results of new developments by sheer application of will, if we exercise our capacity for collective action. We can shape our own future, but it will not be an easy process.

Phyllis Franklin, executive director of the Modern Language Association, was the first respondent. She suggested that although we have learned a great deal about electronic publications, we nonetheless are left with even more questions than before. Over 20 years, the MLA has published a list of vacant positions. At first it was primitive, but it served the needs of the field, and it was sustainable. In 1996–1998, the lure of electronics caused them to want to do something better, and they created an electronic version. It cost $140,000 to do this. And the National Science Foundation did not offer to help. In 1998–1999, the print and electronic product will cost more than double what it did before, and subscription revenues have dropped.

The *MLA Bibliography,* on the other hand, has been paying its way for some time now. Some years ago it became apparent that the software used to create the *Bibliography* was getting old. Consultants were called in and explained, cheerfully, that MLA had what is known in the trade as a "heritage system." The new system took 2 years to bring up and cost $784,000, plus staff and retraining costs. Its maintenance requires $50,000 a year. Will other costly upgrades be needed? Yes. The MLA is absolutely dependent on publication revenues to carry out its mission. It is critical that librarians understand that the financial pressures caused by technology have hit scholarly publishers just as hard as they have hit libraries.

Ken Frazier, director of libraries at the University of Wisconsin and Madison and chair of SPARC, responded next to Eckman. He asked that we examine the issue of how we will know when we have succeeded. SPARC has been in existence for 2 years and has 160 member libraries. SPARC's goals are to promote competition where it is needed most, encourage technology where it might lead to savings, and support academic users with their teaching and research. Frazier believes the traditional view of research libraries is no longer sustainable. Wisconsin has cut 6,000 serials titles and is buying fewer books. SPARC and similar initiatives are imperative.

On the publishing fronts, Frazier believes that librarians can "View with Alarm" and

"Point with Pride"—sometimes at the same time. What should librarians view with alarm? Marketplace consolidation is a real concern. Libraries are moving toward an oligopolistic publishing structure. The aggressive pricing of commercial journals is moving from STM to others areas. The Copyright Clearance Center's recent campaign of intimidation toward hospital libraries was extraordinary and alarming. Efforts to use the commercial clause to trump copyright are clear. We see movement toward the ownership of factual knowledge, an amazing idea with ominous implications for libraries. The situation abroad is even worse where ownership of data is accepted as a fact of life. On the "Point with Pride" side, SPARC has established viable alternative products at attractive prices. Rosensweig, leaving his established journal to start over with SPARC backing, has done a high visibility thing that is showing us the remarkable power of storytelling.

Aggregating is another cause for concern and caution. Products where each buyer purchases the whole bundle are appealing for both publishers and libraries, but there is the potential of distorting the market by preventing the death and marginalization of overpriced products and weaker titles. Buyer resistance among libraries is lowest when we have new money—and we mostly do now.

The next respondent was Michael Baer, senior vice president of the American Council on Education, who stressed that we need to think about a broader base than just the financial one. What about readers? What is it that they like about paper copies? And what are the advantages to them in electronic versions? He urged that we consider the human dimensions and watch the ways they change over time as both habits and equipment are altered during the period of transition. Of course we need to consider the dollars for both print and electronic and the costs of maintaining them over long periods of time. Publishers also must be given a way to protect their economic investment. The easier flow of digital materials, a disadvantage for a commercial publisher, may be a major advance for non-commercial and government publishers.

What about archiving? Bear speculated that institutions will be eager to get involved in this because changes in the way that education is delivered and growth in distance education mean that institutions need access to digitized publications. Economic questions about how this will work, who will store the information, who will pay the costs, and how will costs be managed remain to be answered. Most of the questions relating to the economics of digital publications are clearly ambiguous, and we need more experience to answer them.

The last respondent was Michael Faherty, director of the Brookings Institution Press and president of the Association of American University Presses. Faherty summarized the current state of university press publishing. He reported some very interesting figures that demonstrate trends: the number of new titles is more or less flat, net sales are growing very slowly, cloth sales are dropping, and these presses are scrambling to sell more paperbacks just to keep up. And he noted that "keeping up" still means subsidized, with these presses having in general a net operating deficit of about 10% before subsidies. In contrast to Eckman's view, Faherty's hunch is that electronic products will not turn out to cost less than paper for two reasons. The first is the great cost of learning and getting set up to do electronic publishing—although these costs may subside with experience and the economy of increased scale. The second though is a whole new set of first-copy costs stemming from the pressure to add more bells and whistles, new kinds of functionality, and keeping products up-to-date

in terms not only of content, but also in terms of the program, software, and hardware and archiving that must develop to support them.

The need to consider the entire system of scholarly communication was also a theme. Changes that reduce costs in one area, for example, camera-ready copy, may create costs in another, for example, increasing demands on the scholar's time. The system-wide costs may not be reduced but merely shifted. Faherty concluded by noting that the AAUP is eager to collaborate with other groups, gather more data, and generally study what is happening in ways that will improve the member presses' ability to publish effectively in this changing environment.

7. Panel V: Preservation and access

Clifford Lynch, executive director of the Coalition for Networked Information in Washington, D.C., gave this session's keynote address, entitled *Ensuring the Survival of Scholarship*. Lynch suggested that the success of the print scholarly literature system has set the stage for digitization, as is evidenced by projects such as JSTOR, but that there are still a number of substantial issues to be addressed as the scholarly literature moves into electronic environments. Although there appears to be a fair amount of consensus about the importance of archiving, and even about what to archive, people are beginning to worry about the viability of archiving. This concern with the viability of archiving may be the strongest reason why print still prevails in scholarly publishing.

Lynch expressed uneasiness about the lack of an effective mechanism in today's scholarly communication system for institutionalizing or underwriting the archival materials that are available. By and large, electronic scholarship is being archived on an ad hoc basis, which does not ensure future access. Without an institutional framework to support the archiving of digital material, it is not clear what conventions ought to be followed, either in archiving work created in new genres or in archiving traditional literature that is moving to electronic. To let go of print, in other words, we must have the archival system in place, but we do not necessarily understand the scholarly implications of this system. What does it mean to archive new genres? Does it mean we take periodic snapshots? Does it mean being able to trace the evolution of the site? Does it mean saving only the most recent copy or saving all of the snapshots? What will we do with large amounts of captured video? These are not only questions for archivists or librarians, but they are questions that must be addressed by members of various scholarly communities.

There are a couple of functions that scholarly publishers have traditionally fulfilled, which are still missing in electronic publishing and archiving. In conjunction with the framework of copyright and the doctrine of first sale, explained Lynch, publishers have provided libraries with a market for the purchase of archival objects. They have played a vital role in integrating the scholarly canon into a framework where institutional support, through library acquisitions and collection development, can be applied to preserve material. There is nothing like this yet established to maintain, for example, the world of scholarly web sites. Scholarly publishers also have helped with rights definitions that are not yet clear in the electronic environment. Lynch asked us to think about a web site that is constantly being

updated to include the most current information: are we dealing with history or accuracy? Traditionally, in addition, authors have believed that publishing a piece of scholarship has an irrevocable quality to it, but in the world of electronic publishing this may not be so. Authors may begin exercising their "moral rights" to control their own work, making the collecting and circulating of library material quite complex as authors decide to withdraw a piece of scholarship from the library's holdings.

Lynch concluded by suggesting that the opportunity of the digital environment is that a small number of agencies can be responsible for the management of archiving scholarly material. Of course, this reiterates the need for large-scale institutional sponsorship of archival material, but it also recognizes the need for some redundancy built into the system. Libraries and scholarly publishers need to come up with some new legal, business, and economic models to facilitate licensing terms and business arrangements that can help assure the long-term viability of electronic scholarly resources.

Carol Mandel, deputy university librarian of the Columbia University Libraries; Kevin Guthrie, president of JSTOR; and Peter Givler, executive director of the Association of American University Presses, responded to Lynch's remarks. Mandel discussed her research for the Columbia Online Books project, which was gathered by measuring librarians' attitudes toward electronic scholarly publishing in the humanities and social sciences. Participants in focus groups expressed worries about cataloging, restrictions on use, and loss of selector judgment in the electronic environment. Mandel claimed that although librarians seem to be looking to consortia, professional organizations, and other institutions for solutions to transitory problems, the things that they are worrying about are symptoms of deeper issues. These issues involve ownership, copyright, and changing roles of libraries that may call into question their own involvement in controlling archival responsibilities.

According to Kevin Guthrie, the challenges of archiving something electronically are the reverse of the challenges of archiving traditional research. In the traditional model, what gets archived is what is not used frequently, but in the electronic milieu the material that is used frequently is more likely to be preserved. An important issue then becomes how to archive information that is less used. This, however, means that archiving is not a technical problem, but rather a mission-based, institutional economic construct. JSTOR has archived a core set of journal literature—much of which will never be used—on the assumption that a comprehensive conversion of the entire run of journal articles including lower-use, just-in-case articles can be swept in with the higher-use articles to build an ongoing and sustainable economic model.

The moderator of this session, Peter Givler, was also the final respondent in this session. Givler pointed to the difference between the planned system of preservation and access of the traditional print culture versus the accidental nature in which electronic books and journals are preserved. He questioned the purpose of archiving, and asked whether or not it was necessary to archive everything that is written.

8. Closing speaker

Teresa Sullivan, vice president and graduate dean at the University of Texas at Austin, gave the closing speech on *Future Directions*. She noted that these problems are deep and

difficult, and different parts of our world are wrestling with them. A few years back, no one had instructional technology budgets. We have done it all with no budget—the costs have basically come out of everyone's hide. Meanwhile, our external constituencies have two views of electronic information: the one that it is free and costs us nothing; the other that it is a cash cow, and we can just rake in the dollars. There is a race in the market, including many people who are dedicated to finding ways to make money from electronic information. They are not worried about content because they are counting on universities to provide the content. They will provide the commercialization, and they will take the profits. This is the situation in which the university is finding itself today. What future directions might it follow to address this situation?

There should be more behavioral studies conducted about how academics do their research to discover who is reading what; what the differences are between browsing and reading; and whether scholars read at the center or at the periphery of their discipline, which leads to more cross-disciplinary work. Faculty need to talk about Web sites and how to evaluate them. We need to know if there are differences between younger and older scholars and between adjunct and tenure track in the patterns of their work. Will there be new tools beyond circulation and citation-counts to help identify what is valuable to the users?

We need to understand how scholars will value the non-linear text because the ways in which they do this may change academic values. Will they promote divergent as opposed to convergent creativity? Will there be more emphasis on breadth relative to depth? Will there be new and different concepts of documentation? Perhaps hotlinks will replace footnotes, and a preference for three-dimensional holographic representations and more animated figures seems likely to emerge. How does one evaluate such texts relative to traditional linear texts?

More work in behavioral economics based on examining actual behavior is also necessary to understand the ways in which faculty members conduct research. An interesting example would be a model in which librarians attempt to understand how faculty members *really* feel about their journal collections. Librarians could give each faculty member 20 poker chips for an auction. Each could put all 20 chips on a single journal or distribute them among journals as they choose. Those journals receiving the greatest number of poker chips would warrant continued subscription. This would be a practical way to look at decision making and probably be a more reasonable way than the current method of cutting a given percentage.

There may be other ways to more efficiently use allocated funds. At Los Alamos, for example, the taxpayers are subsidizing the preprint server. There is probably no grant from which some dollars do not flow to the ACS. Maybe money should go directly from the National Science Foundation (NSF) to ACS so that any university with an NSF grant could receive ACS subscriptions gratis. Either way, NSF supports the publication. But this way, all the chemists on the campus, instead of simply the ones with grants, would benefit.

It is interesting to note how various disciplines feel themselves privileged or disadvantaged in this competition. The MLA assumes that they are at the end of the line. Suppose they took the opposite position. Suppose they abandoned the subculture of scarcity, which they have imposed on themselves, and started charging $4,000 for *PMLA?* Libraries would pay. Perhaps campuses should be invited to look at the needs of the humanities as they do of the sciences.

A large-scale discussion about intellectual property must begin now. This discussion needs university general counsels and some of the law professors who do the cutting edge work. The for-profit sector is using these groups for lobbying and litigation, while the academic sector is not, even though they are our own colleagues, and we need them to tell us how to avoid restraint of trade and collusion! Unfortunately, it is almost too late to get into this discussion, but it must happen so that universities can stop giving away the earning stream and find ways to address issues of intellectual property.

9. Conclusion

Each conference panel dealt with an aspect of the system of scholarly communication, but it was a premise of the conference that these seemingly unique challenges are, in fact, intricately interconnected. This interconnectedness is dynamic because it is driven by a rapidly changing system of scholarly communication. Institutions of higher education are compelled to deal with change caused, in large part, by rapid changes in information technologies, and this process both transforms and is being transformed by the dynamic, interconnected system of scholarly communication.

Not surprisingly, a predominant theme of the conference was concern over the ways in which increasing financial pressures and competition from private industry are forcing colleges and universities to reexamine budgetary priorities in light of their strategic investments in scholarly communication. A related theme was an acknowledgment that the financial problems caused by the changing role of technology in the scholarly communication process have hit scholarly societies just as hard as they have hit libraries and universities.

The pedagogical challenges facing higher education because of the impact of new instructional technologies were another main theme. Questions about the quality, standardization, assessment, and effectiveness of teaching a diverse body of learners, both on campuses and at a distance were raised. If, as Daniel Barron indicated, the net generation is processing information and learning differently than the baby boomers, then the apparent discrepancies in the ways that different generations are learning will have profound effects on teaching strategies and methods of course delivery.

Intellectual property and copyright were also themes that recurred throughout the conference. Many panelists alluded to the widespread confusion among university professors and administrators about the meaning of the Copyright Act. As Teresa Sullivan remarked in her concluding discussion on "Engaging the Issues," if there were to be another ARL-sponsored conference in this series, it should be about intellectual property because "[we] are almost too late to get into this discussion, and it is imperative that we get into it as soon as we can."

A final set of issues revolved around the theme of changing conceptions of the role of the faculty in scholarly communication. Are faculty members, or should they be, scholars or technicians, subject experts or interdisciplinarians, rewarded for learning and teaching technology or for traditional research and publication? These kinds of questions are at the heart of the issue of changing roles and expectations in the academic community that is being confronted by new challenges for scholarly communication in the digital era.

In spite of its engaging subject matter of scholarly communication in the digital era, the conference was surprisingly low tech. Conference participants sat in a crowded auditorium-style room with no accommodation for laptops. Given the wide range of representation from the three communities involved, it was somewhat disappointing that there was not much opportunity for formal interaction among the participants. The filled-to-capacity "New Challenges" Conference nevertheless offered an array of high quality speakers whose topics were current, controversial, and commanding of attention. We look forward to future ARL co-sponsored conferences.