



Issue on the Transformation of Scholarly Communications

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In the three articles presented in this issue of *Research Library Issues (RLI)*, Rikk Mulligan offers an overview of the history of scholarly communication from its beginnings in the 17th century to recent innovations in digital and hybrid publishing.

The first piece provides a brief background and context to frame the formation of the first academic journals and monographs, the rapid growth in scholarly publications after World War II, and more recent hurdles faced by serial and book publishing over the past 30 years, with more attention to the changes resulting from the invention of the World Wide Web.

The second article considers in more detail the scholarly journal and article, experiments in digitization to provide online access beginning with JSTOR and Project Muse in the 1990s, and more recent innovations to meet increasing demands for broader and more open access to journal articles and other short-form scholarship.

The third piece examines longer formats of scholarship. This article frames the crisis in monograph publishing along with responses that include digitized books, born-digital ePubs, and current efforts to attempt alternative forms of funding and to strengthen the infrastructure for electronic publishing and support innovations in format that promote greater discoverability, accessibility, and use of long-form scholarship.

These articles provide the background for ARL's strategic initiatives that are focused on promoting wide-reaching and sustainable publication of research and scholarship. A final discussion forthcoming this fall will build on these three pieces to describe emerging forms of digital research and scholarship that derive from the article and book but enhance and extend these modes of discourse far beyond their current states.

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Part I: Context and Background

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Scholarly communication is the process of producing, evaluating, disseminating, and preserving the research findings of scholars and scientists shared with academic communities and other interested parties. This process helps shape academic disciplines, legitimize lines of inquiry and research methods, and influence public policy; it requires not only the availability of published materials, but also their review, use, and reuse as part of an active and evolving exchange of ideas. Scholarly publishing, the journals and monographs at the core of scholarly communications, has faced a series of challenges over the past few decades: discoverability, collection and preservation, and especially publication and production. Since the mid-20th century, new technologies have been and are being created to meet these challenges, yet many solutions have quickly become obsolete or spawned new problems, such as the attempt to reduce costs by using the Internet to distribute digital publications creating complications involving intellectual property rights, discoverability, and citation. Although the Internet initially appeared to offer a way to reduce the costs of scholarly publishing, particularly in the global north and other portions of the developed world, today, more than 20 years after its advent, its potential to deliver innovative modes of transmission and new communication formats remains largely untapped. Digital publishing has become a form of scholarly communication using PDF and ePub versions of articles and monographs, yet these remain tied to the long-struggling traditional publishing industry, particularly in the West, while more experimental and hybrid forms of scholarship remain on the fringe of student use and faculty acceptance.

Scholarly publishing, the journals and monographs at the core of scholarly communications, has faced a series of challenges over the past few decades: discoverability, collection and preservation, and especially publication and production.

Although scholars have always communicated with one another, the system of scholarly communication began with the formation of learned societies in Europe and quickly spread to colonies and centers of learning throughout the world. Groups of philosophers, observers, and experimenters formed societies to help them work together to increase their knowledge and define common goals by sharing discoveries and experiments. Formal scholarly communication in the English language began in the collection of the notes and letters of the members of the Royal Society of London and their publication in a scholarly journal, *Philosophical Transactions of the Royal Society*, in 1665. In addition to notes and letters, scientific articles quickly became the standard form used within such journals to disseminate observations and findings among society members, patrons, and sponsors. The system continued to evolve and expand as these societies proliferated, diversified, and grew. Journals became serial publications whose increasing number and volume required the development of indexing and cataloging practices in libraries and peer and editorial review processes by the societies to manage their production. However, because the audience for these works was relatively small and specialized, seldom were sales enough to cover production costs and labor. Scholarly publications therefore became the product of a gift or prestige

economy rather than that of a strictly commercial market. Much of the labor surrounding scholarly publications, writing, editing, and peer review, was and is essentially exchanged for reputation and prestige, factors that became and remain important in the assessment, promotion, and tenure process of modern higher education.¹ The system of scholarly communication continued to grow and evolve beyond the journal as the landscape of higher education changed.

The passage of the Morrill Act in 1862 brought about the creation of the land-grant university system and shifted the focus of higher education in the US toward research and improving the economy. More than just increasing the number of students and faculty, the range of scholarly disciplines expanded as did large-scale research projects that necessitated a new long-form of scholarly communication: the scholarly monograph, a specialist work on a single subject by a single author, a format that has since become inextricably linked with the system of assessment, promotion, and tenure for those in the humanities and social sciences. The 1887 Hatch Act placed greater emphasis (and access to funding) on experimentation and the 1914 Smith-Lever Act on sharing knowledge and information with the public, suggesting a greater emphasis on publication by professional scholars.² The monograph was intended to meet this need, rather than provide a source of revenue or even cost recovery, so it fell to universities to augment the efforts of the scholarly societies by also becoming publishers. The economics of the monograph meant that these new university presses also came to depend on the same prestige economy that already supported journal production.

Surprisingly, journals and monographs became profitable in the second-half of the 20th century after the GI Bill and the “space race” fueled a greater expansion of higher education and the rapid conversion of teachers’ colleges into universities. Publishing had to expand to meet the burgeoning needs of a growing faculty and body of scholarship, along with increased interest in new science and technology, leading libraries to purchase more works, and then to physically grow as they required more storage space. This activity was largely funded by government grants and programs in the post-war decades, especially in the STEM disciplines (science, technology, engineering, and mathematics), yet society and university presses could not keep up with the demand, attracting commercial publishers to the now lucrative academic market, creating what some have called the golden age of academic publishing. However, because most of this production was supported by public funds rather than the scholarly market (student use, library holdings, or for use in promotion and tenure review),³ when federal and state budgets were eventually cut in the 1970s, sales faltered and scholarly publishing began to suffer.

The changing roles and mission of libraries and the spreading influence of digital technology began to radically alter scholarly communications in the 1980s. While libraries tried to maintain the strengths of their collections, and preservation efforts and bibliographic control, they also moved to automate processes as computer and information technology developed. Library experts such as Martin Cummings and David Lewis considered the costs of automation and the changing nature of the library, its holdings, and services, with Cummings addressing automation and cataloging, and Lewis forecasting not only the way research might change, but also how scholars and students might use the library differently (if at all).⁴ Cummings added to the voices of others in pointing out that the cost of publications had risen faster than the consumer price index since the late 1970s and libraries had started to develop “resource-sharing

schemes” even as publishers began to look to new online sales of information services for profits.⁵ In 1986 Cummings saw the advantages of preparing and storing information electronically to increase access, availability, and preservation, although this was before consumer-based challenges appeared such as media evolution and the rapid obsolescence of formats (floppy disks, video tapes, CD-ROMs).⁶ By 1988, although Lewis was looking at the library, his comments reflect changes needed in the system of scholarly communication as the “power of new media and the failings of the old system [of print publishing] are driving scholarly institutions toward change.”⁷ Things were beginning to change, slowly, and the advent of the Internet created greater disruption of both scholarly communications (including all forms of publishing) as well as research libraries.

Decades before the Internet was created, librarians and others began to envision networked texts, data, and scholarship that would propel research in the future—the activity that became the conceptual basis for the World Wide Web. Before J. C. R. Licklider of MIT published his report outlining such a vision, *Libraries of the Future*, he described how data, programs, and information might be accessed by people using computers from anywhere in the world; he called this concept a “Galactic Network” in 1962.⁸ The first steps to creating this global network, what would become the Internet, began with DARPA and the ARPANET in 1969. By the mid-1980s it was common for students in the sciences and engineering to dial-in to their institutional mainframes and libraries. By the end of the 1980s, network providers including America Online, CompuServe, UUNet, and PSInet, among others, provided access to the growing free and commercial network of servers. The text-based Internet with its electronic billboards, chat relays, and early use-nets all suggested that the potential Lewis had described as the future digital library was within reach and most university students were now expected to own and use computers in their research and scholarship. 1992 is marked by many as the point at which the World Wide Web became open to the public thanks to the invention of Mosaic, the precursor to Netscape Navigator, a graphical user interface that could present the contents (initially limited to text and images) of these early websites—the first web browser.

1992 also marked the publication of an influential book on the need to transform how the library delivered its services at the dawn of the digital age and of a study commissioned by the Andrew W. Mellon Foundation on the changing and possibly troubled economics of the research library. Michael Buckland’s *Redesigning Library Services: A Manifesto* articulated how library services—providing access to knowledge—needed to be considered in terms of the paper library, automated library (where Cummings and Lewis had placed their focus), and the fast-growing electronic library. Even though Buckland’s vision did not immediately integrate with the emerging World Wide Web, it did suggest how networked data might help libraries take advantage of extended, interconnected catalogs, bibliographies, and digital texts. The report commissioned by the Mellon Foundation, *University Libraries and Scholarly Communication*, emphasizes this moment of flux by suggesting that the entire system of scholarly communication was about to change in part because it was no longer sustainable in its present form. The roots of this study lay in the ARL Serials Prices Project (1989), the findings of which so concerned the Mellon Foundation that it launched its own multi-year study⁹ to better understand major trends in research library spending, including the portion spent on journal subscriptions versus book purchases, the share for new acquisitions versus the cost to preserve and catalog holdings, and to consider how new technology had

recently affected the work of librarians and archivists as well as to envision future changes in not just libraries, but also those needed to sustain scholarly communications more broadly. Scholarly publishing had long coped with a series of issues that one press director characterized as a “chronic illness” going back to at least the 1970s, but also continued into the 1990s as libraries bought fewer books and journal subscriptions.¹⁰

Between the economic instability of the traditional print forms and the need for libraries to use the latest technology to fulfill their core services, both short-form and long-form scholarship had to transform. This transformation started with digitized forms made available online, but quickly began to evolve new features and hybrid forms.

In the early 1990s libraries had already been under tremendous strain because of increasing journal subscription fees, the proliferation of cross-disciplinary journals, the growing demands for ever-more specialized monographs for tenure and review (even though fewer were selling to libraries), and the burgeoning amount of scholarship being produced by faculty under greater demands to publish more and faster. As Buckland’s manifesto suggests, libraries were also under pressure to alter the way they provided services to readers who were quickly being redefined as “users.” The Internet spawned the open source movement for computer code, which provided a model for new initiatives pushing for the free and open access to information—including scholarship and the vast field of gray “unpublished” literature. The Internet also quickly offered novel options to disseminate research and create new forms of scholarship and revolutionary experiments in academic narrative and argument as hybrid or emerging scholarship. Between the economic instability of the traditional print forms and the need for libraries to use the latest technology to fulfill their core services, both short-form and long-form scholarship had to transform. This transformation started with digitized forms made available online, but quickly began to evolve new features and hybrid forms.

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Part II: Journal Articles and Short-Form Scholarship

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Researchers and scholars communicate informally, typically verbally and in person (lectures, symposiums, conferences), and formally through publications (peer-reviewed journal articles, conference papers, monographs, and edited collections). Short-form scholarship includes publishing research results and arguments as articles and conference proceedings, but newer online forms such as data sets, data visualizations, and blogs are becoming more common, accepted, and even expected. The oldest formal scholarly communication, the scientific article, appears in the journals of learned societies shortly after they were first published 350 years ago and has since become the gold standard for scholarly communication in the STEM (sciences, technical, engineering, and mathematics) disciplines. Although the article is also used in the social sciences and the humanities, these disciplines favor the monograph format.

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Since the 1970s a number of studies have described challenges to the article and journal in scholarly communications as a growing “serials crisis,” in which the cost for subscriptions or access to bundled scholarly journals has continued to increase faster than the rate of inflation, requiring libraries to spend more on journals and less on book purchases, in turn helping to create the “monograph crisis” by the early 1990s. Over the past four decades, other challenges developed, in addition to rapidly rising costs—from the sheer volume of publications to exchange rate fluctuations (weaker US \$), declining federal and state funding for higher education, reduced university budgets, and the convergence of US and Canadian research library choices in what they purchase/collect that effectively reduces the range of scholarship available to students and researchers.¹ All of these factors became part of a continuing series of crises that have lasted so long that scholarly publishing has been chronically weak and ill for decades.² In the 1990s this illness and the advent of the Internet helped spark the open access (OA) movement for academic publications, and today it increases the pressure to experiment with new economic models and to create and use born-digital scholarship as e-journals, e-books, and other hybrid or emerging forms of scholarship.

The Serials Crisis

The price of journal subscriptions has long been a point of discussion and anxiety; however, it took a spike in prices in 1986 and the subsequent ARL Serials Prices Project to help define the serials crisis by 1989. Mary Case, in her essay describing the first two decades of ARL’s Office of Scholarly Communication, outlines how the crisis came to be understood only during a Mellon Foundation-funded study of journal subscription costs as part of the overall economics of research libraries that resulted in the 1992 report,

University Libraries and Scholarly Communication.³ Since then, ARL staff and many other librarians, publishers, and scholars have continued to refine the discussion of the crisis. This state of affairs has lasted so long that many seem to have accepted it as the status quo; some go so far as to blog that the crisis is over⁴ or ask if it even occurred.⁵ But these crisis naysayers seem to be outliers, most of whom avoided responding to recent arguments that the crisis intensified with the “great recession” of 2007–2009;⁶ they were very quickly refuted.⁷ The argument over journal pricing remains heated even after sparking the rise of open access journal publishing, a recent heightened period of open access activism including journal boycotts by noted researchers, and the emergence of multiple variants of public and open access publishing.

The serials crisis has not been limited to only the price of journal subscriptions in the 25 years since the term was coined. Since the 1960s the exploding number of journals published, especially in the STEM fields, created such a massive body of scholarship that simply finding information became more difficult as the materials required an ever-increasing share of space and portion of the libraries materials support budget.⁸ When impact factors were defined as a means to rank journals in 1969 they helped to create and emphasize hierarchies of prestige and pedigree among publications, yet finding something specific in the vast sea of information became more challenging, even when restricting the searches to the indexes and catalogs of “quality” publications. This massive increase in STEM titles meant that libraries had to choose which to purchase; even the best-funded could not buy everything, and many smaller colleges and universities faced near-impossible decisions over what to cut because no matter how many faculty were part of the selection process, some would continue to loudly argue that they were missing critical teaching and research resources. Although more and more STEM titles were left out of purchasing, the humanities and social sciences bore most of the brunt of these cuts.⁹ Adding yet more pressure to this dysfunctional system, inter- and cross-disciplinary journals were launched to meet the growing, yet more narrow and specific, needs of rising multidisciplinary forms of academic research and teaching. However, because they were new, did not generate high impact factors, or were known to only a rarefied segment of the faculty, many of these publications did not make it into the libraries or later bundling plans of commercial publishers and aggregators.

The 1992 Mellon study, *University Libraries and Scholarly Communications*, describes the origins of the crisis in detail and finds its key factors to be: scientific and technical journals tend to be more expensive; they tend to publish more issues per year, often with more pages; and they use more graphics, illustrations, and images than those of the humanities and social sciences.¹⁰ In addition to escalating subscription fees, other aspects of the crisis include the bundling or aggregation of subscriptions, the practice of requiring authors to sign over their copyright, and the highly restrictive licenses that can even prohibit authors from using their own work in future publications and the classroom. This study became the basis for Mellon’s allocation of grant funding in a number of interrelated projects, initially by digitizing journal back issues to increase access, then turning to digitizing special collections and other library resources, before moving into shoring up and strengthening the scholarly publishing system, especially with the most recent experiments to expand the digital infrastructure of university presses. The Mellon Foundation was not alone in its efforts; the National Endowment for the Arts (NEA) and National Endowment for the Humanities (NEH), among others, also contributed to experiments and advances in the system of

scholarly communication, but since the 1990s budget cuts for the NEA and NEH (public funding) have led to Mellon (private funding) coming to overshadow the rest. Mellon's commitment and resources help set much of the direction for current experiments and projects using the Internet and digitization to better promote scholarly communication.

Reactions to the Serials Crisis

Responses to the rising cost of supporting journal subscriptions included the collective response of library consortia, strengthening interlibrary loan, digitizing back issues, creating digital or e-journals, open access and public access publication, and experiments with alternative short-form formats. Library consortia are not new, but in recent years they have become increasingly involved in the purchase and licensing of electronic resources including databases and bundled journal subscriptions, first introduced in 1996 with Academic Press's "Big Deal." However, 15 years after these bundling options were introduced they were no longer as effective as they had been in increasing the ability of individual libraries to access resources, as members of consortia or individually. As Richard Poynder points out, the bundled option only worked for a short while as the large line-item purchasing limited the flexibility of library directors to apply their budgets and resources more selectively. By 2011 it was apparent that bundling had failed to curb costs—the cost of the bundled deals had risen from 50% of a library's purchasing budget to around 65%.¹¹ Poynder describes the response, "as publishers' journal portfolios got larger and larger as a result of industry consolidation, the Big Deals began to devour an ever larger portion of a library's budget."¹² Regardless, faculty continue to clamor for access but have only slowly started to embrace alternative publishing options such as OA journals or the voluntary deposit of even their pre-press publications in institutional repositories.

Responses to the rising cost of supporting journal subscriptions included the collective response of library consortia, strengthening interlibrary loan, digitizing back issues, creating digital or e-journals, open access and public access publication, and experiments with alternative short-form formats.

Innovations in Digital Journal Publishing

In the 1980s librarian-futurists such as Martin Cummings and David Lewis believed that electronic publication of all journals and books was the future of a near-universal scholarly communication system. Cummings argues that electronic publishing would be used because of the advantages it would offer: "(1) more than one person can access and use the information simultaneously; (2) it is always available (e.g., never at the bindery, misplaced, or lost); and (3) it can be expected to be more durable than information on paper."¹³ Cummings had expected electronic publications to be stored on optical or compact disks, but as with the experiments in putting magazines and journals on floppy disks, these media proved ephemeral. Donald Waters points out that by 2005 peer-reviewed scholarly journals were migrating "from print to electronic publication...at a particularly rapid pace" and that a growing number of "editors are treating the electronic versions of journals as the definitive versions of record."¹⁴ Migrations to electronic journal or e-journal format helped make scholarship more accessible, searchable, and citable, but the exponential

growth of such journals (especially STEM) meant an increased risk of work being lost or overlooked, although journal aggregators and online full-text databases help mitigate against such loss. These newer e-journals began to offer enhancements beyond print and full-text searches as evolving technology enabled embedded images, illustrations, graphs, photos, video and animation clips, and hyperlinks to references and other sources. However, many libraries had to reduce or discontinue some of their print subscriptions to free up funds for new e-journal subscriptions, with others turning to the growing number of open access publications for their users as well. Regardless, Waters warned that libraries (and other subscribers) only licensed access to the “content stored on remote systems controlled by publishers” and that consolidation put this control into “fewer and fewer hands,”¹⁵ necessitating not only some form of sustained access but also the creation of digital archiving services as access was not the same as ownership and material could be lost.

In 1993 the Mellon Foundation began experimenting with new approaches to reinforce the work of research libraries to support scholarship and higher education in general; these included “online, stand-alone, and hybrid technologies, applied to a range of arts and sciences fields in a variety of institutional settings (from small colleges to large research universities).”¹⁶ Mellon emphasized “electronic publishing” broadly by providing grant support to a number of institutions exploiting new technologies in wide variety of approaches in part as a response to the growing crisis in scholarly publishing. In 1994 Mellon began to support the creation of e-journals as well as the digitization of back-issue journals; this meant, among other things, grants to MIT to establish an e-Journal, *The Chicago Journal of Theoretical Computer Science*, which did not restrict the use of its content, making it a very early completely open access publication. Mellon in concert with the NEH helped Johns Hopkins University Press to make their 40 scholarly journals available digitally through Project MUSE (formerly the University Press Ebook Consortium), greatly enhancing their accessibility, but only within those institutions that paid to subscribe to these works. The use of a paywall helped Project Muse recover costs, so within a few years it had expanded to include other scholarly presses and journals as part of its subscription-restricted content as a “leading provider of online journals in the humanities and social sciences.”¹⁷ In 1994 another much more ambitious program was begun, the Journal Storage project (JSTOR); it was conceived of as a means to reduce the costs of (physical) storage, and to enhance access and usage of academic articles by digitizing journal back-issues in the humanities and social sciences.¹⁸ JSTOR began by page-scanning series to supply 600 dpi images as downloadable PDFs in a database, but also began experimenting by adding SGML tags in 1995 to aid in indexing and discovery, providing an example for future digital works to emulate.¹⁹ By 1996 JSTOR had grown to include 100 scholarly journals in a number of fields, with more publishers beginning to recognize the practical advantages to having their materials contained in the database to augment print publication.

In April 1997 a conference largely supported by the Mellon foundation was held at Emory University in which a large number of papers discussed issues surrounding electronic publishing, including: “journal pricing and user acceptance, patterns of use; technical choices and standards, licenses, copyright, and fair use; and multi-institutional cooperation.”²⁰ The great success of JSTOR led to the creation of the ARTSTOR project, another database whose creation would parallel, complement, and even extend the mission of JSTOR to provide textual content by “organiz[ing] and distribut[ing] electronic archives of art

images, manuscripts, and relevant scholarship.”²¹ By 1999 JSTOR had been created as a stand-alone, not-for-profit enterprise, and by 2000 its institutional subscriptions made it self-supporting and a model for future e-journal publishing, especially more recent efforts to create only digital and not print editions. Digitization made more materials available to students and faculty, but, because of paywall restrictions, not to independent scholars or most of the general public who had been part of the earlier visions of the digital future and are part of contemporary references to lifelong learning and citizen-scholars. However, starting in the fall of 2011, JSTOR began to incorporate this mission by making more public domain content freely available to the public,²² and in 2014 began offering its JSTOR Daily articles freely and publicly.

The early experimentation with digital versions of magazines and journals distributed on floppy disks and CD-ROMs were only of limited success and short-lived, but the success of digitized (PDF) articles in JSTOR and Project Muse helped those who wanted to increase access to and use of journals to pursue more born-digital formats. Commercial and not-for-profit publishers made their digital journals more available to an academic audience by establishing their content behind paywalls or through subscriptions similar to the existing big bundle options, but others attempted more ambitious open access plans. Unfortunately, of these early experiments, only half of the 86 OA journals being published in 1995 were still active by 2001 as the initial two to five years of “enthusiasm” waned, strongly suggesting that alternative funding was a necessity for sustainability.²³

A number of other online journals and experiments with short-form scholarship have been much more successful. HighWire Press, affiliated with Stanford University since 1995, started with the *Journal of Biological Chemistry* (JBC Online) and later added *Science*, the *Journal of Neuroscience*, and *Proceedings of the National Academy of Sciences* (PNAS); it now numbers at least 1,700 journals, accessed through institutional and member subscriptions. Since the late 1990s other significant STEM e-journals have been created and thrive today. In the medical field, PubMed Central (PMC), the NIH’s full-text database, was founded in 1996; BioOne (1999) a nonprofit publisher and full-text aggregator offers more 180 titles in *BioOne Complete*, as well as its OA journal, *Elementa: Science of the Anthropocene* through library site subscription. PLOS, the Public Library of Science, was founded in 2001 and reorganized into an OA publisher in 2003 by using article processing charges (APCs) paid by authors (or their institutions)²⁴ to allow unrestricted access and reuse of its content (articles) under a gold open access model²⁵ within its journals *PLOS Biology* (October 2003), *PLOS Medicine* (2004), and several others.

To enhance the accessibility and discoverability of many of these digital publications, in 2003 the *Directory of Open Access Journals* (DOAJ) was founded as a comprehensive directory of journals that conform to the Budapest Open Access Initiative definition of “open access”²⁶ by supporting the rights of users to “read, download, copy, distribute, print, search, or link to the full texts of these articles.”²⁷ As of June 1, 2015, the DOAJ includes: 10,596 journals, 6,385 searchable at the article level; 134 countries; and 1,912,328 articles.²⁸ Beyond the directory, the number of searchable online databases of scholarly journals have expanded to also include: the Academic Journals Database, Open Access Journals Search Engine, Genamics, JURN Directory for the Arts & Humanities, the British Library’s Zetoc, and RoMEO Journals database, among others. But the vast majority of these databases appear to be STEM, many funded on the gold access

model using APCs or author-provided subventions. Some projects have led to completely OA web-based platforms run by scientists themselves, such as arXiv for the physical sciences and bioRxiv for the biological sciences. The acceptance of APCs also led to the rise of “predatory” open access publishers and stand-alone journals, which in 2015 the academic librarian Jeffrey Beall lists at 825 publishers²⁹ and 701 journals,³⁰ respectively.

Some of the first experiments in providing digital access used the back-issues of humanities and social science journals, but these disciplines have generally been much slower in adopting e-journals and remain resistant to public access and open access. Regardless, first the Humanities and soon thereafter the social sciences became the testing ground for not only digital humanities projects, but also new digital publishing initiatives beginning in the 1990s. The Public Knowledge Project (PKP) was founded in 1998 and created the Open Journal Systems (OJS) as an online, freely available, open-source journal management and publishing platform, initially in Canada, as an alternative to paying publishers for access. The Mellon Foundation selected several institutions to receive grants in 2008 to support humanities and social science publishing initiatives in e-journals: the *Journal of the Society of Architectural Historians*; the American Philological Association for the electronic version of *L'Année Philologique*; and the University of York for the online journal, *Internet Archaeology*, to commission articles based on four US archaeological projects.³¹ The University of California Press (UCP) started *Collabra* in 2014, while it will begin by publishing open access STEM titles using an APC variant as its economic plan, UCP plans to expand to social sciences and the humanities over the next three years. Beyond *Collabra* (and its open monograph publishing system, Luminos), UCP is also experimenting with payment plans that enhance the typical gift-economy model and shift the reward back to scholars-as-participants (authors, reviewers, and editors) with a pay-it-forward community approach to its APCs to support OA publication. Open access publication at large is a far more nuanced discussion that extends beyond the e-journal, even though green or gold access are an aspect of how many publishers (with PLOS one of the best examples) are handling payment and access to content, as opposed to the paywall or subscription-based access of Project MUSE and (most of) JSTOR content. Most recently Mellon funding is being used to help support the Hypothes.is Project “to enhance its open source software platform and implement annotation services within Project MUSE; Michigan Publishing’s *Journal of Scholarly Publishing*; Scalar, the multimedia authoring and publishing application developed at the University of Southern California; and MLA Commons, an online platform for scholarly collaboration and networking.”³²

Institutional Archives and Repositories

The proliferation of born-digital e-journals required a new form of preservation and the practice of archiving these digital publications in institutional repositories (IRs) developed in the 1990s. Kathleen Fitzpatrick points out that no single institution could archive everything, and that attempting to do so is beyond the means of even the best-funded research libraries, yet preservation is even more critical for born-digital works.³³ In 1998 the LOCKSS (Lots of Copies Keep Stuff Safe) program was started at the Stanford University Libraries as a way to safeguard digital assets. LOCKSS was also supported with funding from the Andrew W. Mellon Foundation, the National Science Foundation, and the Library of Congress before it became self-sustaining in 2004. CLOCKSS (Controlled LOCKSS), with servers at Rice,

Indiana, and Stanford universities, is a not-for-profit joint venture of libraries and publishers to ensure long-term access to digital scholarly publications. A similar archive is the Scholars Portal, founded in 2002 by the Ontario Council of University Libraries as shared infrastructure and collections among 21 provincial university libraries. Another outcome of Mellon funding is Portico, created in 2002, as a digital archive serving the academic community by helping it transition from print to digital content.

Between Short- and Long-Form

Born-digital research output has also gone beyond the early PDFs of article page-scans and HTML essays to formats that fall between the article and the monograph. Georgetown University Press offers a Digital Shorts product that is a peer-reviewed and professionally copyedited essay that falls between 10,000 and 40,000 words. Palgrave Macmillan uses its Pivot line to sell 25,000–50,000 word essays that are far longer than an article, yet remain shorter than monographs. MIT Press has gone yet another direction is selling excerpts (perhaps better thought of as “teasers”) of its monographs as stand-alone products. These new formats have not been as successful as the university press might like, but they are similar to the use of blogs and some forms of social media in that they provide more immediate work to the public and suggest greater experimentation will come in the near future.

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Part III: Long-Form Scholarship: Monographs and Scholarly Books

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The modes of traditional long-form print scholarship primarily encompass the monograph, scholarly book, critical edition, textbook, and the edited collection. In some quarters a sharp distinction is made between the monograph and the scholarly or trade book because of the differences in their respective audiences and sales figures. The historian and former provost of the University of Pennsylvania Stanley Chodorow makes this distinction by describing the monograph as a “specialized work of scholarship that provides a detailed treatment of a narrow topic within its field” that is also “the product of a large project usually carried out by an individual scholar,” while the scholarly book “is aimed at the broadest possible audience within a field and deals with general theoretical issues or offers a general explanation of a general question.”¹ For many outside the community encompassing colleges, universities, research libraries, university presses, and learned societies, the distinction between these types of books is “academic.” For those in the humanities and humanistic social sciences the monograph is the most important format of scholarly communication, yet many argue that its existence has grown increasingly endangered over the past two decades, prompting cycles of analysis, reaction, and frustration. Sometimes referred to as “the book that won’t sell,”² monographs stimulate debates about the need to reach a larger audience (to sell more copies) and revise the peer-review process to increase use (and sales), and spark fears of further declines in print runs and the number of manuscripts accepted for publication, leading to experiments in electronic books and digital presses, and proposals for alternative forms of economic support, especially of the first-books of early-career scholars.

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In America both university presses and the monograph date back to the last quarter of the 19th century, although the latter has only gained prominence over the past few decades as it began to figure more heavily into the professional certification and assessment of humanities scholars.³ The form of the specialized scholarly monograph derives “inspiration from the German universities, where strong emphasis was placed on research and publication,”⁴ according to Joanna Hitchcock, but this form also tends to restrict its readership and limit sales because it does not usually appeal to a general audience. Yet this form of scholarship has become the gold standard for humanities scholars in the promotion and tenure process, and is sometimes considered in hiring decisions. Douglas Armato, director of the University of Minnesota Press, points out that questions about whether the monograph is overproduced, overly specialized, and has too limited an audience go back to at least the late 1920s. Yet its format was not designed to be profitable and instead relied on the “gift-economy” system of the “free” labor of scholars,

supplemented (or supported) by university subsidies to their presses to meet the demands of the academic market. This combined market system began to fail⁵ when monograph sales flattened in the 1970s and 1980s as the number of monographs purchased by college and university libraries, the greatest share of sales, leveled off amid budget cuts⁶ ...while the number of monographs published continued to climb. This market instability and a feared decline in scholarly communications contributed to the decision of many agencies and funders, most notably the National Endowment for the Humanities and the Andrew W. Mellon Foundation, among others, to begin evaluating alternate modes of scholarly communication such as experiments in electronic publication in the 1990s;⁷ these began with journals but quickly moved into experiments with book-length works.

As the Internet began to coalesce, the digital book came to be seen by many as the future of higher education and scholarship, with early projects focused on digitizing special and hidden collections in research libraries or assessing the financial hurdles to establishing electronic libraries.

By the mid-1990s the continued weakness of monograph sales and flattening or declining acceptances for publication began to be termed a crisis in scholarly communications within academic departments, university presses, and scholarly societies. In September 1997 the American Council of Learned Societies, the Association of American University Presses, and the Association of Research Libraries cosponsored a conference, "The Specialized Scholarly Monograph in Crisis or How Can I Get Tenure If You Won't Publish My Book?" The conference proceedings describe the weakness of the scholarly monograph within an environment struggling to not only adjust to the existence of the Internet, but also to respond to the network being used to distribute digital copies of works and born-digital sources in ways that did not threaten established academic publishers. The conference was convened in response to specific fears: that the number of books published had leveled off, decline in amount-per-title printed (from 1,000–1,500 to anywhere between 200–400), weakening university support for their presses, and fear that "subventions for publishers from agencies such as the National Endowment for the Arts and National Endowment for the Humanities had virtually disappeared."⁸ Scholarly societies, including the Modern Language Association (MLA) and American Historical Association (AHA), issued their own warnings to members regarding the crisis by the late 1990s and early 2000s. Their more dire predictions went beyond the soft-sales of monographs and greater publisher selectivity, to the possible damage that fewer published books might do to the academic credentialing and hiring processes, as well as further limiting access to scholarship for students, researchers, and the general reading public. Although technology was first used to digitize older books for preservation and to increase access in the early 1990s, the growing challenges to publication moved some to advocate for experiments in electronic books or to argue that the monograph required a new effective means of online publication to be saved.⁹ The efforts to create digital manuscripts and electronic theses and dissertations (ETDs) quickly expanded into a variety of ventures in e-books, e-presses, and alternative funding strategies for digital monographs including open access initiatives, but many of these initiatives have since stalled due to pushback from publishers and (often midcareer) humanities scholars themselves.

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research libraries or assessing the financial hurdles to establishing electronic libraries. The National Endowment for the Humanities and the Mellon Foundation helped fund projects that created digital versions of primary materials ranging from medieval and early modern manuscripts to early American fiction or varieties of cultural heritage materials including letters and diaries. The Mellon Foundation moved from its study of the economics of research libraries to projects such as the Online Books Evaluation Project (1994–2000), which sought to forecast the processes needed to create a digital library, and a number of more recent projects to evaluate digital monograph production. While the foundation began to first consider what kind of infrastructure would be needed to support digital books it also started to explore a variety of methods to produce such materials, including the humanities scholarship most threatened by the monograph crisis. Over the past twenty years a number of projects have helped to produce online long-form works: e-texts and digital versions of texts; digitized print monographs; developing specialized tools and techniques to mark-up electronic texts; print born-digital monographs; the first electronic press software systems; and the early-stage development of digital press infrastructure, some of it aligned with the open access movement.

E-Texts and Digitized Versions of Books

The earliest electronic (ASCII) texts were products of Michael Hart's Project Gutenberg, started in 1971, with later additions to the digital corpus made by projects such as the MIT-based Shakespeare Digital Archive beginning in 1992, but digital monographs lagged behind. The efforts to develop e-texts have grown (if not matured) with the World Wide Web and gained substance from technological innovations in digital media. The Library of Congress ran its pilot program for what would become the American Memory project from 1990 to 1994, when it became the National Digital Library Program and was supported by Congressional and private funds for the next six years of its development; its collections include digitized texts.¹⁰ Shortly thereafter, in their 1999 annual report, Mellon emphasized its continued and growing focus on the impact of information technology (especially digitization) on scholarship, scholarly communication, and libraries. That year the Mellon Foundation supported the American Historical Association's efforts to produce electronic versions of doctoral dissertations with an emphasis on the potential benefit that electronic manuscripts could be more easily used by future scholars. Mellon also helped fund a project by the American Council of Learned Societies (ACLS) to digitize a backlist of 500 titles (primarily monographs) and promote a database that would make these works available by subscription. Similar grants helped the Oxford University Press begin its own digital library of 1,500 volumes and the University of Virginia digitize a number of early editions of American literature.¹¹

Between the years 1995 and 2000 the number of Internet users exploded from 16 to nearly 400 million.¹² The proliferation of websites and digital resources also grew rapidly, shifting from government and higher education to commercial pursuits until the dot-com bubble burst. Other large-scale projects include what began as the Google Book Search Project in 2002, to become the "Google Print" Library Project in 2004, whose initial collaboration has grown from Google and a small number of university and commercial presses to include over 100 participants drawn from American, Canadian, British, and European members and is now known as the Google service, Google Books.¹³

Digital Monographs

Donald J. Waters, senior program officer for scholarly communications at the Mellon Foundation, pointed to the digital transformation of journals in the late 1990s through the accomplishments of JSTOR and Project MUSE, and work by publishers including Elsevier and Wiley as models for what Amazon, Google, and the Internet Archive did for books in the first decade of the 2000s.¹⁴ A search of the Mellon Foundation's grants database reveals that between 1993 and early 2015 at least 41 of its grant-recipient projects have involved some aspect of digital monograph publication or systemic evaluation and have been at least partially funded with more than 21 million grant dollars.¹⁵ Of these projects involving digital monographs, 33 have been funded since the year 2000, with more than half only begun within the past five years, shortly after the "end" of the "great recession." Mellon's Office of Higher Education and Scholarship in the Humanities helped fund early digital monograph production assessments at Johns Hopkins and Stanford universities (1994 and 1996), and some of the first texts created as part of the University of California Press's Scholarly Monographs in Area Studies project were funded by Mellon's Office of Scholarly Communications beginning in 1997.¹⁶ Other projects include the ACLS History E-Book Project, a \$ 3-million, five-year grant to produce 85 original digital manuscripts that became self-sustaining in 2005, and was renamed the ACLS Humanities E-Book (HEB) project in 2007. As with the ACLS backlog, this online collection of around 4,300 humanities books is fully searchable but only accessible through institutional and individual subscriptions today.¹⁷ Still, this is but a fraction of the total number of scholarly monographs produced in any given year.

E-Presses

Efforts to digitize texts and create digital monographs led to the first forays into developing electronic publishing platforms (software) and a more robust digital press and distribution infrastructure. Digitized texts (PDFs of JPG images) quickly grew more sophisticated to incorporate specialized SGML markup, such as that of the Text-Encoding Initiative (TEI), and to also produce XML with a variety of outputs including Acrobat PDF, ePub, or HTML for web and mobile viewing. In 1997 Mellon supported an experiment in the electronic publication of scholarly monographs by the University of California Press to create 24 monographs in Middle Eastern, African, and South Asian studies. After having matured into a self-supporting producer in the early 2000s, Project MUSE partnered with the University Press E-Book Consortium in January 2012 to launch the University Press Content Consortium, with close to 100 presses participating by 2014 using an e-book distribution model.¹⁸ Most recently, the Mellon Foundation has turned to focus on infrastructure and university press digital capacities for groups of university presses working together based on a multi-part solution, including: "(a) editing; (b) clearing rights to images and multimedia content; (c) the interaction of the publication on the Web with primary sources and other related materials; (d) production; (e) pre- and post-publication peer review; (f) marketing; (g) distribution; and (h) maintenance and preservation of digital content."¹⁹

The University of California Press announced its Luminos digital monograph press in the fall of 2014, offering not only open access scholarship but also a new way of handling the funds of APCs by "paying it forward." Although UCP requires APCs (traditional subventions) to sustain the editorial and peer review portions of the publishing workflow, rather than hold onto the excess as profits their goal is to give "editors and reviewers the opportunity to put their earnings towards their supporting institution's

OA initiatives or the article processing charges of future authors' submissions to the journal."²⁰ Another recent innovation is the networked monograph—electronic versions of scholarly works that will be iterative and produced alongside traditional print editions. Among these Mellon-funded projects are Manifold Scholarship, a joint venture of the University of Minnesota Press and the GC Digital Scholarship Lab at the Graduate Center of the City University of New York (CUNY),²¹ and the Enhanced Network Monograph, a three-year project of New York University Libraries and NYU Press to experiment with new publishing workflows and with the capacity for readers to engage the texts online. The University of North Carolina Press is developing its Longleaf Services as an experiment in a collaborative platform that will handle production, operational and marketing task, and free up academic presses to concentrate on the editorial process foremost. The Humanities Open Book Program is a recent joint grant program of the NEH and Mellon Foundation that is again looking to release backlist monographs and scholarship.²²

International efforts began in the late 1990s with far more of these projects geared toward versions of open access (green or gold) or completely free and open access after the Budapest Open Access Initiative was released to the public in 2002. OAPEN (Open Access Publishing in European Networks) was started in 2000 and has grown to become a platform for open access, peer-reviewed humanities and social sciences monographs produced by European publishers. As with many of the other systems, the OAPEN library and publishing platform allows users to browse the full text of its works or by author, series title, or subject, with additional search capability. The Australian National University (ANU) Press, originally founded as ANU E-Press in 2003, changed its name in 2014 because “digital publication has become the norm across publishing, the Press no longer needs to set itself apart as a digital publisher, and so has taken the traditional academic publishing name of ANU Press.”²³ The Canadian Public Knowledge Project was founded in 1998, created its Open Journal Systems in 2001, and its Open Monograph Press in 2013, an open source, online environment for editing and producing digital texts. The Open Library of the Humanities, founded in 2013, is developing its own scholarly publishing pilot to complement its megajournal platform.²⁴

In the UK, the Knowledge Unlatched²⁵ pilot project ran from October 2013 through February 2014 as an example of what Eileen Joy calls “graduated OA.”²⁶ Knowledge Unlatched (KU) included a collection of 28 books produced by 13 publishers, that remain available as OA downloads through HathiTrust even though the project has stalled because the OA playing field is in flux and its model depends on a near comprehensive change in the way libraries and publishers interact. (KU required libraries to pay title fees to publishers in order to allow access to these works through a range of Creative Commons licensing agreements.) Also in the UK, the Higher Education Funding Council for England (HEFCE) Monographs and Open Access Project began in 2013 and will end in 2015. This is another project founded on the premise that monographs and other long-form publications must move from the traditional publishing model in order to survive. They have received a great deal of pushback against OA publication but their Expert Reference Group is optimistic and is pursuing a middle course that recognizes the substantial issues surrounding both print and open access monographs. However, the group is also considering how advances in digital technologies are creating new opportunities for scholarship while driving cultural changes that challenge the monograph as the preeminent form of scholarly communication.

Alternative Funding Strategies

Over the past 20 years a number of alternative funding and sales strategies have been advanced to produce long-form scholarship. Part of the monograph crisis was and is exacerbated by the distribution of portions of or entire digitized texts, often under fair use for students and scholars, but also through unauthorized (and arguably illegal) channels to the general public. Some contend that unauthorized electronic distribution further reduces sales, others that it diminishes the use of libraries and specialized efforts of curators including librarians.

Alternative funding strategies have been advanced to help promote the timely release of research, especially of scientific works through journals and conference proceedings, but increasingly for humanities and social science scholarship to help many early-career scholars who have a more difficult challenge in publishing their first books. In 1995 Sanford Thatcher offered a number of proposals to change the financing of scholarly monographs, the most radical was for universities to “consider a joint scheme to cover all the up-front costs of publishing in fields with low sales.”²⁷ Thatcher was concerned that support for scholarly monographs would be forced to shift away from the university toward the scholarly societies; in 1997 the MLA began fulfilling this expectation when it recommended that departments support their faculty better because subventions had become a common factor in academic publishing and that university administrations might wish to consider subvention funds as a source of such support.²⁸ By 2002 the AHA joined the MLA in speaking out against the difficulty of publishing first books and suggested actual dollar amounts for subvention support.²⁹

In 2015 these discussions seem to have run through a number of options and returned to their origins. The AAU/ARL Task Force, formed in 2012, developed a First Book Prospectus in 2014 that described a system whereby universities agree to pay a subvention for the first book of new tenure track scholars—the 1% solution³⁰—as part of the newly hired scholar’s start-up package. In early 2015 the prospectus shifted its focus more toward supporting a digital monograph (long-form argument) for faculty, but not necessarily restricted to the first book. Since 2014 Rebecca Kennison and Lisa Norberg have thrown their efforts into growing the Open Access Network as a solution to convert traditional print and subscription publications, including those of academic journals, books, and monographs to OA by having all institutes of higher education pay a scaled amount (annually or over a period of years) into a centrally managed fund. The Mellon Foundation also developed and circulated an option in 2014 to help institutions of higher education ramp up a system to fund faculty publications using Mellon grants to fund the shift. This “seed fund” plan experienced a great deal of pushback from humanities faculty, and was revised in late 2014 to concentrate instead on growing the digital publishing infrastructure of North American university presses. Carl Straumsheim provided an overview of Mellon’s initiative for *Inside Higher Ed* and eight of the grant recipients presented lightning talks about their projects at the June 2015 Association of American University Presses meeting in Denver, including: the University of California Press and California Digital Library; the University of Michigan Press and partners; the University of Minnesota Press and CUNY Graduate Center Digital Scholarship Lab; New York University (NYU) Press and NYU Libraries; the University of North Carolina Press; Stanford University Press; West Virginia Press; and Yale University Press. Many of these projects are experimenting with integrating features, data sources, and interactivity that exceed the early goals of the AAU/ARL Task Force, the Mellon Foundation, and others

to merely provide digital versions of monographs as PDFs or ePubs—these initiatives are beginning to create hybrid and interactive forms of scholarship that go beyond the limitations of print.³¹

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