

# Final Synthesis Report of the e-Journal User Study

December 2002

Prepared for  
the Stanford University Libraries  
e-Journal User Study



By  
Institute for the Future  
SR-786

2744 Sand Hill Road  
Menlo Park, CA 94025  
phone: 650.854.6322  
fax: 650.854.7850  
[www.iff.org](http://www.iff.org)

## Table of Contents

<b>EXECUTIVE SUMMARY</b> .....	1
I. INSIGHTS: HOW SCHOLARS USE E-JOURNALS .....	1
II. IMPLICATIONS: KEY USER NEEDS .....	2
III. PATHWAYS FOR E-JOURNAL USE IN THE NEXT TEN YEARS .....	2
IV. RECOMMENDATIONS FOR LIBRARIES AND PUBLISHERS .....	3
Plow: Prepare the Ground for New Opportunities .....	4
Sow: Plant the Seeds of Future Opportunity .....	4
Grow: Nurture the Proven and Likely Sources of Future Success and Value .....	5
Harvest: Reap the Value from Current Core Competencies and Sources of Value .....	5
V. CONCLUSION: LESSONS FROM THE STM COMMUNITY .....	6
<b>FINAL SYNTHESIS REPORT OF THE E -JOURNAL USER STUDY</b> .....	7
INTRODUCTION .....	7
I. INSIGHTS: HOW SCHOLARS USE E-JOURNALS .....	8
Scholarly Context and Communities Shape Routines for Using e-Journals .....	9
The Value Proposition of e-Journals and Online Content Is Distinct for Users as Searchers, Readers, and Authors .....	11
Users Will Pay for Online Access to Selected Titles— But Not for Individual Articles .....	14
Online Scholarly Content Does Not Diminish the Importance of Paper as a Scholarly Tool .....	16
Users See e-Journals As Part of a Larger Pool of Modular e-Content .....	18
Frustrations with e-Journals Are Linked to Expectations Shaped by the Internet .....	20
Online Scholarly Activity Is Shifting Scholarly “Action” Beyond the Journal .....	22
II. IMPLICATIONS: KEY USER NEEDS .....	24
Users Want Deep Archives .....	24
Scholars Use Features That Are Aligned with Their Core Information Practices .....	24
Libraries and Publishers Should Clearly Articulate Their Service Offerings .....	25
Online Environments Should Support Core Modes of Scholarship: Searching, Reading, and Writing .....	25
Scholars Need Better Mapping of the Online Scholarly Landscape .....	25
Users Need Tools and Spaces That Allow Them to Create, Maintain, and Participate in the Community .....	26

Users Need Support for Building New Kinds of e-Content .....	26
Prices for Personal Journal Subscriptions Should Increase Only Moderately .....	26
Users Want More Choice in Subscription and Membership Packages .....	26
III. Pathways for e-Journal Use in the Next Ten Years .....	27
A Framework for Thinking About e-Journals in 2012 .....	27
Pathways for Scholarly Communications From 2002 to 2012 .....	29
Where e-Journals Flourish—and How We Get There .....	30
IV. RECOMMENDATIONS FOR LIBRARIES AND PUBLISHERS .....	34
Plow: Prepare the Ground for New Opportunities .....	35
Sow: Plant the Seeds of Future Opportunity .....	36
Grow: Nurture the Proven and Likely Sources of Future Success and Value .....	38
Harvest: Reap the Value from Current Core .....	39
Competencies and Sources of Value	
V. CONCLUSION: LESSONS FROM THE STM COMMUNITY .....	40
Lessons for Non-STM Journals .....	41

## EXECUTIVE SUMMARY

The purpose of this report is to synthesize the results and lessons from the Stanford E-Journal User Study (eJUS<sup>1</sup>) and to offer some new insights into the debate on the future of e-journals as a scholarly tool, and as a force of change on scientific scholarship. The eJUS project focused on understanding e-journals in the context of user needs. Over the course of two years, data produced through the project include three quantitative user surveys, a Web log data mining analysis, an ethnographic study of scholarly e-journal usage, a white paper on e-journal features and their use, and a white paper on e-journals and branding. All of these are available at <http://ejust.stanford.edu>.

### **I. INSIGHTS: HOW SCHOLARS USE E-JOURNALS**

A number of key insights are particularly worth highlighting.

- Scholarly context and communities shape routines for using e-journals.
- The value proposition of e-journals and online content is distinct for users as searchers, readers, and authors.
- Users will pay for online access to selected titles—but not for individual articles.
- Online scholarly content does not diminish the importance of paper as a scholarly tool.
- Users see e-journals as part of a larger pool of modular e-content.
- Frustrations with e-journals are linked to expectations shaped by the Internet.
- Online scholarly activity is shifting scholarly “action” beyond the journal.

---

<sup>1</sup> This study was made possible by a generous grant from the Andrew W. Mellon Foundation.

## **II. IMPLICATIONS: KEY USER NEEDS**

E-JUST data about user practices and e-journal usage patterns suggest that e-journals must meet the following needs to be positioned for success.

- Users want deep archives.
- Scholars use features that are aligned with their core information practices.
- Libraries and publishers should clearly articulate their service offerings.
- Online environments should support core modes of scholarship: searching, reading, and writing.
- Scholars need better mapping of the online scholarly landscape.
- Users need tools and spaces that allow them to create, maintain, and participate in the community.
- Users need support for building new kinds of e-content.
- Prices for personal journal subscriptions should increase only moderately.
- Users want more choice in subscription and membership packages.

## **III. PATHWAYS FOR E-JOURNAL USE IN THE NEXT TEN YEARS**

In this section we discuss two central tensions in scholarly communication—the extent of competition and diversity in the publishing arena, and the visibility and local value-add of academic libraries. These provide a useful framework for thinking about the future of e-journals and the choices that libraries and publishers can make over the next five to ten years. Expert informants indicated that stronger libraries and a diversity of commercial and nonprofit presses would allow e-journals to flourish. Section III discusses how libraries and publishers might help to bring this about, and what the possible effects on e-journals and users would be.

For the publishing environment to become more competitive and offer more diverse options to scholars, several core areas related to publishing and e-journals should change in the next decade:

- New publishing structures and economies of scale.
- Closer relationships to user communities.
- New methods of measuring impact.
- Diverse peer-review models.
- Alternatives for journal editorial boards.

Experts identified the following four areas that would provide significant leverage for libraries. Change in these core areas would drive up library visibility.

- Limited funds not locked into a single publisher.
- Subject specialists as pivotal members of knowledge communities.
- University content as a source of value.
- Rights and permissions as a source of expertise.

#### **IV. RECOMMENDATIONS FOR LIBRARIES AND PUBLISHERS**

Libraries, scholarly societies, and other publishers are in a position to make critical choices that will significantly shape the direction and evolution of e-journals and online scholarly content over the next ten years. It is important to distinguish, however, between the choices that will have short-term impact and those that will take longer to create tangible change. Section V recommends strategic actions using the metaphor of gardening.

### **Plow: Prepare the Ground for New Opportunities**

Plowing actions, taken in the present, will set the stage for both short- and long-term change. Plowing gets rid of bottlenecks, barriers, and obstacles that would impede other strategic efforts.

- Challenge static notions of the journal.
- Prepare to make the transition to e-journals.
- Accept change in the industry status quo.
- Rethink the big deal.

### **Sow: Plant the Seeds of Future Opportunity**

Such seeds are actions to be taken in the present that require time to take shape and come to fruition. Sowing involves setting multiple efforts in motion to see which one gathers the most momentum and relevance for the long term. Sowing also involves thinking about what can be pilot-tested, prototyped, and experimented with to learn about possible future opportunities.

- Develop tools for universal searching across databases.
- Experiment with subscriptions to communities rather than to journals.
- Explore the parameters of a content module<sup>2</sup> economy.
- Actively track new technologies.
- Study the dynamics of successful online communities.
- Create a strong and distinct brand within the library.

---

<sup>2</sup> See *Reflections on Branding and E-Journals*, pp. 5–6.

## **Grow: Nurture the Proven and Likely Sources of Future Success and Value**

Growing involves identifying efforts in the current environment that are likely to create value but that need some kind of development—either attention, awareness, funding, staff, or redirection. Taken now, these actions would provide short- to medium-term results.

- Leverage the library as local publisher.
- Expand the notion of publisher brand beyond content.
- Interpret new methods of resource discovery.
- Develop alternative models for editorial boards.

## **Harvest: Reap the Value from Current Core Competencies and Sources of Value**

Harvesting focuses on creating short-term results and benefits. It requires a careful examination of the environment for sources of immediate value. Harvesting includes reaping the benefit from low-hanging fruit that would provide tangible value in the short term. This activity may yield some benefits smaller in scope than the benefits of other activities, but it is nevertheless important to do to initiate momentum for change.

- Leverage expertise and partner with industry in archiving and categorization.
- Leverage existing knowledge of user communities to drive the e-journal transition.

## **V. CONCLUSION: LESSONS FROM THE STM COMMUNITY**

As a final question to the study, we briefly explored what kinds of lessons might be drawn from the experiences of the scientific community for scholars in other fields who are looking to publish or transition to e-journals. Scientists, scientific publishers, and the librarians and specialists who support them have been at the forefront of electronic publishing, and have valuable stories to tell about what has worked and what has not. Beyond the fundamentals of editing and producing a journal, such as assembling a first-rate editorial board, establishing academic credibility, and matching publishing objectives with publishers and platforms that will fulfill those objectives, the experts identified the following points as primary concerns for the electronic journal:

- Understand the range of community digital information needs and wants.
- Create a sustainable business model.
- Rethink the meaning of society membership.
- Partner with expert delivery providers.
- Explore options for disaggregating content.
- Design content for future flexibility.
- Start to create critical mass of online content.

## FINAL SYNTHESIS REPORT OF THE E-JOURNAL USER STUDY

*I mean, after all, words are words, and they're the same words on paper as they are on e-journals. It's the same article, it's the same journal, ultimately. The only thing that the e-journal possibly can give you is ability to search a greater percentage of the literature effectively than one currently does.*

—Senior Clinician, 2001

*If all scholars' preprints were universally available to all scholars by anonymous ftp (and gopher, and World-Wide Web, and the search/retrieval wonders of the future), NO scholar would ever consent to WITHDRAW any preprint of his from the public eye after the refereed version was accepted for paper "PUBLICATION." Instead, everyone would, quite naturally, substitute the refereed, published reprint for the unrefereed preprint. Paper publishers will then either restructure themselves (with the cooperation of the scholarly community) so as to arrange for the much-reduced electronic-only page costs ... or they will have to watch as the peer community spawns a brand new generation of electronic-only publishers who will.*

—Steven Harnad, 1994

### INTRODUCTION

The preceding quotations, both from users of scientific scholarly content, represent two extreme ends of the debate on the electronic journal, or e-journal. The first user holds that e-journals are simple mirror copies of print journals, differing only in format. The second proposes that e-journals can be the wedge that drives open the current traditional world of scholarly communications and publications, creating a new paradigm for scientific scholarship and inquiry.

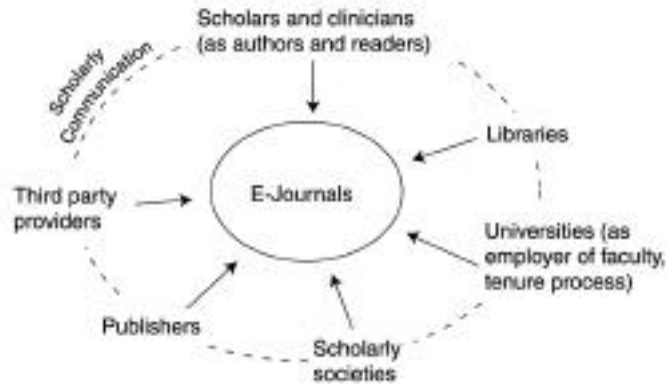
The purpose of this report is to synthesize the results and lessons from the Stanford E-Journal User Study (eJUS<sup>3</sup>) and to offer some new insights to the debate on the future of e-journals as a scholarly tool and as a force of change on scientific scholarship. The eJUS project focused on understanding e-journals in the context of user

---

<sup>3</sup> This study was made possible by a generous grant from the Andrew W. Mellon Foundation.

needs. It sought to understand the role and fit of e-journals in the scientific scholarly process for life scientists. How do life scientists use e-journals? How are e-journals valuable, and where do they link to pieces of the scholarly communications and publishing processes? Figure 1 illustrates the focus of the eJUSt and this report.

Figure 1  
Framework for Examining E-Journals



Source: Institute for the Future.

The eJUSt was not a project to study the future of libraries or universities or the future of the scientific scholarly publishing industry—although e-journals do sit within this broader context of players. This report is intended to highlight key insights from the user research, consider them in the broader industry context, draw out implications for meeting user needs, and make recommendations for libraries, societies, and publishers. The report includes five basic sections: (1) insights into how scholars use e-journals, (2) implications regarding key user needs, (3) pathways for e-journal use in the next ten years, (4) recommendations for libraries and publishers, and (5) conclusion and lessons for non-STM editorial boards who may be considering e-journal publication.

## I. INSIGHTS: HOW SCHOLARS USE E-JOURNALS

A significant portion of the eJUSt project<sup>4</sup> focused on understanding user practices related to e-journals and on how users determine the value and relevance of online scientific scholarly content. User research included three quantitative user surveys, in-depth ethnographic interviews with users, workshops in which experts commented on

<sup>4</sup> See the eJUSt Web site (<http://eJUSt.stanford.edu>) for a complete description of the study and for a report of the results.

user findings, and user log data from selected journals. The large data set obtained leads to many detailed findings, but some key insights are particularly worth highlighting. These insights frame the context for understanding user needs in the evolving arena of e-journals and online scholarly content.

### **Scholarly Context and Communities Shape Routines for Using e-Journals**

Scholars and clinicians follow a few high-level patterns when using e-journals. The majority of users start with multijournal search engines such as PubMed, for instance, rather than at the Web sites of individual journals, according to eJUSt Web log data.<sup>5</sup> At a deeper level, however, eJUSt studies found that scholars use e-journals in idiosyncratic, personalized ways, shaped largely by particular scholarly contexts and the disciplines and communities of practice in which the individual scholar learns and thinks. In this sense, e-journal practices are like individual fingerprints, following a pattern of research strategies but with a personal signature.

A common driver, or explanation, for these personal practices is convenience.<sup>6</sup> Scholars use whatever is free and easily available at their institutions. Scavenging from their environment, they put together the tools that work most effectively for them. If they can walk across the hall or down the hill to the library, or if their institution is invested in promoting a particular indexing or searching system, this is often what they use. The presence or absence of dedicated computer terminals, access to free printing and copying, library proximity and hours, family demands, and ability to shift some of the burden of work to an assistant also contribute to different assessments of whether e-journals are convenient scholarly tools.

Different factors in the scholarly context and different attributes of the scholarly community create different notions of convenience. Strategies for using e-journals depend on many variable factors in the scholar's environment, and scholars craft individual routines for using e-journals depending upon their information tasks and objectives. Of survey respondents, for instance, 92% stated that they prefer online retrieval of journal articles because of the physical convenience. As readers, however, they prefer paper journals or printed copies of journal articles. Two-thirds said they

---

<sup>5</sup> See Web Log Data Mining Report, [http://ejust.stanford.edu/research\\_findings.html](http://ejust.stanford.edu/research_findings.html).

<sup>6</sup> Both surveys and qualitative interviews identified convenience as a significant driver for media choice and for the effectiveness of e-journals as scholarly tools.

immediately print a full-text article they have retrieved online; the rest read from the screen. Qualitative data suggest that reading itself is a diverse practice that takes different forms in print and online formats depending on the goal and task of the scholar (e.g. scanning, browsing, studying, or filtering).

These routines also change over time and place. Some key drivers shaping e-journal usage and preferences for paper or electronic format include scholarly goal, technical and staff infrastructure, time and place of work, and professional characteristics, such as scholarly field, laboratory responsibilities, and so on.<sup>7</sup>

Scholarly field and community of practice are other important factors that shape notions of convenience, usage patterns of e-journals, and relative value of e-journals. Some life sciences fields, such as biology, tend to have very fast paces of innovation and discovery, so that quick publication and awareness of new articles are critical for scholars. Other fields have slower paces of innovation, reflected in the nature of community-based information and communications processes. Both quantitative and qualitative data suggest that clinicians, for instance, demonstrate distinct information practices—that is, distinct ways of and purposes for searching, reading, and writing. Interviews revealed that clinicians search mostly for educational and clinical material rather than for academic research. This changes the approach of their search: they often use abstracts to answer specific questions without reading an entire article.

The survey data show that medical doctors tend to be less frequent readers of e-journals and are less likely to prefer e-journals to printed journals as a form of retrieval. Medical doctors were also more likely to say that e-journals have cumbersome interfaces that waste time. Just over half (53%) of all survey respondents reported that e-journals help them to organize their personal archives, whereas medical doctors were less likely to say that this was a benefit.<sup>8</sup> The special characteristics and necessities of distinct disciplines, fields, and communities of practice will shape appropriate features and attributes of e-journals, to form a system that works best for users.

---

<sup>7</sup> See *E-Journal Usage and Scholarly Practice* at [http://eJUS.stanford.edu/findings/full\\_0801.pdf](http://eJUS.stanford.edu/findings/full_0801.pdf), pp. 13–16, for more detail.

<sup>8</sup> See Survey 2, p. 18, at [http://ejust.stanford.edu/findings2/report\\_survey2.pdf](http://ejust.stanford.edu/findings2/report_survey2.pdf)

## **The Value Proposition of e-Journals and Online Content Is Distinct for Users as Searchers, Readers, and Authors**

The role of the user approaching the literature strongly determines the value of e-journals. As searchers, readers, or authors, scholars do different things with scientific content; they evaluate e-journals and e-articles differently. The value of the e-journal, then, shifts in each of these contexts, as does the e-journal's ability to support each activity. A separate process of adoption, usage, and evaluation of e-journals takes place in each of these activity domains. Success or effectiveness of an e-journal must thus be evaluated according to the criteria of searchers, readers, and authors.

*The searcher.* On the surface, better searchability appears to be the primary source of value of the e-journal. When asked in our interviews and surveys, scientists consistently identified full-text article retrieval and ease of browsing/searching as their main reasons for using e-journals.<sup>9</sup> This may be because scholars are most often introduced to e-journals via search-and-retrieval of content, as opposed to through browsing, for instance. In this way, scholars gain their initial experiences interacting with e-journals and establish their first expectations of what an e-journal can do for them. An important eJUSt finding was that scholars acting as searchers are more likely to bypass the journal as a container or significant boundary delineating a collection of ideas and content.<sup>10</sup> Indeed, more than three-quarters (77%) of respondents usually started their online article searches from a multijournal search Web site with links to full text, such as PubMed, Medline, Ovid, ScienceDirect, or HighWire, rather than through the Web site of a specific journal.<sup>11</sup>

*The reader.* The searchability of e-journals is not the whole picture, however. Scholars search because they want to read, and they read while they search. Many prefer e-journals over print editions because they can get to what they want more quickly: to the articles that will help further their research or answer their questions. E-journal reading happens in both electronic and print formats. For full-text e-journal articles, the third survey showed, printouts are the final destination and the preferred format for reading.<sup>12</sup> Onscreen, many scholars read abstracts as part of their content evaluation process; a

---

<sup>9</sup> See *E-Journal Usage and Scholarly Practice*, pp. 6, 21–23; see also findings of Surveys 1 and 3.

<sup>10</sup> See *E-Journal Usage and Scholarly Practice*, p. 16, 61–62.,

<sup>11</sup> See Survey 2, p. 12.

<sup>12</sup> See Survey 3, Highlights; see also Web Log Data Mining Report.

majority read e-TOC alerts regularly; and a minority read full-text articles in PDF or HTML formats.<sup>13</sup> Study findings also pointed to ways in which disaggregated electronic content might support nonlinear reading habits developed on paper.<sup>14</sup> Given the prevalence of electronic content and the proliferation of screens in today's world, younger scholars are likely to enter the academy with a different set of paper- and screen-reading practices than in the past, which will change the way that e-journals serve their readers in the next ten years.

*The author.* As authors, scholars have yet another set of needs and desires, which leads to another value proposition of e-journals. As authors, scholars are concerned primarily with the impact factor and the prestige of the journals in which they publish (50% cited this as the most important criterion for selecting a journal for publication) and with wide dissemination of their work (26%). Whether a journal is online is not important—at least for now.<sup>15</sup> These findings are not surprising, given that authorship is critical for tenure, promotion, and grant seeking. The different functionality of e-journals—potentially much wider dissemination, real-time cross-referencing, links to databases, and more convenient interaction with authors, for instance—could eventually alter traditional peer review, publication, and tenure processes, however.<sup>16</sup> In the meantime, most authors see the electronic format in a more prosaic light, as offering increased speed and convenience in manuscript preparation and online peer-review processes.<sup>17</sup>

*Core information practices.* Six major categories of information practices emerged from our interviews with respondents.<sup>18</sup> In each of their roles as searchers, readers, and authors, scholars cycled back and forth among these practices. E-journals provide value when they help scholars hone these six domains of information practice and achieve their scholarly goals as searchers, readers, and authors (see Figure 2).

---

<sup>13</sup> See Survey 2.

<sup>14</sup> See *Reflections on Branding and E-Journals*, p. 3.  
[http://ejust.stanford.edu/findings/interview\\_branding.pdf](http://ejust.stanford.edu/findings/interview_branding.pdf)

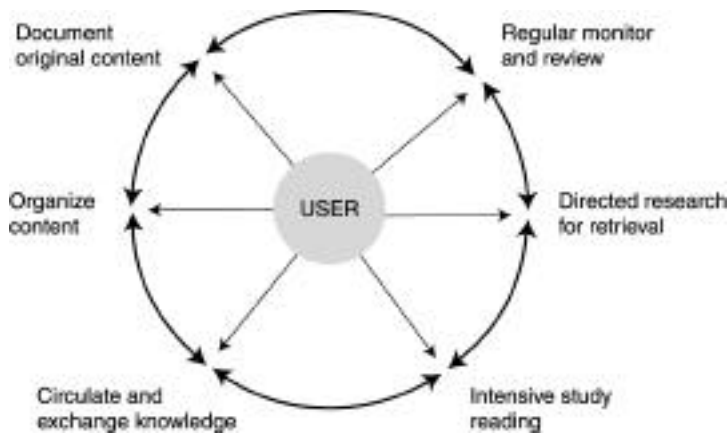
<sup>15</sup> See Survey 1, p. 25, Additional findings from the study.

<sup>16</sup> See *E-Journal Usage and Scholarly Practice*, pp. 44–45.

<sup>17</sup> See *E-Journal Usage and Scholarly Practice*, pp. 41–44.

<sup>18</sup> See *E-Journal Usage and Scholarly Practice*, pp. 29–44; see also *Core Scholarly Information Tasks and E-journal Features: Expanded Discussion*. At [http://ejust.stanford.edu/findings/interview\\_coretasks.pdf](http://ejust.stanford.edu/findings/interview_coretasks.pdf)  
[http://ejust.stanford.edu/findings/interview\\_coretasks.pdf](http://ejust.stanford.edu/findings/interview_coretasks.pdf)

Figure 2  
Six Core Information Practices



Source: Institute for the Future

These six core practices are as follows:

1. *Monitor and review content regularly to keep current.* Users look for a provocative, interesting reading experience and an expanded sense of where their own research links with the research of others.
2. *Conduct directed research for retrieval.* The knowledge domain narrows as users look for a list of relevant citations or a set of articles, abstracts, or data.
3. *Study and read intensively to extract knowledge.* Users dissect articles, extract knowledge, and make sense of ideas.
4. *Circulate and exchange content to build peer networks.* Users increase their interactions around content with tools such as e-mail with URL or PDF attachments, lab Web sites, and distributed, flexible printing.
5. *Organize content to create context and relevance.* Users catalog and file in idiosyncratic ways that help them think more effectively.
6. *Document original content to establish ownership of ideas.* Users write and publish in order to contribute original ideas and discoveries to a particular field, share knowledge, and receive credit for contributions.

## **Users Will Pay for Online Access to Selected Titles—But Not for Individual Articles**

Tenopir and King's work on the scholarly use of e-journals demonstrates that scientists have come to rely much more on their institutions to provide them with reading material and much less on personal subscriptions over the past 25 years.<sup>19</sup> Although scientists nearly halved the number of journals they subscribe to personally during that time period, the number and cost of journal titles has risen sharply. In sum, there are more journals, they are more expensive, and scholars have come to expect their libraries to bear more of the burden of purchasing and providing access. The eJUS study shows this reliance on institutional access; 50% of respondents strongly agreed that they access most scientific journals through institutional subscriptions (an additional 29% somewhat agreed), and 43% strongly agreed that more content will become available to them for free through institutional subscriptions (an additional 44% somewhat agreed).<sup>20</sup>

Findings from the e-JUS study on pay-per-view fees confirm that scholars are largely unwilling to pay for what they think should be free. Only 36% of respondents in our second survey (all of whom used e-TOCs regularly) had ever used pay-per-view features, and of these, only one-third had found these features useful. In addition, the top search concern "frequently" experienced by feature users regards "articles that are not available in full text online without a pay-per-view fee" (67%). Medical doctors and U.S. and Canadian scholars were more likely than others to agree that they would do without or go to the library rather than pay any amount at all for online access; older scholars were less likely to say they would never pay.<sup>21</sup> The convenience of immediate access to full-text articles, then, is not valuable enough to scholars—in a third-party payment system—for them to pay the fee.

Although institutional access to subscriptions is important, however, eJUS data suggest that personal subscriptions also have a role. Scientific societies have worried that scholars who once paid for private copies of printed journals subscribed to by their institution would be unwilling to do the same for electronically available journals. But e-JUS study findings suggest that online access may actually motivate personal subscriptions and society memberships. Half of all respondents reported taking journal

---

<sup>19</sup> Tenopir, C. and King, D.W. *Towards Electronic Journals: Realities for Scientists, Librarians and Publishers*. Washington, D.C.: Special Libraries Association, 2000.

<sup>20</sup> See Survey 1, pp.8, 25.

<sup>21</sup> See Survey 2, pp. 14-16.

subscriptions and society memberships specifically to gain access to online full-text articles—spending an average of \$360 per year (with the median of annual spending being \$250) for an average two or three society memberships and one or two journal subscriptions.<sup>22</sup> Respondents also indicated that “taking advantage of features the journal has available online” was their third reason for subscribing to a new journal in the last year (just behind “having more convenient access,” and “journal gained importance in my field”)—but these are likely to be journals to which their institutions do not already subscribe.<sup>23</sup>

Journals may lose personal subscriptions as more institutions provide online access. The top reason given by survey respondents in the eJUS study for canceling personal subscriptions was not institutional access, however, but rather rising journal costs. Spiraling journal prices are eroding the base of personal subscribers just as electronic editions are drawing in new subscribers.<sup>24</sup>

In many ways, the structure of the scholarly content industry is similar to the structure of the health care and network television industries: the user does not pay directly for service. Third-party payments to support the industry and the provision of content or service characterize all three businesses. This complicates processes for assessing value. Users take services for granted: libraries and their holdings are seen by undergraduates as paid for through tuition and by faculty as part of their compensation package. In the health care industry, however, we now see that shifting more of the costs (co-payments and deductibles) away from third-party payers directly onto consumers has changed the way that consumers engage with the insurance providers, products, services, and patient care. Consumers who bear more of the costs are becoming increasingly savvy and well informed.

It is not inconceivable that libraries will be forced to further cut journal titles, and individual scientists may well pick up some of the titles no longer paid for by their institutions. If this happens on a large scale, publishers and societies should be ready for a higher level of demand for services and products tailored to context-specific usage: clinicians may want to search and download abstracts to handheld devices at the bedside, for instance. Outside of the institutional context, e-journal users are also consumers who

---

<sup>22</sup> See Survey 3, pp. 8–12.

<sup>23</sup> See Survey 2, p. 21.

<sup>24</sup> See Survey 2, p. 21.

are increasingly accustomed to making complex value decisions in purchasing multi-option service plans for things like cable television or mobile phones. They will bring their consumer behavior to the scholarly content marketplace when they are required to make direct payments for content or services of any kind.

### **Online Scholarly Content Does Not Diminish the Importance of Paper as a Scholarly Tool**

Despite the migration of scientific journals to the online world, scholars still use paper to read, think, and organize. The big differences over the next ten years will be in the new kinds of pathways to paper content and in the relationship of paper to online content. Three issues that emerged from the eJUSt data illustrate the evolving relationship between paper and electronic formats: portability, bundling, and readability. Data from the eJUSt surveys and interviews indicate that scholars have developed distinct practices for locating relevant content online and then converting it into the appropriate paper or electronic format for a particular use at a particular time. Knowing when and why paper is important will help in the building of electronic content and delivery systems to meet user needs. Portability, bundling, and readability are three issues that reflect scholars' needs for "potential paper"—that is, for the ability to generate paper-based content at any point in the scholarly process.

Survey respondents like paper journals because they can be carried around and used in a variety of settings. In fact, 54% cited portability as their top reason for continuing to have a printed edition delivered to them.<sup>25</sup> Self-printed article content can be just as portable, however. In fact, self-printed content is a primary goal of many online sessions, as shown from the Web log data results. Typical sessions from Web log data ended with a print request of a PDF article, approached via one of two primary pathways.<sup>26</sup> The majority of the log data cases began an online session from a multijournal Web site, PubMed (consistent with results from the second user survey<sup>27</sup>), which linked the user directly to an HTML article. The user browsed, read, and evaluated the article in this format before linking to the PDF version for printing. A second path to printing started at a journal Web page, where the user could browse the journal's contents

---

<sup>25</sup> See Survey 3, p. 16.

<sup>26</sup> See Web Log Data Mining Report for more detail.

<sup>27</sup> See Survey 2, p. 12, for online search starting points.

before linking to a specific article and then to the PDF version for printing. Upon locating a full-text article online (through searching and browsing), more than two-thirds (68%) of users immediately print and read the article, according to the third eJUSSt survey. About one-third first read the article onscreen (23% in PDF and about 10% in HTML).<sup>28</sup> These self-printed articles can presumably be carried around to any location.

These data are important regarding a second issue: readability. EJUSSt research identified a mode of reading distinct from browsing or scanning. Study reading, or intensive reading, helps in the thinking process, the creation of knowledge, and the assimilation or integration of new knowledge into existing knowledge bases. Most respondents commented that they prefer to do intensive reading in hard-copy format (either printed journal or article printout), which allows them to make notations and to move around easily within and between documents. Indeed, readability is clearly linked to both intra- and interdocument mobility.

Scholars value *intradocument* mobility because it allows them to move around within documents at their leisure. They read different parts of an article at different moments and for different reasons—through habits formed over years of practice. Flipping pages lets them refer back and forth to the parts they want to study, compare, and digest. *Interdocument* mobility allows mobility across separate documents, whether in file folders or from stacks of articles on the floor. This activity is useful for wide-scale literature reviews and comparisons. Electronic tools and search environments currently limit the degree of document mobility online. The more that online format, tools, and delivery can support document mobility, the more likely scholars are to find online content readable.<sup>29</sup>

In addition to facilitating reading, paper is an important archiving or storage mechanism.<sup>30</sup> Scholars indicated that they develop their own practices for organizing content, whether in traditional paper files and stacks or in online files linked to their own reference or citation databases. Upon locating an article, more than half (52%) of respondents in the follow-up survey said they print a paper copy and file it, 28% print the article and save it in an electronic file, and 20% save it only electronically (perhaps to

---

<sup>28</sup> See Survey 3, p. 15.

<sup>29</sup> See *E-Journal Usage and Scholarly Practice*, pp. 37-39.

<sup>30</sup> See *E-Journal Usage and Scholarly Practice*, pp. 37-42.

read and/or print later).<sup>31</sup> One of the appeals of self-printing and organizing is that scholars can create their own bundles of content. Traditional printed journals present content in a particular order and combination (the journal issue) that the editorial board deems useful. Scholars often want more options for bundling and packaging their content, whether for reading during a train ride home, handing out to a class or lab team, or filing as reference material. Forms of customized self-printing would give scholars a degree of control over their paper content that would support their reading and thinking.

### **Users See e-Journals as Part of a Larger Pool of Modular e-Content**

What is the difference between the latest printed copy of *Journal of Immunology* lying on a table in the lab and the same journal online? Does only the format differ, or does something more substantial distinguish the two? Qualitative interviews from the eJUST suggest the latter.<sup>32</sup> Although editorial boards and publishers continue to produce online journal articles that appear the same as the articles on paper, a careful look reveals the seeds of new practices that mine the extra functionality of e-journals and e-articles. Scholars use e-journal articles as nodes in a network of linked, shareable content—not only as discrete articles bound to a particular journal. This trend is likely to increase, driven by the increasing presence of hyperlinks, the proliferation of new forms of content in the digital library, and more sophisticated data-tagging, searching, and navigation tools that facilitate content disaggregation.<sup>33</sup>

*Increased presence of hyperlinks.* Hyperlinking is emerging as perhaps the most useful and important of all the value-added e-journal features currently available. Three-quarters of our respondents had used and found useful hyperlinks to cited articles (both within the same journal and across journals). Within this sample, hyperlinking to scientific databases was also a popular feature (63%), followed by hyperlinking to authors' e-mail addresses (61%), authors' Web sites (52%), and video or animated graphics (45%; 27% said they would like to try video or animated graphics but had not yet used them).<sup>34</sup> The success in the last two years of CrossRef, a nonprofit reference linking service, is testimony to the rapid adoption of hyperlinking as a primary resource

---

<sup>31</sup> See Survey 3, pp. 15–16.

<sup>32</sup> See *E-Journal Usage and Scholarly Practice*, pp. 44–46, 49, 53–54.

<sup>33</sup> See *Reflections on Branding and E-Journals*.

<sup>34</sup> See Survey 2, p. 7, table 1.

discovery tool. Hyperlinking lies at the heart of what distinguishes the e-journal from the print journal—the ability to create and follow networks of linked knowledge.

*New forms of linkable content.* Hyperlinked e-journals exist as part of a spectrum from publicizing to publishing, bringing informal and supplementary information into closer proximity with formal, peer-reviewed material. Conference proceedings; lab Web sites and faculty Web pages; genetic databases; e-print archives and prepress articles; course syllabi and class assignments; video, film, and graphic modeling; online textbooks; and author e-mail addresses are some of the holdings that already surround and can be linked to e-journals in the digital library.<sup>35</sup> For example, CrossRef initially focused on citation linking for e-journals but has recently expanded its coverage to conference proceedings, reference books, and other content types. This is not to say that the presence of other forms of content *necessarily* means interlinkages: multijournal archives routinely exclude non-peer-reviewed research. But like it or not, formally published e-journal articles are becoming more like assemblages of linked content than parts of a larger journal whole. Who decides what should be linked—an intellectual, financial, and political issue—could have ramifications for scientific practice and the dissemination of scholarly knowledge.

Finally, in addition to the multiple forms of scientific content currently online, flow-tracking and data-mapping technologies are generating new forms of content: maps of the relationships represented by links between otherwise loose bundles of information. These tools track how meaning is being made through the links among content.

*Content disaggregation.* The increasing standardization of data-tagging does two things: it allows the digital identification of smaller and smaller units of data, and it allows interoperable systems and tools to search, locate, and find that data. This enables the disaggregation of the journal article into its component parts (such as the abstract, methods section, or bibliography), turning these parts into what Kircz calls independent knowledge “modules.”<sup>36</sup> EJUST qualitative research found that scholars commonly

---

<sup>35</sup> See *E-Journal Usage and Scholarly Practice*, pp. 44–46.

<sup>36</sup> Kircz, J.G. “New practices for electronic publishing: Will the scientific paper keep its form?” *Learned Publishing*, Association of Learned and Professional Society Publishers, 2001; 14,4:265–272. <http://tamino.catchword.com/vl=1263530/cl=17/nw=1/rpsv/catchword/alpsp/09531513/v14n4/s4/p265>; see also Kircz, J.G., and Harmsze, F. “Modular scenarios in the electronic age.” *Conferentie Informatiewetenschap* 2000. <http://www.science.uva.nl/projects/commphys/papers/mod2k/mod2k.html>.

disaggregate printed journal articles as they read, moving around according to interest, perhaps starting with the methods section, then moving to results, bibliography, and so on.<sup>37</sup> In the electronic format, these sections can be produced as discrete modules that can be linked or aggregated according to a user's needs. With the disaggregation of content, therefore, the electronic environment can support not only everyday nonlinear reading practices, but perhaps even more importantly, new levels of scholarly activities involving search and navigation, organization and archiving, and peer-to-peer communications. Uniform tagging on PubMed Central now allows searches for reagents mentioned only in the methods section of an article, for instance, or searches of just figure and table legends.

### **Frustrations with e-Journals Are Linked to Expectations Shaped by the Internet**

E-journals appear as constellations of networked information in a larger informational galaxy. Expectations of the features and functionality of e-journals are, and will be, shaped by this broader, rapidly evolving context. This means that when e-journals provide a dead end or constrain interaction with the rest of the Internet environment, they create hassles and frustration for scholars. Qualitative eJUSt findings illustrate that many scholars do not distinguish between the features of an e-journal, those of a search engine, and those of an article database or journal aggregation. In particular, young scholars who have developed their formative scholarly experiences on the Web will continue to bring their expectations and notions of access, seamless connectivity, content modularity, and nonlinear thinking structures to their interactions with e-journals.

The first eJUSt survey showed that the more scholars use e-journals, the more they see other kinds of value from the Internet-based context of e-journals. One-third of respondents strongly agreed that e-journals provide other kinds of value from alerts, linkages, and other diverse features. High-frequency e-journal users were more likely to strongly agree with this.

Currently, scholars use the hyperlinking features of e-journal articles well and consider them highly useful. A majority of e-journal users clearly use links to articles within a journal, across journals, to authors, and to relevant databases and consider them effective for scholarly practice.<sup>38</sup> The next most used and useful group of features

---

<sup>37</sup> See *E-Journal Usage and Scholarly Practice*, pp. 37-39.

<sup>38</sup> For a detailed list of e-journal features, see Survey 2 Highlights and full report materials.

includes electronic manuscript submission, access to articles “in press,” and online peer-review processes. Although these features are reportedly used by fewer scholars, they are among the highest-ranked features that scholars would like to try. With the growing use of e-journals, these results suggest, scholars will continue to find great benefit from applying the Internet’s connectivity and linkages to various scholarly work-flow processes beyond searching.

E-journals create disappointment and hassle when they fail to leverage the expected connectivity of the Internet or when that connectivity creates new kinds of work. The most significant current weaknesses or problems with e-journals include the lack of back issues, poor filtering and assessment tools, and lack of a standard for searching across various knowledge environments. Almost three-quarters of the second survey respondents stated that the lack of access to older issues was a significant problem. For many of the life sciences fields, “old” often means approximately five years or older.

A second type of frustration and concern stems from new abilities to search and access content electronically. These concerns were that too many search results are returned (41%) and that results are not well sorted (38%).<sup>39</sup> New Internet access creates new kinds of work. This suggests that features that improve a scholar’s ability to filter and assess large amounts of results or that better narrow down results are still underdeveloped.

A third area of difficulty and frustration for scholars arises out of the relationship among online content domains. Open-ended responses in the surveys and in-depth qualitative interviews suggest that scholars encounter difficulties when too many barriers among knowledge environments make searching cumbersome and difficult. Scholars indicated that they often jump in and out of search environments, losing their place or cutting off a search because they can’t search through to new environments. This occurs even when scholars have access to multiple search environments.

These three types of frustrations with e-journals are all examples of how e-journals are inconvenient for users, at times leading them to more traditional scholarly media and resources such as the library or a printed journal issue. EJUS identified

---

<sup>39</sup> See Survey 2, p. 14.

several areas across the six core information practices where feature improvements could make e-journals more effective, convenient, and valuable for scholars. They include features that help scholars follow knowledge paths, quickly rate and evaluate content online, access information outside the conventional publication cycle, monitor knowledge horizons, place their work in larger contexts, facilitate collegial and community exchanges around content and ideas, and work with paper content.<sup>40</sup>

### **Online Scholarly Activity Is Shifting Scholarly “Action” Beyond the Journal**

New configurations of information and infrastructure made possible by the online environment are expanding the sources of value that scholars obtain from journals and scientific scholarly content and, in so doing, are moving the locus of scholarly “action” beyond the journal.<sup>41</sup> Traditionally, content has been the primary source of value for journals, yet without navigation, archives, and community, this value decreases. New players (software providers, third-party service providers, aggregators) are joining journal publishers and libraries to create or broker the new information topography, new forms of evidence, and sources of value. Innovative tools for navigating, archiving, creating community, and even creating new kinds of content have the potential to create new kinds of scholarly experiences. As Andrew Odlyzko suggests,<sup>42</sup> “Traditional journals, even those available electronically, are changing slowly. However, there is rapid evolution in scholarly communication.”

E-journals exist in an environment in which it is now possible to make channels between different domains of scientific literature (peer reviewed and not), conference proceedings and lab Web sites, databases and journal articles, and so on. A vibrant spectrum of activity between informal publicizing and formal publishing is growing.<sup>43</sup> As electronic peer-reviewed material competes with an increasingly active zone of other kinds of online and/or digital information, the development of knowledge area boundaries becomes a key issue. Scholars are already dealing with this: among our first survey

---

<sup>40</sup> For a full description of features that support core information practices, see *Core Scholarly Information Tasks and E-Journal Features: Expanded Discussion*.

<sup>41</sup> See *Reflections on Branding and E-Journals*, for more detail on sources of value and branding strategies for journal publishers and other players.

<sup>42</sup> Odlyzko, A.M. The rapid evolution of scholarly communication. *Learned Publishing* Jan. 2002; 15,1:7–19. <http://www.dtc.umn.edu/~odlyzko/doc/rapid.evolution.pdf>.

<sup>43</sup> See *E-Journal Usage and Scholarly Practice*, pp. 32–34, for a discussion of the publicizing/publishing spectrum.

respondents, 17% strongly agreed that e-journals had increased their exposure to non-peer-reviewed papers (50% somewhat agreed).<sup>44</sup> New kinds of boundaries, as well as editorial voices, will likely emerge to distinguish between the different kinds of content. Some of these boundaries may be formally established by professional societies, whereas others may originate from scholars, labs, and other peer groups that have Web capability to make their own links among distinct articles and content.

E-journals and other online tools, spaces, and Internet capabilities drive this dynamic middle zone of the spectrum by facilitating a new relationship to information, knowledge, and peers. As a result, significant scholarly activity is growing outside the boundaries of the traditional journal. Societies have the opportunity to redefine and expand their offerings by supporting this important dynamic middle zone.

Findings from the eJUSt ethnographic interviews and survey data identify several factors that will continue to drive this middle zone and new kinds of scholarly practice.

*E-journals tend to increase scholars' exposure to a broader literature faster,* thereby increasing peripheral vision to the edges of the scholar's discipline and to other disciplines. Of respondents, 52% strongly agreed that e-journals make them aware of recent research faster. One-third of respondents strongly agreed that they read more papers outside their discipline (and 38% more somewhat agreed).<sup>45</sup> Increasing awareness at the periphery increases the scholar's ability to make connections to other fields and helps place research in a broader context. A lower barrier to cross-disciplinary material may also encourage scholars to take searching and reading risks.

*E-journals facilitate participation in a greater flow of information and scholarly communications.* Many informants felt that they had increased the amount of information they pass on to others by using e-mail to send URLs, PDF files, and cut-and-pasted abstracts; handing out reprinted downloaded PDFs; and so on. One-third of survey respondents strongly agreed that they had exchanged more articles with colleagues. Greater ability to disseminate information informally among peers creates a new way for scholars to relate to each other and their information.

---

<sup>44</sup> See Survey 1, Graphs and descriptive statistics, perceptions of e-journals and online searching Q14\_3.

<sup>45</sup> See Survey 1, Graphs and descriptive statistics, perception about the impact of e-journals on research, Q16\_4.

*E-journals provide new ways for presenting scientific results that contribute to new thinking processes.* Scholars mentioned the emergence of new publishing formats (such as film) and of larger data sets that could conceivably change the way scientists think about scientific problems and questions. Not only are computer-generated simulations and models new ways of presenting information, they are in themselves new forms of evidence. Emerging opportunities for expressing data could possibly shape future design of experiments.

*E-journals make data more visible and increase evaluation and scrutiny.* For the reader, increased access to evidence promotes scientific transparency, visibility, and accountability. E-journals, with the capability to link to more complete data sets and additional information, could increase the level of scrutiny of scientific results and interpretations. When data is less visible, the journal plays a paramount role in the evaluation and verification process. But with better access to other people's data, the locus of evaluation may shift toward the individual scholar. The need for editorial validation could conceivably decrease, as scientists are able to dig deeper into specific data and results. At the same time, the unevenness of newly visible data is already a source of some tension.

## **II. IMPLICATIONS: KEY USER NEEDS**

E-JUST data about user practices and e-journal usage patterns suggest that e-journals must meet the following needs to be positioned for success.

### **Users Want Deep Archives**

Back issues are a key resource for scholars, who expect the same kind of hyperlinking and accessibility to older resources as to current literature. Without accessibility to content archives, e-journals will remain a niche service and will not become a fundamental piece of the scholarly communications environment.

### **Scholars Use Features That Are Aligned with Their Core Information Practices**

Scholars don't use whatever features are available; they use what is relevant, easy, and effective. In other words, they look for value based on the task at hand and on the relative costs of performing it. E-journal services and features should be evaluated against the

framework of the six core information practices: regular monitoring and reviewing of content, directed research for retrieval, study reading to extract knowledge, content exchange to build peer networks, organization of content for relevance, and documentation of content to establish ownership. These practices represent a more comprehensive look at scholars' behavior beyond searching.

### **Libraries and Publishers Should Clearly Articulate Their Service Offerings**

Libraries and publishers should make their service offerings clear. This is important in an industry where third-party payment removes many users from making purchase decisions and assessing alternatives. Scholars bring their consumer behavior to the content marketplace and, when faced with purchase decisions (rather than simply use decisions), look for clear value trade-offs. Publishers should articulate their offerings to users in both reader (consumer) and author (producer) roles. Libraries should make their offerings clear to demonstrate their value to users.

### **Online Environments Should Support Core Modes of Scholarship: Searching, Reading, and Writing**

The online environment is geared predominantly toward the scholar as a searcher. Data show that scholars have different needs and notions of value when they are readers or authors. E-journal service design should address the more comprehensive needs and practices of the user as searcher, reader, and author. Features that work across these modes will help create a seamless and more coherent online scholarly environment. For example, HighWire Press provides a form of user education and takes advantage of a branding opportunity by highlighting the services related to a variety of information tasks, from within the single-article environment.

### **Scholars Need Better Mapping of the Online Scholarly Landscape**

The online information landscape is full of barriers, uneven terrain, and diverse domains of knowledge. Scholars need help understanding what the landscape looks like and how to traverse its boundaries. They need more clearly articulated pathways or at least the tools to create these pathways themselves. Tools and services that support more seamless navigation across domains of the landscape will improve the efficiency and success of scholars in their online activities.

## **Users Need Tools and Spaces That Allow Them to Create, Maintain, and Participate in the Community**

As the number of scientists increases, the number of subfields and specialties increases, and the volume of papers grows, scholars will likely rely even more on their communities to help them make sense of things and establish priorities. Informal tools and spaces for meeting and exchanging with colleagues are already emerging. These should be supported, along with more formal venues for communities to take hold and evolve online.

## **Users Need Support for Building New Kinds of e-Content**

Modular content implies a new kind of authorship in the form of links and relationships. Users will need help in assembling the pieces of an article—to decide what should be linked to what and how metadata should be created. Librarians could greatly assist in transferring knowledge about taxonomies, keywords, and so on.

## **Prices for Personal Journal Subscriptions Should Increase Only Moderately**

EJUS data show that a price increase beyond the budgets of scholars is the most common reason for personal subscription cancellations. For personal subscriptions, price increases should be below the annual inflation rate (currently less than or equal to 3% on average).

## **Users Want More Choice in Subscription and Membership Packages**

Subscriptions for both individuals and libraries should be modified from a package sell to more choices (differentiated products) and differentiated prices per product. Individuals like to have choices, and their preferences for different products can vary by demographic characteristics. One example is country of residence. Subscribers outside of the United States and Canada may like to have online subscriptions because they save money and get faster delivery than printed editions sent from abroad. U.S. and Canadian subscribers, however, might prefer to have printed editions in addition to online subscriptions, because delivery of printed editions of North American journals is relatively less expensive.

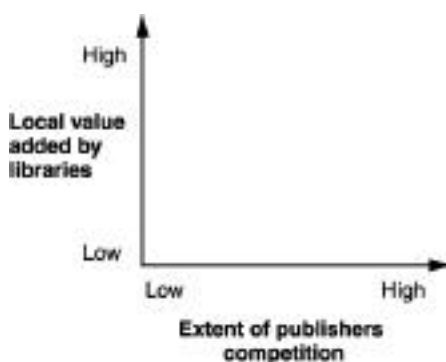
### III. PATHWAYS FOR E-JOURNAL USE IN THE NEXT TEN YEARS

E-journals sit within an interconnected web of academic libraries and their larger university institutions, publishers (general nonprofit, society, and commercial), third-party service and tool providers, and, of course, scholars in their roles as searchers, readers, and authors. E-journals support scholarly communications needs to varying extent depending on pivotal strategic choices made by each of these groups. Each has a role in the future of e-journals.

#### A Framework for Thinking About e-Journals in 2012

The eJUS team conducted an expert workshop on May 16, 2002, and follow-up individual interviews to review study findings and to discuss their implications for libraries and publishers.<sup>46</sup> Experts included representatives from libraries, publishers, scholars, and third-party providers. The discussion pointed to two central tensions that provide a useful framework for thinking about the future of e-journals and the choices that libraries and publishers can make over the next five to ten years. Between the extreme ends of these two dimensions is a space which can describe where we are today with regards to library value and publisher competition and where we might be in the future, given today's strategic choices. This space also provides a possible landscape for examining the evolution of e-journals over the next five to ten years (see Figure 3).

*Figure 3*  
*Future Landscape for e-Journals*



Source: Institute for the Future

<sup>46</sup> The Power Point presentation from this workshop is available at [http://ejust.stanford.edu/second\\_exworkshop.html](http://ejust.stanford.edu/second_exworkshop.html).

### *Dimension 1: Local Value Added by Libraries*

This dimension reflects the extent to which libraries make choices to become value-added service providers rather than local “pass-throughs” for the services of other providers and to articulate that choice effectively to users and other stakeholders. At the low extreme of the dimension, libraries are covert facilitators with unrecognized and under-funded selection and acquisition services. They don’t demonstrate their value to users beyond making contracts with publishers for aggregated packages of content—so users are left with whatever the publisher offers. They don’t demonstrate their value to publishers as a primary conduit to users or user advocates. And because they don’t demonstrate their value to their institutions, their budgets and institutional visibility decrease.

At the high extreme of this dimension, libraries choose to become providers of value-added services and to work to make their services visible. This strategy involves making choices about where and how to add value to purchased services and to create branded services that distinguish the library from other content service providers. At this extreme, libraries demonstrate value by strategically identifying how they can increase core sources of user value (through content, navigation, community, and archives).<sup>47</sup>

### *Dimension 2: Extent of Competition Among Scientific Scholarly Publishers and Providers of Content*

This dimension describes the competitive field among information providers, whether nonprofit societies or commercial publishers. Little competition exists at the low extreme of the dimension. The result is near-monopolistic control over the channels for publishing scientific scholarly content. At this extreme, societies contract the bulk of their publishing activities to large commercial publishers, who have infrastructures and economies of scale to manage such processes. As a result, nonprofit societies have less control over intellectual property rights (particularly authors’ rights), pricing structures, methods of distribution (e.g., bundling), format, design, and related services associated with their journals. A few publishers make most of the decisions regarding pricing and dissemination.

---

<sup>47</sup>See *Reflections on Branding and E-Journals*, pp. 6–10.

Consolidation does enable publishers to standardize more easily across their own journal titles, which could improve searching and navigation for the end user, but there would be little assurance that such features would be available or affordable. This type of centralization could occur among a few commercial entities or large public (government) institutions, with potentially comparable outcomes: little incentive for change or innovation.

At the high extreme of this dimension is a world of many diverse channels of publishing. A great deal of competition exists, and publishers of all kinds find a niche in the marketplace. Authors find available a wealth of both formal and informal venues for disseminating their work. The diverse marketplace for publishing provides no single standard for basic publishing and dissemination processes (such as peer review, search criteria, archiving and hosting environments, and so on), however. Users need to devise new ways to search, navigate, and evaluate the explosion of diverse forms of content.

### **Pathways for Scholarly Communications from 2002 to 2012**

According to some experts, the pathway to a better future for scientific scholarly communications and publication requires movement up (more local value added through libraries) and to the right (more publishing competition). The upper-right-hand corner of Figure 3 seems to be the best place for e-journals, and scholarly communication in general, to flourish. Strong libraries are strong advocates for users, and strong competition in the publishing arena offers authors a diverse range of venues for publication and ensures that at least a portion of scientific knowledge remains under the control of nonprofit publishers. The current situation, identified by experts as close to the lower-left-hand corner, is not sustainable for libraries and problematic as well for smaller and/or noncommercial publishers.

A few key factors shape the environment in which e-journals currently exist.

- *Prices are rising.* An increasing volume of scientific research, increasing numbers of serial titles, and increasing investments in infrastructure to support both print and electronic publication lead to rising and unsustainably high journal costs.

- *“Big deals” constrain library choice and innovation.* Libraries are already constrained to shrinking budgets for buying journals—and today’s weak economy means even more funding cuts. One response has been to buy multi-journal packages from single publishers in order to control the rate of price increases, provide users with a wide array of titles, and reduce transaction costs. As a result, however, flexibility in the selection and deselection of titles is often reduced, and scarce funds are locked up with one or two large publishers. Libraries are left with less control and with limited ability to innovate or experiment in ways that provide new value for their institutions. Few libraries are making clear commitments to providing innovative value-added services. (LANL, Stanford University Libraries, and the University of California are notable examples.)
- *Commercial profitability determines what is published.* Commercial publishers are consolidating. Fewer and fewer large companies publish approximately half of the 100 highest-impact life sciences titles. Content is published if a financially viable market exists for it—but perhaps not if it is seen to be unprofitable.
- *Commercial and nonprofit publishers conflict.* In addition to the consolidation of publishers through acquisition of smaller publishers by large commercials, and to the financial insolvency of societies and small nonprofits, anticompetitive actions are beginning to emerge. Subsidized, nonprofit services are being pressured to close if seen to be competing with commercial services (as when PubScience recently closed under pressure from an industry association).

### **Where e-Journals Flourish—and How We Get There**

Assuming that increased publishing competition and stronger libraries are the desired outcome, two key questions are important: (1) How do we get from the current situation to a world of more publishing competition and more value-added library services? (2) What is the best place in the future space illustrated in Figure 3 for e-journals that better support scholarly needs?

### *Competition Among Publishers and Content Providers Needs to Increase*

For the publishing environment to become more competitive and offer more diverse options to scholars, several core areas related to publishing and e-journals should change in the next decade. There are many complex pieces to this puzzle; experts interviewed in the eJUSt study identified a few key arenas in which change would significantly affect publisher diversity.

- *New publishing structures and economies of scale.* Nonprofits develop economies of scale and publishing cooperatives to compete more successfully with commercial presses. This is especially critical in two areas: (1) international marketing, where it is simply not economically feasible for smaller societies or publishers to deal with organizations on an individual basis, and (2) standardization of data tags, interface, and ability to manipulate across journal formats and rules. If nonprofits who work with societies can't figure out a way to standardize, they lose much of the value of electronic content.
- *Closer relationships to user communities.* If both libraries and publishers were to develop closer relationships to users, there would be more pressure on commercial publishers. Better knowledge of user communities translates into clearer demands of publishers and provides the opportunity for smaller publishers to pick a core need and deliver (in other words, to create their own market in which to compete with the big publishers).
- *New methods of measuring impact.* Scholars (both readers and authors) flock to quality, cutting-edge content. When that content is electronic, they use e-mail and hyperlinks to share it more easily and widely than printed content. New impact metrics, measuring an article's number of hits, number of citations, level of online discussion generated, number and nature of links, and so on, help to identify quality published content and give status to smaller, innovative journals and publishers.
- *Diverse peer-review models.* Rising numbers of titles also mean more expensive multi-journal packages. Providing alternative peer-review processes—such as preprint archives or BioMed Central's Faculty of 1000—creates a more user-based marketplace of demand for articles while retaining traditional peer-reviewed journal titles.

- *Alternatives for journal editorial boards.* Better understanding of the desires and needs of editors would ensure that scholars on boards who want to support noncommercial publishing have a place to go. Publishers increase competition among nonprofit and commercial presses by better understanding what editors need and by offering attractive alternatives to large commercial presses.

*Impact on users.* A diversity of publishing venues would also bring with it challenges and opportunities for users. First, the explosion of content sources is already an issue in terms of navigation, filtering, and organization, and this could grow worse with increased diversity and number of publishers. Difficulty in sorting and making sense of too many search results is a primary concern for users today. Second, multiple diverse publishers would mean diverse search environments and more boundaries around knowledge areas—making it more difficult for users to search across databases, journals, and domains of content. As identified in the user insights, this too is an area in which users want to see improvements. If this service were not provided by the library, it would have to come from the publisher or from third parties. Third, timeliness of content (receiving alerts and access to prepress or preprint articles) is another user need that could be difficult to meet if a diverse market becomes fragmented. Finally, smaller or informal publishers might not market themselves to libraries, but could make themselves available through direct-to-user services such as Google.

These different standards for access and delivery would create an inconsistent and confusing information environment. An appropriate level of service and set of tools would have to accompany an increase in diversity publishing venues, then, to best affect and benefit users. Without these services and tools, the content environment would likely remain difficult to incorporate into scholarly practice.

### *Creating Stronger Libraries*

A few core areas in the library domain would need to change in the next ten years in order to provide more local value-added services. Although many lower-level actions would have a measured impact on increasing library visibility and value, experts identified the following four areas that would provide significant leverage for libraries. Change in these core areas would drive up library visibility.

- *Limited funds not locked into a single publisher.* If libraries were not tied into multiyear “big deals,” they would have more flexibility in their budgets. They could add or drop journal titles and make more careful acquisitions. Just as importantly, altering the terms (or opting out) of big packages would open up funds for the kinds of experiments and innovative partnerships that are critical for increasing the value of libraries. Libraries are the customers who support commercial presses, and they promote competition in the publishing arena by supporting a diversity of nonprofit and commercial publishers.
- *Subject specialist as a pivotal members of knowledge communities.* Subject specialists are critical for evaluating usage of content and tools. These are the people who can make sense of whether the “big deal” is working at a local level. They are in a position to understand and communicate what kinds of content specific communities want and how individuals want to access that content. Specialists also track the changing information needs of diverse communities that include undergraduates, graduates, faculty, and the public. They work with users to understand what kinds of tools and services are working and what is missing. Libraries would be more likely to increase their budgets for staff who place these specialist roles.
- *University content as a source of value.* As official university archivists, libraries organize and preserve content deemed valuable to the institution. With the shift to personal digital media, libraries are being pulled into the question of whether and how to archive new forms of content—such as digital class projects, project proposals, and Web sites—and how to provide secure access. In this sense, librarians are engaging the issue of publishing—making public—content from their own institutions and becoming producers as well as managers of information. Institutional repositories of all kinds would constitute a new kind of leverage for the library in terms of providing new value to the institution.
- *Rights and permissions as a source of expertise.* As scholarly journals and course materials migrate to the Web, and more print content is digitized, the electronic exchange of information is becoming increasingly central to contemporary teaching. Librarians’ knowledge of issues around negotiating rights and permissions to content is critical and would be of increasing value to institutions.

*Impact on users.* Stronger libraries would have a significant impact on user experience. First, libraries are local customizers, translating existing offerings from publishers to meet their community's diverse needs. Stronger libraries would be more demanding customers of publishers and third-party providers, pressuring them to provide more innovative, user-centered services. Second, stronger libraries are critical to supporting institutional innovation in creating new knowledge in the current environment. Proactive librarians with muscular budgets would help users link to new sources of content, introduce them to new discovery tools, and help them maintain a critical perspective on rapidly changing information technologies. The role of the librarian would be enhanced so that the librarian would be an important, highly visible partner in scholarly endeavors. An increase in the extent and visibility of local value added through libraries would change the dynamics of the content environment, redefining the balance of power in several areas. This would provide users with more options for support and service.

#### **IV. RECOMMENDATIONS FOR LIBRARIES AND PUBLISHERS**

Libraries, scholarly societies, and other publishers are in a position to make critical choices that will significantly shape the direction and evolution of e-journals and online scholarly content over the next ten years. It is important to distinguish, however, between the choices that will have short-term impact and those that will take longer to create tangible change.

Strategic action steps can be thought about in many frameworks. One is through a garden metaphor, with four basic activities: plowing, sowing, growing, and harvesting. These categories are useful for prioritizing and staging strategic actions today for future short- and long-term results. Briefly, they answer the following questions: What needs to be plowed under to make way for new opportunities? What seeds need to be sown in the present to stimulate opportunities in the future or avoid threats? What exists in the current environment that provides value but requires further growth and development? And finally, what in the current environment could be harvested for immediate value? Libraries, societies, and publishers have options for activities in these four areas that will increase the competitive nature of the content market and the ability of libraries to provide visible, value-added services.

## **Plow: Prepare the Ground for New Opportunities**

Plowing actions, taken in the present, will set the stage for both short- and long-term change. Plowing gets rid of bottlenecks, barriers, and obstacles that would impede other strategic efforts.

### *Challenge Static Notions of the Journal*

Publishers, and even societies, should think beyond the current journal format. Putting a printed journal online and adding a limited search feature is not meeting the needs of users—not as the online journal is currently being used, that is. The new format should be more flexible and, if anything, a launching point for other presentations of content. The richer the content around the article, the more conducive it is to being used by the community in multiple ways; for instance, eJUSt log data show that users may value “field specific resources/databases” as much as they value retrieving full-text articles online. A feature available at the *Journal of Nutrition* Web site, which provides access to a “nutrient information” database, for instance, was requested as frequently as were full-text articles.<sup>48</sup>

### *Prepare to Make the Transition to e-Journals*

Societies that haven’t made the transition to e-journals should do so. Publishers and libraries should work hard to identify those who haven’t made the transition and bring them into the fold. This will help keep society journals alive as healthy competition to commercial journals that are not organized around the society, and will provide the basis for more community-oriented journal content. If done right, this could help grow society memberships through institutional licensing to content-rich, society-based sites.

### *Accept Change in the Industry Status Quo*

The scholarly content industry is undergoing profound structural change. Scholarly communications is transforming rapidly on the Web outside of the boundaries of the traditional journal. Users may more easily be accessed directly, and new players have more opportunities for new kinds of mediation. Libraries in particular should understand new forms and values of mediation in the industry in order to best articulate their

---

<sup>48</sup> See eJUSt Web Log Data Mining Report.

strategy. This is essential to keep third parties (many of them newcomers to the industry) and publishers (especially those with deep pockets) from creating systems and services that bypass the library.

### *Rethink the Big Deal*

Libraries should explore other models besides the aggregated bundle from publishers. The model may make sense depending on institutional priorities and user bases; however, the bundle strategy already proves to be an endgame for libraries by locking in budgets for several years, eliminating the value libraries provide in their selection process, and squeezing out little publishers.

### **Sow: Plant the Seeds of Future Opportunity**

Such seeds are actions to be taken in the present that require time to take shape and come to fruition. Sowing involves setting multiple efforts in motion to see which one gathers the most momentum and relevance for the long term. Sowing also involves thinking about what can be pilot-tested, prototyped, and experimented with to learn about possible future opportunities.

### *Develop Tools for Universal Searching Across Databases*

Libraries and publishers should take the initiative to invest in pilot projects for more sophisticated search tools that can cross domains of content. This is a primary need for users. If libraries and publishers don't do this, third-party providers will, reducing the amount of value that libraries and publishers can bring to the table. Libraries might partner with other libraries or with friendly publishers to develop tools themselves.

### *Experiment with Subscriptions to Communities Rather Than to Journals*

Societies have an opportunity to stress the value of community, in addition to content, because the Internet environment is exposing new forms of value in navigation, archiving, and community exchanges. Users may be willing to pay for memberships to carefully structured virtual environments that go well beyond the journal.

### *Explore the Parameters of a Content Module<sup>49</sup> Economy*

Publishers—particularly small, nonprofit societies—should prepare for a new economy of online modular content. In the next decade, users could become subscribers not only to journals, but to article databases or even to smaller grains of information.

### *Actively Track New Technologies*

Both libraries and publishers should aggressively track and get up to speed on new technologies. Software developments include flow-tracking software, data-tagging, mobile data applications, search methods, recommendation systems, semantic Web applications, and tools. Hardware includes mobile devices that make content more portable and remotely accessible, such as PDAs, cellular phones, palmtop computers, and other handheld digital devices. Printer and imaging technologies also need to be tracked and monitored for new developments. New technology developments should be prioritized into those that provide incremental improvements and efficiencies and those that disrupt existing processes and create new activities.

### *Study the Dynamics of Successful Online Communities*

The Internet has provided societies, publishers, and libraries with many examples of successful online communities in other areas, such as health and caregiving, entertainment, social communication for friends and family, business collaborative communities, and so on. Many good analyses suggest how and why online communities succeed. Libraries and societies in particular should study and understand what makes a successful community online and apply these lessons to their own knowledge communities.

### *Create a Strong and Distinct Brand Within the Library*

The world of diverse and numerous publishers will create a lot of noise and competition for libraries. Libraries would benefit from developing a strong brand message to their user community as collaborators and partners with scholars. Libraries have an enviable position of being close to the user; this should be leveraged. Also, scholars will need help to become savvy consumers in a future content market fragmented with diverse options.

---

<sup>49</sup> See *Reflections on Branding and E-journals*, pp. 5–6.

The consumer products marketplace has shown that more choice and direct payment and interaction with providers still require mediation by some trusted source. Libraries have a unique opportunity to fill this necessary and important position for scholars.

### **Grow: Nurture the Proven and Likely Sources of Future Success and Value**

Growing involves identifying efforts in the current environment that are likely to create value but that need some kind of development—either attention, awareness, funding, staff, or redirection. Taken now, these actions would provide short- to medium-term results.

#### *Leverage the Library as Local Publisher*

Libraries have access to a local community of faculty, authors, and other developers of content. This material is in different formats, ranging from presubmitted articles, databases, experimental data, images, course materials and syllabi, and other forms. This is a valuable scholarly resource that could benefit from broader sharing among the local community. Librarians could contribute to building standards for metadata, developing taxonomies, and working with authors to create data tags for individual articles, for instance.

#### *Expand the Notion of Publisher Brand Beyond Content*

Publishers—particularly smaller publishers—should articulate a clear brand message that emphasizes a core user need. This is essential for surviving in a competitive publishing world.

#### *Interpret New Methods of Resource Discovery*

Librarians can help share discovery methods across disciplines. Historians have a very different approach than do scientists, for instance, seeing information tasks such as access, searching, retrieval, and organization as an integral part of their research. Scientists may need to come to new terms with the changing role of information and information retrieval in their disciplines, and librarians can help them do this.

### *Develop Alternative Models for Editorial Boards*

Publishers and, to a lesser extent, libraries should think about how they can provide new models around which editorial boards can organize. Commercial publishers may offer attractive financial incentives to editors, whereas high-impact journals leverage their prestige. Publishers should think about what editorial boards want and how they can offer alternative models that support strong, community-based content.

### **Harvest: Reap the Value from Current Core Competencies and Sources of Value**

Harvesting focuses on creating short-term results and benefits. It requires a careful examination of the environment for sources of immediate value. Harvesting includes reaping the benefit from low-hanging fruit that would provide tangible value in the short term. This activity may yield some benefits smaller in scope than the benefits of other activities, but it is nevertheless important to do to initiate momentum for change.

### *Leverage Expertise and Partner with Industry in Archiving and Categorization*

Libraries have expertise in how to think about intellectual content and knowledge, organize it, and archive it. They could provide leadership in this area for the broader scholarly content industry.<sup>50</sup> Third-party providers and publishers could benefit from libraries in this area and seek their expertise in partnerships. Libraries should focus on archiving material and developing systems and standards that others may follow.

### *Leverage Existing Knowledge of User Communities to Drive the e-Journal Transition*

At present, e-journals are in a period of fundamental transition. At the heart of this transition is the benefit that e-journals provide to scholars and their scholarly communications. Libraries, societies, and publishers have data and insights about users—their patterns of using tools, content, and community practices. This knowledge should be a driving force behind the transition of e-journals into their next form. Libraries could provide a forum or set an agenda for sharing the insights from this data across the

---

<sup>50</sup> The Andrew W. Mellon Foundation has been instrumental in organizing exploratory projects of this nature, such as the e-journal archiving project between Harvard University Library and Blackwell Publishing on e-journal archiving, or the digital preservation project between Yale University Library and Elsevier Science. See <http://www.diglib.org/preserve/harvardfinal.html> and <http://www.library.yale.edu/~okerson/yea/>, respectively.

scholarly communications industry. This would benefit users and service providers equally.

## **V. CONCLUSION: LESSONS FROM THE STM COMMUNITY**

*The Stanford E-Journal User Study* provided many insights regarding the practices and needs of e-journal users. This report has highlighted some of the key insights from that research, considered them in the broader industry context, drawn out implications for meeting user needs, and made recommendations for libraries, societies, and publishers. To position themselves for success, e-journals must understand how scientists use the media and what scholars need from e-journals. Libraries, scholarly societies, and other publishers must also make critical choices to significantly shape the direction and evolution of e-journals and online scholarly content over the next decade. How well the needs of users are met will affect the future of e-journals as a tool in scientific scholarship and inquiry.

As a final question to the study, we briefly explored what kinds of lessons might be drawn from the experiences of the scientific community for scholars in other fields who are looking to publish or transition to e-journals. Scientists, scientific publishers, and the librarians and specialists who support them have been at the forefront of electronic publishing, and have valuable stories to tell about what has worked and what has not.<sup>51</sup>

### **Lessons for Non-STM Journals**

Researchers from the Institute for the Future asked experts from libraries, publishers, and third party providers about their recommendations for those outside of the STM field who were interested in e-journals. The experts pointed out that the fundamentals of a good journal do not change online. These include things such as assembling a first-rate editorial board, establishing academic credibility, and matching publishing objectives with publishers and platforms that will fulfill those objectives. As one of the digital library experts put it, “there is currently a tremendous amount of volatility in society titles jumping from one publisher to another in search of the best deal.” No matter what the

---

<sup>51</sup> Most radical, perhaps, has been the ongoing Public Library of Science endeavor. While PLOS has recently been invigorated by the backing of a major foundation and is supported by several high profile scholars and scientific associations, the project has yet to address the larger issues of publication demands for tenure, promotion, and grant-seeking. These issues severely limit publication options, particularly for younger scholars without tenure.

delivery format, journal editorial boards should prioritize their goals and think about the different value that commercial and nonprofit presses can provide. Beyond these fundamentals, the experts identified the following points as primary concerns for the electronic journal:

- *Understand the range of community digital information needs and wants.* As readers, searchers, and authors, scholars and other users in the journal community will have different information needs and wants. Because users interact differently when searching, evaluating, navigating, and archiving electronic content as opposed to traditional printed content, it is critical that journal editorial boards understand these before trying to provide a new electronic journal.
- *Create a sustainable business model.* Journals will have new infrastructure needs in the transition to electronic delivery, and many printed society journals are underpriced to begin with. Editors should raise prices in a controlled manner over a number of years, in order to ensure they're getting a fair price before going online, and to support new needs without raising prices so quickly that personal subscriptions suffer.
- *Rethink the meaning of society membership.* The conflict of institutional access with membership remains an issue. Scholars with institutional online access to a journal are not necessarily subscribing members, while subscribing members may cancel their subscriptions if they can read the journal for free online. Societies should consider what else they can offer beyond the journal, for the price of membership.
- *Partner with expert delivery providers.* Creating and hosting an online journal is a significant amount of work. Societies should find the best partners for their needs rather than try to go online by themselves.
- *Explore options for disaggregating content.* Online journals have the opportunity to change or even deconstruct the traditional journal and article format. This could be a significant new source of value in the online journal edition and editors should research hyperlinks and other online features that allow users to do new things with content.

- *Design content for future flexibility.* E-journals sit within a larger web of connected and connectable content. Editorial boards should consider a future in which the value of online content increases with its ability to be linked and manipulated in relation to other content. This means careful consideration of data-tagging standards, data-base positioning, and the different intellectual property issues of commercial and non-profit publishers.
- *Start to create critical mass of online content.* Even though much of the older literature in the social sciences and humanities may not be digitized for many years to come, e-journals become increasingly valuable when a critical mass of online content is reached. Therefore it is important that journals get online, even if only in an experimental mode. Each community and discipline will have its own specific legacy of journal structure, reading, publishing, and researching practices, and it will take trial and error to establish which kinds of e-journal are most effective and useful.