

On the Threshold of Discontinuity: The New Genres of Scholarly Communication and the Role of the Research Library

Clifford Lynch

Introduction

Research libraries have historically shaped much of their role through a relationship to a canon of scholarly publication and the system that produces it. The boundaries of this canon have always been indistinct and problematic, and implicitly captured in the well-established notion (and problem) of “gray literature”. The largest portion of the acquisitions budget traditionally has supported the purchase of the canonical print scholarly literature—in recent years, predominantly journals—and the construction of the supporting apparatus of catalogs and abstracting and indexing databases.

Innovative scholarly use of the networked information environment is creating complex and rapidly evolving new genres that raise both tactical and strategic issues for research libraries. The products of scholars’ engagement with new technologies increasingly fall well outside of the traditional canon, yet encompass some of the most important and vital new scholarly communication. And many of us still attempt to understand

these new genres through analogies to print, just as their creators mimicked both print layout and formatting and social practices of print early in the development of the new genres. Print conventions conferred legitimacy as well as a familiar point of departure.

Electronic journals are a case in point. Traditional print journal publishers are going electronic; through the 1990s *de novo* electronic journals sprang up in huge numbers. Both types of network delivered journals are very tied to conventions, organization, and practices of print journals, no matter how strongly they emphasize and celebrate the ways in which they differ from, enhance, or supplant print journals.

The implications of these developments have been, and continue to be, discussed at great length. The developments impact both scholarly communications generally and libraries specifically, as a key component in the overall system of scholarly communications. The discussions simultaneously fascinate, engage, threaten, and energize scholarly publishers, authors, editors, readers,

Clifford Lynch is executive director of the Coalition for Networked Information.

and librarians. Yet we may, in the heat of rhetoric and analysis, fail to recognize that our discussions have chosen to focus on developments that really continue the evolution of traditional scholarly publishing. We've chosen to emphasize extrapolation rather than to identify and understand emerging discontinuity. The prism of the print tradition is a comfortable and comforting one. We are bringing electronic journals into the shelter of the traditional canon, and we are finding that this really isn't so difficult.

In this paper, I will argue that a new wave of materials is emerging that have much less connection to the recent history of print-dominated scholarly publishing and that cannot be understood or managed from a print-based perspective. In some ways, these new materials combine pre-Gutenberg (perhaps Medieval) traditions of communication with 21st century capabilities (instantaneous worldwide dissemination, electronically enabled and hosted communities, and the ability to capture, record, and archive events as they occur, building upon the capabilities of photography and sound recording, and later the capability to capture moving images that have had such profound effects over the past century). With these new genres, the scholarly canon will expand massively, and its boundary regions will become much broader, more diffuse, and more uncertain than those inhabited by the historic print gray literature. The inherent uncertainties of these materials (new questions of ownership, archivability, and content stability which are well settled for printed materials) will compound the difficulties libraries face in defining their roles in the management of the new scholarly communications.

Let me be clear: I am not predicting the demise of print, but rather the emergence of a new and important body of materials that fall within a very different intellectual regime; libraries will have to come to terms with the new while continuing to manage the old.

The paper begins with a look at some of the emerging genres and the technology trends in which they are incubating. It then considers the major historic functions of research libraries—selection and acquisition; organization; access; and archiving and preservation—in the context of these new forms.

New Genres, New Literatures, New Technical Enablers

The change to the canon of scholarly literature began with informal electronic-mail-enabled communication,

soon supplemented by more structured listservers and electronic-mail-based journals. At first, these tools were largely, and sometimes slavishly, modeled on print predecessors; but they made scholarly communication more rapid, more global, and also more ephemeral and informal. Scientific research in many areas (most particularly and prominently, perhaps, molecular biology and the earth and space sciences) was fundamentally changed by the creation of shared, network-accessible data and knowledge bases. The Worldwide web is actually changing the conduct and dissemination of scholarship as it is used both for the distribution of papers prior to their publication in the print literature, and for the creation of major academic instructional and research resources completely outside of the traditional authoring and publication framework. The results are visible everywhere: in preprint archives, in scientific databases that complement the journal literature, and in the development of monographic and encyclopedic web sites in the humanities and sciences.

Similarly extensive changes are rippling through mass-market products such as newspapers, magazines, newsletters, music, sensor data and telemetry, and, perhaps soon, films. Because these mass market products represent the raw materials of future scholarship, the changes are of importance to research libraries. While we will not consider these shifts in any detail here, it is worth noting that they are taking place; the transformation of scholarly communication is part of a larger change, and is not occurring in isolation. Because scholarly communication innovation occurs in a limited environment that is characterized by the availability of advanced, precommercial technology, the developments there are likely to provide insight into the broader shifts. Scholarly communication may well prove to be a bellwether for the mass market.

Scientific databases—with molecular biology and genomics being perhaps the most prominent example—represent a much greater discontinuity, in some senses, than the other developments such as journals delivered over the network. They represent a new literature that is evolving alongside the traditional journals and books, closely linked to the traditional literature but standing independently. They encapsulate new social structures and new usage patterns that borrow heavily from the print tradition. They both point towards the future and hark back towards the past. Space does not permit a full consideration of these databases as new genres that are

detached from publishing as we have understood it, but they should be recognized as one of the first key points of departure, and as content that has very high impact on the research community.

What we see today is just the beginning. Even more extensive shifts are on the horizon. They will be enabled and fueled by technologies such as the new high-performance networks such as those developed under the Internet 2 and Next Generation Internet programs to link our major universities and research centers, and by a whole range of dramatic price-performance improvements in storage, computation, and input/output devices.

It's helpful to consider concrete examples of what's rapidly becoming feasible on a reasonably large scale and the ways in which they are radically different from the print-inspired networked information developments. Network-based seminars provide a good place to start, in part because much of its technology base is shared with the other examples I'll discuss later.

Network-Based Distributed Seminars

With enough network bandwidth, it is now fairly easy and inexpensive to conduct a lecture, seminar, or other discussion across multiple sites (including individuals sitting at workstations as well as classroom settings). To be sure, there are real limitations on the group of technologies that make this possible. High quality is still expensive and is best accomplished through specially designed and instrumented rooms, rather than with cheap consumer-grade digital cameras. It takes a fast network connection and a fast workstation to provide high-quality, full-screen video playback. But these constraints are easing with each new generation of technology.

More fundamental, and more deeply problematic, are the limitations on effective interaction. As Michael Schrage has observed, a true interactive discussion, there's an inexact but real limit on the number of participating sites. Above that limit, videoconference essentially becomes a broadcast (possibly moving from one source site to another over the course of the conference in a rather structured way), perhaps augmented with a few rather formal questions and responses. While we can broadcast easily to a very large number of sites, and even allow people at these sites to queue to submit questions, we do not know how to scale really interactive discussions to large numbers of sites. (It is worth noting that this is not purely a technology problem; in meet-

ings involving a large number of people organizers typically resort to the mechanism of breakout discussion groups that report back in plenary in order to inject some sense of interactivity and participation, even though this organizational approach is very limited. Collaboration and interaction in large groups is a hard and poorly explored problem.)

The critical point to understand about the digital capture and dissemination of a lecture is that it need not be a strictly real-time event. It costs very little more to capture the lecture, store it, and make it available for replay on demand if it's being digitally transmitted in the first place. It is even feasible to provide random access to specific clips within the lecture, though not necessarily in terms that are helpful to a viewer—it's easy to respond to a request to view a lecture starting at a given minute, as opposed to a request for the segment when the lecturer discusses a specific topic. But the key point is that the event takes on a dual existence as an artifact that can be preserved and delivered on demand.

Much discussion has focused recently on the implications of distance education in the networked world and, in particular, on two controversial and emotionally laden scenarios. In the first situation, universities worldwide engage in a competitive battle to service distance learners as individuals who attend courses through the net. In the second scenario, a few major universities (or for-profit commercial concerns) become the suppliers of many of the large enrollment lecture courses that are part of the core undergraduate curriculum for hundreds of other institutions. These recipient institutions would no longer need faculty to teach locally (or at least a lot fewer of them), but could just purchase material that's delivered over the net.

While these are undoubtedly going to be serious long-term issues, we may find that the mixture of available technology and academic needs creates a rather different opportunity in the near term. On a technology basis, high performance networks don't currently or in the very near future reach enough of the players in the scenarios described above. The political, economic, business, credentialing, labor relations and similar factors involved are extremely complex and controversial. And the strongly ingrained conservatism of higher education means that change from within the academy will be slow and incremental.

But consider: At research universities, there are always courses at the advanced graduate level that depart-

ments would like to offer but don't have the faculty expertise or critical mass of students to support. The ability to make a broad range of specialized offerings available is a very important component of the quality of advanced graduate education. The best universities, when two or more are geographically close, often offer their graduate students cross-registration and collaborate to develop and coordinate the richest possible collective range of educational offerings. These formal course offerings are further supplemented by opportunistic, ad hoc seminars in which visiting researchers present and discuss the latest research results.

These advanced courses are not commodities in the sense that one might argue that, say, most Calculus I course lectures (except perhaps in the hands of a magnificently gifted teacher) are commodities, covering nearly identical material in nearly identical ways; each advanced seminar or course covers relatively unique content and has some lasting value. Indeed, it is not uncommon historically for lecture notes from such courses to be written up, informally distributed, and even placed in departmental libraries or published in series titled "lecture notes in..." These courses and seminars often also ultimately give rise to formal papers or books that eventually become part of the traditional print literature. And they are generally not part of a competitive economic battleground between universities. The spirit is really one of collaboration among colleagues in a scholarly discipline.

Internet 2 is interconnecting the major research universities in the United States with capabilities that will be extremely hospitable to digital delivery of these kinds of distributed seminars, lectures, and advanced courses. They have always been an important part of scholarly communication and advanced education, but the new networked environment will make them much more accessible. Recordings will preserve what have historically been events as permanent content that can be managed and delivered on demand. Even further, digital recordings can readily be annotated and linked to documents, computer programs, or other recordings.

Collaborative Research Environments

Videoconferencing technology and network-based interaction is also evolving in another important direction. About a decade ago, the concept of a "co-laboratory" was first articulated as a place on the network that would provide a forum for scientific collaboration and research; this was a very powerful vision that captured the imagi-

nation of many scientists, scholars and educators. We are now finally witnessing the actual development of operational collaboratories that serve communities of researchers. (An excellent example of this technology is the Upper Atmosphere Research Collaboratory, UARC.) These environments variously combine videoconferencing, synchronous and asynchronous text-based messaging, shared control of scientific instrumentation, access to data (from observational sensors, simulations, or data archives), analysis and visualization tools, shared whiteboards, literature databases, and authoring tools. Their scale is sufficiently limited that the interaction problems that characterize very-large-scale seminars don't seem to be a major factor.

The technical requirements for using these collaboratories vary widely, from access to routine workstations (perhaps augmented with inexpensive digital cameras and microphones) at the low end, all the way through use of very costly, experimental, immersive, virtual reality "caves" at the research frontiers. At the high end, participation assumes not only very sophisticated input/output equipment (the caves), but an accompanying very-high-bandwidth, low-latency, quality of service managed communications infrastructure.

The focus of such collaboratories, naturally, is science, or more generally research—the vast majority of the systems built to date are in the physical sciences, and it still remains somewhat unclear how to translate these working environments to host and serve the practice of scholarship in some other, more individualistic and less data intensive disciplines, particularly in the humanities and some of the social sciences. But to the extent that we have learned how to create collaboratories, these systems also document the research and knowledge creation process. Actually recording the process of science research is something of an afterthought, a byproduct of the development of collaboratories, but it's important to note that events and activities that take place in these collaboratories can be stored, reviewed, replayed, and annotated.

It is worth also recognizing the generalization of this effort. In academia, we honor the processes of science, the work of scholarship, the processes of collaboration and analysis and authoring, as having a special importance, so it seems natural to build systems to facilitate these processes. But technologies very similar to those at work in the collaboratory can be used to provide electronic "places" to host routine meetings for or-

ganizational problem-solving, and to also record and make available the record of these activities. It may well be the case, in the not too distant future, that in information technology intensive organizations every meeting has an indefinitely long afterlife as a recorded artifact which can be reviewed, annotated, and referenced, and shared as an intrinsic byproduct of the meeting itself, rather than through surrogates such as meeting minutes that may sometimes be specially prepared to document the event.

Instructional Media Systems

Under the auspices of the Educause (formerly Educom, prior to the CAUSE-Educom merger) National Learning Infrastructure Initiative (NLII), there has been a great deal of work on the development of standards for an Instructional Management System (IMS). The IMS can be viewed as a special-purpose digital library that houses digital instructional media objects. The scope of the standard transcends a simple repository to explore links to evaluation and course delivery management as well as to links between instructional objects and the scholarly literature. Many specifics remain unresolved, but the broad scope of the initiative is clear. In terms of the new genres of scholarly communication, the IMS represents a confluence and formalization of traditional classroom activities (involving not only teaching tools and materials but also the evaluation of student learning results) with an archivable record of the processes of classroom teaching and learning. And, of course, materials within the IMS can be linked in very complex ways to other IMS materials, to the more traditional published scholarly literature, or to other new genres such as records of network-based seminars or collaborative participation.

The implications of the IMS are far-reaching. They raise the possibility that instructional materials will be acquired and managed on an institutional basis, rather than individually by students directly purchasing textbooks or their electronic successors. Each faculty member can continually customize the instructional media objects if he or she wishes. The IMS environment creates a much more detailed record of the use and impact of these materials; this record can be managed, owned, accessed, shared and annotated.

Classroom practice itself, or more generally the construction and use of a distributed, network-based learning environment, and even potentially the interpersonal interactions and collaborations that occur when groups

of students learn together, becomes an artifact that is subject to collection in the digital world.

Web Sites as Monographs and Encyclopedias

We are seeing both individual scholars and groups of faculty and students (not necessarily at a single institution) developing subject-specific web sites that represent a new genre in scholarly communication, somewhat akin both to monographs and to highly focused encyclopedias. I've discussed these developments elsewhere (see my paper and others in the proceedings of the conference *The Specialized Scholarly Monograph in Crisis, or How can I get Tenure If You Won't Publish My Book*, at www.arl.org) and will not repeat these details here. However, some of the key characteristics of these works are that they are often collaboratively developed; they evolve continuously; and they are rich in image, sound, and moving images in a way that published print works cannot afford. Because of the ability of the web to make links among independently managed information, they also have the property that their boundaries are unclear; they exist in and define a continuously evolving relationship between the scholarship of multiple individuals or groups, and in this sense represent collaboration as a dynamic process rather than a static series of citations among fixed, published works.

These sites are becoming very important, particularly in the humanities and some social sciences, but also in niche areas of the sciences where they are replacing or supplementing monographs and specialized textbooks. In some cases, they are folding together extensive primary source materials with commentaries and analysis, thus confusing boundaries that have been well-established in print literature through the publication of authoritative editions of primary source materials on one hand, and of critical and analytical works that make reference to these primary source materials on the other. The growing availability of a new range of digitized source materials from cultural heritage organizations such as museums and archives is also providing exciting new opportunities to integrate materials which can enrich these sites, particularly again in the humanities and social sciences.

Coping with the New Genres: What are the Roles for Research Libraries?

As organizations, research libraries have a set of specific functions with respect to scholarly communication: they

select and acquire; they organize and describe; they provide access; and they archive and preserve the record of communication. For the traditional print canon of scholarship, the practice of these functions is well understood and well established. For the new genres described above, it will be necessary for libraries to reconceptualize their activities virtually from first principles. This section of the paper does not provide comprehensive answers; rather, it makes a series of observations and comments that may help to structure the discussion of how the research library will ultimately respond to the challenges offered by the new, discontinuous, technology-enabled forms of scholarly communication.

A caveat is appropriate here. Libraries do not define an era's practice of scholarly communication; rather, libraries must respond to the construction of these practices by communities of scholars. This is a time of enormous change, and of exciting new possibilities: it remains to be seen which of the possibilities offered by technology will prove to be fruitful in improving the practice and documentation of scholarship. These determinations will not be made by libraries, but rather by scholars, teachers, and students, and the criteria for acceptability will not be driven by the convenience of libraries. It is crucial that libraries maintain a posture that is both skeptical about the importance of emerging genres and at the same time accommodating and responsive to new genres as they do emerge into broad use and acceptance by the community of scholars. This is going to be a very difficult balancing act, particularly given the attraction of innovation, the lure of the new, which will tempt libraries to engage new genres early in their development. At the same time, I believe that libraries do have a legitimate role in the dialog and debate about which emerging genres should find acceptance, because the ability to organize, provide access, and preserve these genres is an important factor in establishing their viability; it's essential that libraries make their voices and perspectives heard in the discussions.

Selection and Acquisition

It is clear that the new genres are not yet controlled or marketed by traditional publishers; no commercial marketplace exists for most of these new works. Libraries will need to take a much broader view of how they define the potential universe of materials that are candidates for acquisition and incorporation in their collections. There will be no catalogs to shop from, no ap-

proval plans. For the new genres, price will be a very poor indicator of quality; some of the best may be free, subject only to the effort of working out appropriate agreements with the creators. Identifying materials for potential acquisition will require a close, continuing and open-minded dialog and collaboration with working scholars.

Historically, publishers have served an important role in clearing and clarifying rights to works that they offer for sale. Libraries have not had to worry about who owns materials—when they purchased works from publishers, these publishers would provide implicit answers to questions about ownership, and would in effect indemnify libraries with regard to intellectual property liabilities. As libraries consider “acquisitions” (whatever this ultimately turns out to mean; see below) from the new, broader array of genres of scholarly communication, it is not clear who, if anyone, they are acquiring the materials *from*; ownership of these new information objects is debatable and often diffuse. Some of the material is free for use worldwide via the web, but it's unclear whether this extends to copying. Other complicating factors include the involvement of students as well as faculty in the creation of materials, and the multi-media character of many of the new genres, which invoke intellectual property questions not only about authorship but about participation and depiction of individuals in the events that the works document (Think about model releases for people who are part of a video record, for example: will seminar participants be asked to fill out a form, or will policies be established that say that enrolling as a student or entering a particular classroom implies consent to be imaged?). Intellectual property issues, particularly as they relate to libraries, are much better understood for textual materials than for images, sound, performances, records of events and activities.

Further: libraries used to purchase published material, and their subsequent use of this material was defined within the framework of copyright law, the doctrine of first sale, and fair use. More recently they negotiated licenses for materials, extrapolating from this framework. The new genres are different. Consider the network-based seminar for example. Agreements about what rights the library may have and the duration of those rights is unexplored territory that will have to be mapped through negotiation, institutional policy development, and the emergence of social norms; perhaps occasionally even by law or litigation.

There is a problem of content stability with some of the new digital genres. Unlike print publications, many of these works are continuously evolving. It's not clear what the library would acquire, or how to draw boundaries around the acquisitions.

For some of the new digital genres acquisition costs are not established by publishers, but rather are determined by the costs of the deployment of the technology necessary to record and to store the record of events. Thus, acquisitions costs are related to technology costs in a much more direct, volatile and local way. For example, libraries may in essence be offered the opportunity to selectively fund the creation of content by deciding when they will fund audio or video recording.

Finally, there is an enormous problem with quality control and ranking, and the setting of priorities. Assessing these materials and prioritizing them for potential acquisition will involve a much closer collaboration with faculty and researchers and a much greater exercise of judgement by libraries. A lack of bias towards traditional, well-understood and well established scholarly publishing will be essential for libraries that successfully recognize and exploit the emerging opportunities. Indeed, more than a lack of bias will be required—there is tremendous inertia in the commitment to the print canon: the traditional forms are supported, and promoted through salespeople and marketing campaigns, and also by all of the assumptions of legitimacy implicit in printed literature which manifest themselves in settings such as tenure and promotion practices. They are endorsed and validated by citation indexing, library statistics, journal impact ratings, editorial board members, faculty authors and reviewers—journals in particular are wide-reaching social activities that mobilize large numbers of people in the academic community as advocates.

Organization and Description

Content stability, or fixity is a problem for description and organization. It is not clear what needs to be described. So much of the theory and practice of description is predicated on static, fixed representations as a basis.

The content of these new genres involves multimedia, especially sound records and video. The technologies of capture will provide an enormously large corpus of information at relatively low cost. There will be a need to apply automatic indexing tools, to the extent that this is feasible, just because of the sheer volume of

material. Most of the content is unique, and shared cataloging or indexing models historically used to control and distribute the costs of description and indexing thus offer little economic relief. The pragmatics of indexing video and audio in useful ways will be critical; as speech to text technology comes along, for example, even if it is imperfect, it will be important because it will allow us to leverage text indexing technology against multimedia content.

There is no longer—at least at any practical level—a single, cost-independent “right” way to describe and organize materials that are characteristic of the new genres. For the foreseeable future, the “gold standard” of description will be detailed, human-expert-supplied description (which is very expensive) both of the work itself and, in many cases, supplementing the content of the work with navigational aids; increasingly we will see various computational services that provide indexing and other organizational services competing with human description, offering admittedly inferior quality but at much lower cost and with much greater timeliness. Library managers will need to learn to make what are ultimately engineering decisions about how to execute these cost-performance tradeoffs. To make these decisions we will have to understand technology's capabilities and costs, but also what users of the materials really need.

Further, the materials involved are not only dynamic but also represent complex, interlinked and autonomously evolving works, which present major conceptual challenges to traditional descriptive practices. Addressing the new genres will require not only near term pragmatic approaches, but, in the longer term, new foundational research and deep intellectual consideration. This, in turn, has major implications for how we train new professionals and for the research agenda in library and information sciences.

Access

Provision of access is intimately related to control and rights, which in turn will be negotiated as part of the acquisitions process. Given the ambiguities of ownership and library rights surrounding the new genres, it is unclear that research libraries have, or can acquire, a clear, unlimited and permanent mandate to offer access. It seems likely that research libraries will find themselves engaged in increasingly complex and delicate negotiations about who can have access to these materials, for how long, and under what conditions. It will be very

important for libraries to learn to link access capabilities and selection, to decide when materials are *not* worth acquiring because access is too constrained and they can't afford to keep the materials for close to a century until they enter the public domain.

We are also going to have to sort out what levels of access are responsive to the user community, and this is closely tied to the ability to organize and describe the new genres. It is clear that we can provide superficial description of large scale records of events, for example, and provide access to them. It is much less clear that it will be practical to offer descriptions and provide access at a finer level of granularity, within an object, at least in the near future. We'll have to identify situations when it's not worth acquiring content because the library cannot afford to invest in organizing it in a way that's useful to the user community.

Preservation and Archiving

How long should materials that are part of the emerging genres be archived? Who decides? This, of course, is closely related to who owns them and who controls them—who has the ability and authority to make preservation and archiving decisions? The economic and legal models that surround printed scholarly communication place these decisions in the hands of libraries; licensing of electronic information from traditional publishers has changed this balance, and has made the ability to choose to archive part of a license negotiation. (It is worth noting that as libraries have recognized that archiving decision-making and capability has to be part of a licensing discussion, they have been relatively successful in getting scholarly publishers to address the issues.) For the new forms of scholarly communication, preservation decision making is likely to be a very delicate discussion, and one that will in part be driven by the conversion of content to traditional scholarly communication channels: once a technical report, or a lecture, or a collaborative session is represented in the traditional scholarly literature, the justification of maintaining the “raw materials” for this publication becomes much weaker, and is often likely to be justified more on grounds of capturing history than an active, vital record of scholarship that will be revisited and reused by disciplinary scholars and students rather than historians. The “author” rather than the publisher will be much more prominent for the new genres. Authors will want to assert “moral rights” over their works — they will want to be able to withdraw inaccurate or out-

of-date lectures, or even performances that just did not go well, in a way that they never could with published journal articles, for example.

Stability is a problem for archiving as well: It is not clear what is being archived, or in how many versions, or for what purpose. There are some very complex technical issues here. These have been explored elsewhere and I won't belabor them here.

It is unclear how to finance archiving and preservation of these materials. Their volume is no longer driven by acquisitions budgets or by the scholarly publishing system, but by activities that may take place largely beyond the control of the library. And, of course, costs are open ended and unpredictable for digital preservation, unlike the costs associated with preserving modern printed materials (on acid-free paper).

Conclusions

It is clear there are some common and problematic themes: Content stability and ownership or usage rights are particularly prominent. Libraries will need to consider downstream use of materials as part of the acquisitions process—lifecycle costs and benefits, not just pure acquisitions costs, will be key in determining selection. Archivability, rights to archive and preserve, as well as access restrictions and a realistic assessment of the ability to organize material should and will factor into acquisitions and selection decisions. These are not totally new considerations, but they will take on vastly greater importance.

One fundamental challenge will be to balance resource allocation (not just in acquisitions dollars, but resource commitments at a financial, operational and intellectual level, over the full spectrum of acquisitions, organization, access and preservation activities) to traditional published literature—supported by well-understood economic models, an intensive social advocacy, and an aggressive sales force—with the commitment to new forms of scholarly communication.

This is a time for independent thinking, for intellectual courage, for leadership, innovation and pioneering. It is a time to recognize that we must move to a view that is broader than the print tradition and the published canon. Libraries can embrace or delay the emergence of the new genres; to the extent that they move to engage them, they have the opportunity to shape the landscape of scholarly communication for the next century, and their roles in managing it.