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Back to the Future: At Last Librarians Chart a New Course in Scholarly Electronic Publishing

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The number of electronic journals and newsletters has more than doubled since last year and has multiplied by over 15 times since 1991 (per the *Directory of Electronic Journals, Newsletters, and Academic Discussion Lists* (1996), Available: http://arl.cni.org/scomm/edir/index.html [1997, August 13]. Initially, librarians were optimistic that e-journals would ease the runaway serials inflation evidenced in print journals. This relief has not yet occurred, though some librarians are still hopeful, Further, librarians raged that scholars were signing away their copyrights to commercial publishers who then gouged libraries for journal subscriptions to those same scholarly works. Much discussion ensued, and librarians concluded that the cycle must be broken!

HighWire Press, an enterprise unit of **Stanford University Libraries and Academic Information Resources**, is charting new waters as co-publishers of low-cost, graphically-rich Internet editions of University and scholarly society e-journals. HighWire Press works with its partners to publish, distribute, and archive e-journals. It provides a common user interface to its titles and hyperlinks to related Web sources. The goal of HighWire Press is to "return responsibility for scholarly publishing to those committed to the primacy of scholarly communication rather than profit taking."

An in-depth interview with **Michael A. Keller** (University Librarian; Director of Academic Information Resources; Publisher of HighWire Press at Stanford University) follows in which he provides insightful, thought-provoking answers to questions involving his role and HighWire's mission, as well as its uniqueness, impact on the market, customer base, competition, partners, and the future.

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1. What is HighWire and what is its mission?

MK: HighWire Press is an enterprise unit of the Stanford University Libraries and Academic Information Resources. Lately we have been describing its mission as both church and state: on the church side HighWire's mission is to enhance scholarly communication by making use of information technologies and global networks; on the state side, HighWire's mission is to affect the marketplace of scholarly reports, typically in the form of journal articles and scholarly monographs. A fuller exposition of these is available at the HighWire Press Web-site <http://highwire.stanford.edu/about.shtml>.

2. How did you arrive at the name?

MK: After **John Sack** had begun work as the Associate Publisher and Director of the as-yet-unnamed press in the Spring of 1995, he gave me 3 possible names and asked which I liked. HighWire Press was the one we selected because it conveys dual and complementary meanings, those of a press whose works are distributed by wires and of an enterprise involving risk.

3. How long have you been at HighWire? How has your past experience molded your present interests in electronic publishing. Describe your transition from musician to electronic publisher: evolution or revolution or continuum?

MK: As the founder of HighWire, I have been with it from the beginning. Before even an embryonic form, during my interviews at Stanford, then Vice-Provost and Dean for the Libraries and Academic Information Resources, **Bob Street,** proposed to me as a candidate and his immediate reporting officers that we discuss how the information and network technology professionals could work with the library professionals on the possibility of using network publication as a counterpoise to the pricing and distribution policies of the for-profit publishers of scientific, technical, and medical journals. At that point, **John Sack** was **Director of the Stanford Data Center**. Previously, while I was at Yale as Associate University Librarian and Director of Collection Development, John and I had compared approaches to the same problem. He and **Rebecca Lasher Wesley**, the Math-Computer Sciences Librarian from Stanford and I with **Katherine Branch**, the Head of the Yale Science Libraries, were trying to use the capacities of the networks and our institutional computing services to distribute technical reports in math, computer sciences, and electrical engineering from Stanford and pre-prints of math articles from Yale. The Stanford approach became one of the roots of the **Networked Computer Science Technical Report Library**. The Yale project went through a prototypical period and then went quiet. The roots of HighWire Press thus go far back in time.

In December of 1993, I was presenting to the Stanford Academic Senate the annual report of the Libraries for the previous year and foreshadowing some of the Libraries programs for the coming years. In the question period following my report, Professor of Biology and biochemist **Robert Simoni** asked me whether I thought CD-ROMs were an effective mode of publication of scientific journals. My response was no and that network publishing was a far better mode of distribution. After that meeting, Bob and I spoke about the challenge the **American Society of Biochemistry and Molecular Biology** (ASBMB) was having with the growth of the *Journal of Biological Chemistry* (JBC) which had recently gone from 48 issues to 52 issues per year in order to cope. He and some of the other associate editors of the journal along with **Chuck Hancock**, the executive director of the ASBMB, **Herb Tabor**, the editor-in-chief, and **Ralph Bradshaw**, the treasurer of the Society, were anxious to consider alternative modes of publication as their science continued to grow. Late in that month, December of 1993, I downloaded my first network browser, Mosaic, and spent nearly a week glued to my workstation at home, itself connected to the Stanford network by an ISDN line. By the end of the first day, it was apparent to me that the final piece of the puzzle was in our hands. With adequate browsers, freely available, network publishing of the reports of scholarship was within sight.

Within a few weeks of the New Year of 1994, **Bob Simoni** and I started working very hard to convince the publications committee and the finance committee of the ASBMB that an experiment with

network publishing of the *JBC* was in order AND that Stanford wanted to participate in such an experiment. I formed a study team consisting of **Ann Mueller** from the Stanford Data Center, **Sandy Senti** from the Stanford Networking Group, and **Michael Newman**, newly named Head of Stanford's Biology Library. Their charge was to provide functional specifications and a basic technology plan along with a time and fiscal budget for network publication of the *JBC*. They did a fine job in fairly quick order. Bob Simoni and I then worked for several months with colleagues from the ASBMB. Eventually, in January of 1995, we agreed to fund jointly the design and development of an Internet edition of the *JBC*. In the middle of all of this, Bob Street returned to his home department, Civil Engineering, leaving me with a new title and some of his former domain; beginning in September of 1994, I was Stanford's first University Librarian (my predecessors had been Directors) and Director of Academic Information Resources, the largest centrally-managed academic computer operation at Stanford. As part of this new responsibility, I was given co-ownership of the **Stanford's Distributed Computing and Communications Service**, which included another piece of academic computing AND the all important Networking group. This new, combined organization was dubbed **SUL/AIR**.

With this agreement in hand, I approached John Sack to ask him whether he would like to leave the Stanford Data Center and join SUL/AIR as Associate Publisher and Director of HighWire Press. After due consideration, he agreed and began his brilliant career in

"The enhancement of scholarly communication is not simply a function to be performed in North America."

network publishing in February 1995. He assembled a team of four full-time staff, a couple of co-opted librarians, **Michael Newman** and **Vicky Reich**, and some student employees. By May 1995, the first several issues of the *JBC* were ready and a production scheme with superb through-put was ready in its first form. *JBC* was an instant success as measured in numbers of hits and the satisfaction of its readers as reflected in the feedback messages (All HighWire Press co-publications include a feedback function.) John Sack had begun collaboration during this design and development period with **David Lipman**, head of the National Center for Biotechnical Information of the **National Library of Medicine**, the research development arm of the organization responsible for **Medline**.
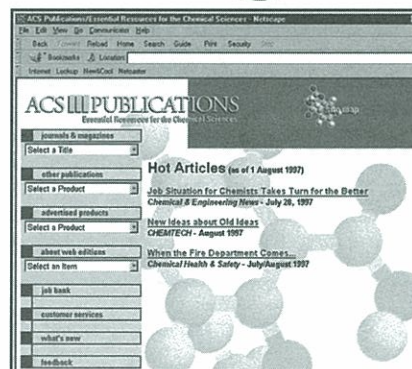
In mid-1995, there occurred two events of considerable importance to HighWire's future. First, **Jeff Pudewell** joined SUL/AIR as Assistant University Librarian for Finance and Administration, whose duties included responsibility for enterprise development. Jeff Pudewell's contribution to HighWire Press and to the publishers for whom HighWire works are in the realms of market analysis and business modeling; he has brought to bear professional and informed skills (he is a librarian as well as a degreed fiscal officer) on the questions of subscriber demographics, as well as the tactics and strategies available to scholarly societies in meeting their own organizational goals. Second, the new editor of *Science Magazine*, **Floyd Bloom**, a reader of the *JBC*, and Professor of Neurosciences at the **Scripps Institute**, and his colleagues at the **American Associa-**

tion for the Advancement of Sciences invited me and John Sack to journey to Washington, D.C. to present the *JBC* and share with them our experiences in bringing up an Internet edition of the journal. By the time lunch was over, we had begun talking about how HighWire and AAAS/ Science might work together to bring out an Internet edition of *Science magazine*.

With the launch of a successful Internet edition of the *JBC*, the most cited scientific journal in the world according to **ISI**, and the launch in the fall of 1995 of *Science Online*, another of the most cited scientific journals with a huge global readership, and one of two predominant science news magazines, HighWire's potential for achieving its missions and helping the scholarly societies with which HighWire has been working was apparent. Many other publishers have begun working with HighWire, each with its own desires, styles, business models, and strategies, each an appreciable challenge to HighWire. From the first, we saw that we were successful in prosecuting the church mission of HighWire, that of improving scholarly communication. Lately, as the societies working with HighWire are getting larger shares of authors and readers, we are beginning to see how the state mission might be realized.

The roots of HighWire Press go back into the stimuli of outrageous prices and price increases by the for-profit publishers of scholarship, to experiences with computers and networks beginning literally in my first days as a librarian at **SUNY/Buffalo**, to early attempts to use the Internet to distribute scholarship in my **Yale** days, and finally to the superb colleagues, technical resources, and the spirit of entrepreneurship at **Stanford University**.

A description of the course of a career which began in music and musicology, went through music librarianship to collection development and has landed up in my present set of responsibilities would be tedious. Rather, let me mention a few attributes of my training, education, and experience which have influenced the approaches we have taken here at Stanford and not just in HighWire Press.

As a musician, one is devoted to the piece, to the performance of a work of art. Whether the tuba player has had a tiff with his girlfriend or the oboe player has a bad reed, or the violinist is a radical vegetarian with communitarian leanings, the performance of the work is paramount and all the musicians know this. As a musicologist, I received my education from **Steve Bonta**, **Howard Brown**, **Jim McKinnon**, **Ed Strainchamps**, **Jim Coover**, **Tom Walker**, **Jeremy Noble**, and **David Fuller** among many others. These scholars emphasized accuracy and clarity in understanding and reporting on contexts and historical facts, on musical and social structures, on interpretation and criticism. Theirs is a discipline of depth and delicacy and I am sure that the focus on the stuff of scholarship itself, the music, the composers, the schools and sources, rather than upon historiography or the sociology of musicology affected

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me. As a librarian, I was lucky to be treated as a colleague by the scholars and performers at Cornell and Berkeley. **Giles F. Shepherd Jr**. and **Henk Edelman**, among many others on the staff of the **Cornell Libraries** in the 1970s, showed me to how to stay focused on service to scholarship and the centrality of building great collections to support great scholars. **Joe Rosenthal** and **Dorothy Gregor** at **Berkeley** can only be described as heroic figures; they saw and anticipated the transformation of libraries from print-based to the inclusion of digital sources and services. With virtually no support from any superior at Berkeley, they began the transformation in very intelligent ways. Along the way, I had some wonderful experiences with some colleague music librarians, especially those involved with the systematic retrospective conversion of music catalog records begun with the **Associated Music Libraries Group**. And at Yale, I had the pleasure to learn more about collection development from my colleagues in the Bibliography Dept. as well as from the area curators, from **Ralph Franklin**, the Director of the Beinecke Library, from **Penny Abell**, the University Librarian, and from the spectacular faculty and students of that wonderful university. In the Yale years, one could see the function of the University Librarian as orchestra conductor, as herder of cats, as campus leader.

4. How does HighWire differ from other E-journal vendor offerings, and how is it better?

MK: It is important to realize that HighWire is NOT presently a vendor of e-journals. HighWire is a co-publisher of scholarly journals with Internet editions, but the subscriptions, including terms and conditions, are declared by the originating publishers. That said, there is not a single model of HighWire journals. Each publisher has different attributes from the others. In general, the e-journals co-published with HighWire feature easy navigation, generous hyper-linking within a title, among HighWire titles, to Medline and related meta-data sources, superb rendition of graphics and half-tones in varying degrees of resolution, access to information not available in the printed editions, feedback and communications possibilities to connect readers to editors and readers to authors, and superior design work so that the realization of the publication in the Internet edition is intuitive and easy to read and to use in scholarship. Readers of HighWire's journals are delighted also with the availability of HTML and PDF versions of articles. This combination of forms satisfies those who wish to scan an article online and then print it in page form as well as those who wish to print the page form and read it. Publishers working with HighWire have realized that attempting to restrict access to the content or the ability to copy and print it once a subscription has been placed is counter-productive to their primary goal, that of scholarly communication.

6. It appears HighWire has moved from an experimental model to a production model. Can this model be replicated on other campuses?

MK: From the first, HighWire Press was intended to be a long-term enterprise. *JBC* and *Science magazine* were in prototypical forms in their first Internet incarnations, but HighWire was always intended to become a significant feature of the scholarly publishing landscape. In order to do this, however, HighWire's team must take into account and sometimes lead the I.T. and networking marketplaces. So, the actual technology at work has evolved based on opportunities and demands. We believe in and can see several Internet years in one chronological year. Scholarly publishers work with HighWire precisely because we can offer both a distinguished track record as well as a record of responsiveness to their needs along with leadership in adopting and adapting new technologies to scholarly network publishing. To do so in a true production environment, one in which we now are processing about 2,000 page equivalents each week for on-time, high quality publications, is remarkable. We believe we can scale our

The greatest library book thief of this century was Stephen Blumberg of Ottumwa, Iowa. Over a 20-year period, he stole some 23,600 books weighing over nineteen tons and valued at $20 million from libraries in forty-five states, the District of Columbia, and two Canadian provinces. Found guilty of theft, he served five years and eleven months in prison and was fined $200,000.

approach rapidly to meet demand, noting that the HighWire team has gone from a group of four to a group of twenty in just two years. We believe that the HighWire model can be replicated at other locations and, indeed, have offered selectively to universities to assist in the promulgation of our methods elsewhere. To date, there has been substantial interest from **Griffith University** in Brisbane, Australia, and from **Harrassowitz** in Wiesbaden, Germany. Replicating HighWire elsewhere is not merely buying some software in shrink-wrapped boxes and applying that software to files of material ready to be published on the net. We have also had interest from our colleagues at the **Autonomous University of Mexico** (UNAM) in HighWire's approach. There is lots more to this than meets the eye, and much of it involves attitudes, styles, and drive as much as great design, development, and production professionals, engaged and committed librarians, superb network and server support, and critical masses of practicing, publishing scholars who share the vision.

7. Generally, what impact will HighWire have on scholarly publishing, and more specifically on commercial STM publishing?

MK: Ultimately, we wish to create a marketplace correction which would result in most of the high impact scholarship being published by the universities and scholarly societies themselves. Another way to characterize this correction would be to say that more scholarly authors and readers were reading low cost, high impact scholarship published by not-for-profit organizations. With regard to commercial publishing, we hope and expect to have the effect of lowering prices for low impact scholarship. We hope to return responsibility for scholarly publishing to those committed to the primacy of scholarly communication rather than profit taking.

"We seem to be competing quite effectively with commercial publishers the way things have been going."

Ironically, the scholarly publishers working with HighWire have discovered that because of their Internet editions, they are finding new readers in distant places. Essentially, the combination of excellent, high impact content with superior design and functionality of the Internet editions, and relatively good distribution of the Internet editions over the public Internet is opening new marketplaces for these publications. This effect of leveling the playing field for distant readers who were previously disadvantaged by delivery of the print editions is enhancing the globalization of the scientific and scholarly communities, a process begun with email. The same process is underscoring the value of membership in the scholarly societies. The ASBMB, for instance, has opened its membership to non North American members as a result of the *JBC On-line*.

8. Have your market studies revealed what percentage of scholarly publishing is sponsored by non-profit associations and societies?

MK: Our studies show that about 50% of the titles in the most cited 500 journals in STM as analyzed by ISI are published by scholarly societies. More than 50% of the citations and pages are published by scholarly societies. Much more than 50% of the subscription money goes, however, to commercial publishers.

A specific study of *JBC On-line* has been performed by **Prof. Carl Gotsch**, an economist at Stanford, and **Vicky Reich**, Assistant Director of HighWire Press with support from the **Council on Library and Information Resources**. The final version of the paper, "Electronic publishing of scientific journals; effects on users, publishers and librarians," is available at: <http://www-sul.stanford.edu/staff/pubs/index.html>.

9. What positive feedback have you received about HighWire? What negative feedback?

What are you doing about it?

MK: HighWire has gotten a lot of praise, though that which we appreciate the most comes from readers who do not know of our work, but make use of it anyway. We know of cases where parents and relatives of sick persons learned of a course of therapy as a result of searching journals co-published by HighWire and succeeded in improv-

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ing the treatment of diseases and conditions because of the functions we provide for searching and navigation. We are gratified to learn about scholars whose work is made easier and more complete by the use of journals brought to the Web by HighWire. We are delighted to get more challenges and opportunities from our co-publishers, thinking especially of our friends at *Science magazine* and *JBC*, for new functions and new modes of communication. Readers from formerly disadvantaged venues, those who would have received the paper journals weeks after publication, let us know that even across difficult network connections, the investment of minutes for downloading is to them a bearable price to pay for real-time access to fast-breaking science. I guess also that the fact that we are now regularly getting a million hits per day on articles co-published with HighWire is also something of a compliment.

On the other side, we have heard from readers who are disappointed with the terms of subscriptions; our response to this is to refer them to the originating publishers who set those terms. We fairly often hear from people with problems which turn out to be technical ones. Often readers do not read our suggestions for optimizing their browser. There are a bunch of problems which turn out to be networking problems. Our European readers, for instance, know that they must read HighWire journals before 2:30 PM their time, because when Internet users in the Eastern time zone of North America turn on their network connections, response and waiting times increase dramatically. To address this latter problem, we have begun serving such remote locations through dedicated band-width to a few remote sites around the world. More such sites will appear in the next months. Extensive research and testing has indicated to us that this solution is far preferable to that of mirror-siting, especially when considering the complexity of our technical architec-

ture. For each of our journals using this global Internet distribution service, there is a special address arrived at by hyper-linking from the journal home page. A reader merely adds that location to his or her list of bookmarks and is conducted directly by **Digital Island**, the service provider, to our servers here at Stanford, leaping over numerous problems of the public networks.

10. What is the main obstacle between libraries and electronic publishers? What do you think libraries/librarians want concerning electronic publishing? (Quality product, stable archive, reasonable pricing?) How will HighWire benefit libraries?

MK: Our perspective as a library as well as a co-publisher is that pricing and archiving are the principal concerns. It is a shame, in a way, that other concerns are not as actively considered. The importance or impact of the content, for instance, should be of paramount concern. Why libraries and their consortia are so anxious to acquire access to low impact scholarship for more money than was asked for the print editions is beyond me. Another issue should be design and hyper-linking to remote information resources. However, back to pricing and archiving. So far, with some few exceptions, and those misunderstood, pricing models for Internet editions have been based on preserving the cost recovery (and in the case of for-profit publishers, the profit margin as well) of the print run as well as the Internet publication costs for scholarly journals. We should begin to see and to appreciate models which deliver lower costs for Internet editions. The question of who is responsible for the digital archive of a particular publication is partly a technical and management problem, and partly a sociological one. We as Internet publishers need to offer archival versions and/or services upon which libraries can rely. To date, most librarians want computer-output microfilm as the archival version of the Internet editions we co-publish. Go figure. Given agreement with our co-publishers, HighWire is ready to place mag tape versions in escrow, to prepare CD-ROM versions, and to commit to long-term storage and access here at Stanford. The sociological questions involve the library community's making wise decisions about providing this function which in the print world was quite obviously a by-product of the collection development policies and practices of each institution. We now have to depend more distinctly upon certain libraries functioning as digital archives; most libraries simply do not have the technical capacity to perform in this way. Facing and dealing with this reality is apparently a difficult thing, especially for a number of libraries who consider themselves research libraries and who have archives. One hopes that we do not lose too much content before the social questions are settled. The technical and managerial ones are much easier.

HighWire Press has and will benefit libraries by strengthening the role of the publishers of low cost, high impact reports of scholarship. Over time, we expect that their success, that is their success in scholarly communication among readers and authors, will produce meaningful results for libraries in what and how content is made accessible to academic readers as much as in reduced costs or at least lowered rates of increase of cost. For these results to be realized in their fullest forms, other factors outside of our control, but clearly influenced by the publication of high impact journals online, must change — for instance, more readers to have good network connections, good enough workstations or network computers, adequate training and support for their information technology. Another example of a desired change is the acceptability of the networked version of these journals to the exclusion of the printed versions. When the first high impact journal goes entirely digital, a new phase of scholarly communication will have begun. A final example is the availability of well-managed, capacious networks functioning freely around the world.

> *" ... attempting to restrict access to the content or the ability to copy and print ... is counter-productive to [the goal] of scholarly communication."*

11. Who do you consider to be your primary customer; the Association/publisher, libraries, the end-user or other?

MK: Speaking as the Publisher of HighWire Press, our primary customers are the societies and publishers with which we work. Speaking as the University Librarian at Stanford, our primary customers are Stanford's faculty and students, our readers in general. Speaking as an officer of Stanford, we at the Stanford Libraries and HighWire are seeking to perform a couple of missions which address all readers of scholarly publications everywhere. There is not a simple answer to the question, but essentially if we do good work with and for HighWire's co-publishers, we will have done well for the authors and readers of scholarship.

As HighWire's design and development process involves, among other factors, the engagement of readers, we are involving at least representatives of the population of readers in the creation of the Internet editions.

12. Who do you consider to be HighWire's primary competition? In its entrepreneurial role, how will university-based HighWire continue to compete with the deep pockets of commercial publishers?

MK: At one level, HighWire essentially seems not have any competition. There are alternate suppliers of services and added content, but none of them are comparable to HighWire in some ways. We seem to be competing quite effectively with commercial publishers the way things have been going. I cannot see any way in which commercial publishers can compete effectively with HighWire as it is the scholarly and society publishers as well as university-based publishing organs which we seek to empower. It is with that group that there is serious competition and we at HighWire seek to improve and alter the basis of the competition. Essentially the battle has already been decided in favor of the scholarly and society publishers in STM on the basis of content; most of the content readers want is published by not-for-profit publishers. Now we have to help resolve the battle at the economic level. Since deep pockets are not the essential or defining difference between HighWire and the commercial publishers, we believe that we can continue to affect the market correction mentioned earlier.

13. What do you see as the future of HighWire and electronic publishing in general; 1-2 years, 5 years and 10 years? What related or evolving products and/or services do you anticipate spinning-off from HighWire?

MK: In the next few years, HighWire will continue to help bring significant journals to the Internet in digital editions. HighWire has received support from the **Mellon Foundation** and from Stanford's

president, **Gerhard Casper**, to create an Internet publishing capacity for scholarly monographs, working closely with the **Stanford University Press**, whose director is **Norris Pope**. Within a couple of years, we expect to have several dozen monographs available. We hope also to have co-published within a few years some reference works as well. In each of these genres, those of the scholarly monograph and reference works, we expect to apply the lessons learned and to provide the functionality provided in the journals co-published with HighWire as well as some new ones.

We have worked with our colleagues at *Science*, especially **Ellis Rubinstein** and **Monica Bradford**, in addition to **Floyd Bloom**, on something we are calling knowledge environments™, virtual libraries and content and services for narrowly defined realms of specific disciplines. Such knowledge environments ™ may be useful in policy and advocacy professions well. In the policy and advocacy realms, in addition to our colleagues at *Science*, we are working with **Chuck Savitt** and his colleagues at the **Island Press**, a distinguished not-for-profit environmental publisher. These and other information products deriving from HighWire and from SUL/AIR's experiences are contemplated.

14. The Harrassowitz and HighWire homepages mention a partnership. Please explain. What do you see as the role of the subscription agent in the future?

MK: **Harrassowitz** and **HighWire** have entered into a limited partnership. **Friedemann Weigel** and his colleague directors of Harrassowitz along with **Joan Griffith**, responsible for Harrassowitz's Internet presence, are serving as representatives of HighWire's Internet publishing services to European publishers, obviously seeking to establish relationships with scholarly societies and other publishers similar to the ones now working with HighWire. Harrassowitz will also serve as the European help desk for readers of HighWire journals, a first point of contact and assistance. There is every possibility that the limited relationship with Harrassowitz will become larger, perhaps with the establishment of a design/development and production operation in Wiesbaden and perhaps with some responsibilities for marketing and subscriber support.

The role of the subscription agent in an age in which the Internet editions predominate over the print editions of journals is questionable. We have dealt with subscribers for only a few of the HighWire journals, but have noticed the number of interactions necessary to open a campus to a subscription; there is room for re-engineering there, reducing the number of players and making the interactions much more mechanical. There is clearly a role for some kind of consolidating agency, however, and given the predictable growth of computer memory capacity with predictably lowered costs per unit of memory as well as with the improvement in software design and operation, it is completely possible and, indeed, highly desirable, that some subscription agencies assume more responsibilities even while the number of links in the chain of scholarly communication is reduced.

15. What other partners are involved with HighWire? What will those partnerships mean to us as librarians?

MK: **Griffith University** in Brisbane, Australia has a similar role to that of **Harrassowitz** and has already negotiated for the CAUL Libraries in Australia what amounts to a national site license for *JBC* in addition to having begun the role of representing HighWire's publishing services to Australian publishers. We fully expect a similar relationship with our colleagues at UNAM. As it has been my contention that we in North America could address the crisis in foreign acquisition by stimulating Internet publication in the countries of origin, we have been encouraged by these relationships to think that readers everywhere might benefit from the improved distribution of foreign source material and commentary through the Internet. The enhancement of scholarly communication is not simply a function to be performed in North America. Internet publishing in numerous sites can have significant benefits to our readers.

16. What is your storage capacity for archival data now and for the future? How will libraries negotiate long-term access?

MK: Our storage capacity for archival data is essentially unlimited for the moment and for the future. The main question here is the management of the transition from one storage medium to another and from one data format to another as these technologies evolve over time. As we get consensus on data archiving in the library and I.T. communities, we will have greater assurance of the long-term survivability of sources in digital form. As the publishers working with HighWire are every bit as concerned as librarians and readers are with the development and acceptance of long-term data archiving, we believe that the negotiations will occur with the same degree of acceptance as consensus is reached on method. Librarians should be negotiating now so that the subscriptions and licenses preserve the right of access to the Internet editions for the years the subscriptions were in force.

17. Please comment on the document formats i.e. HTML, SGML, PDF etc. being used now and what direction is HighWire heading?

MK: HTML and PDF formats are in use and available to readers in most of the HighWire journals. Underlying these formats are SGML versions in very systematic form. Because the browsers currently support fewer characters than STM journals employ and because there are graphics and half-tones included with the texts, gifs are employed as well. We believe that these document formats will persist and we intend to keep using them, hoping, however, that the browsers will expand the number of supported characters. We have been working on the problem of mathematical equations, but have not yet solved that problem. We currently present them as images, but seek to make them searchable. Versions of Tex are a possible approach, but there are technical implications and limitations involved with Tex as well.

18. How many mirrored sites will be added; international and US. How does the Digital Island arrangement figure into this?

MK: Because of the overhead and technical difficulties with mirror-siting as a technique, we have resolved upon the use of a global Internet distribution service rather than establishing mirror sites. We can see, however, the possibility of sister sites, in Wiesbaden with **Harrassowitz**, in Brisbane at **Griffiths University**, and perhaps in Mexico City, each with its own particular array of content. **Digital Island** gives our readers superior access to the journals by dedicated band-width and very low latency. As the number of local relay sites provided by Digital Island increases, we believe that many of our remote readers will see substantial improvement in the delivery times of articles in the HighWire journals."

19. What are your thoughts about per-use fees rather than annual subscription fees to full-text resources?

MK: I have mixed feelings about per-use fees. On the one hand, as librarians we make capital investments in information not just for the current populations of readers in our insti-

Chaos
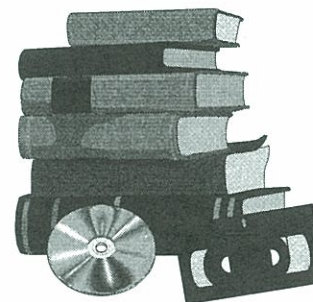
complete unit, the Object can be used by your computer without pre-arrangement. For a look at these concepts in more detail, I urge you to spend a few minutes on the Web. Go to <http://www.disa.org> (DISA, the Data Interchange Standards Organization, is Secretariat to the U.S. EDI standards development group). Once there, you are given the option to look at some of the committee activity. Select the Strategic Implementation Task Force (SITG) and take a look at the UN and ISO/IEC documents on file there. AND, if you find yourself thinking that you can help this effort and make it work more appropriately for your organization or community, get involved. Contact BISAC or SISAC at the addresses elsewhere in this article and volunteer. We can use all the help we can get if we're going to get in right in the next century!! 🌳

Back to the Future

tutions, but for future generations as well. Thus, expending capital on information as though it were merely a utility is onerous. On the other hand, if reliance on per-use fees for low impact information allows more selective capital investments in high impact information, then my instincts as a collections person might be satisfied. The expansion of reliance on per-use fees might accelerate the market correction we at HighWire are involved with as well.

20. After two years into the project what has surprised you? Any profound lessons? Have your goals changed?

MK: The enthusiasm for the online versions by readers has surprised us. The warmth and strength of our relationships with our co-publishers has been a wonderful surprise. The examples of the *JBC* and *Science* have been mentioned only and are quite pervasive ones, but the other relationships with the other publishers have been wonderful and quite productive as well. The most profound lesson to date is that HighWire demonstrates what a small, but brilliant band of professionals can do to affect change given the focus on the mission, on satisfying authors, editors, readers, publishers using information technology. Our goals have not changed, though our methods and technologies have.

21. Would you like to add anything?

MK: I can promise only that the future will bring as many opportunities and changes as the recent past. Not only HighWire, but Stanford in general seeks to exploit the opportunities to the advantage of its academic community and for the colleague communities elsewhere. Get more information about HighWire at http://highwire.stanford.edu/." 🌳

Innovation Affecting Us

Popular report options include: items selected but not yet ordered, recently shipped items, approval plan activity report sorted by fund code. Reports can be created, viewed online and printed or (if too long) attached to emails. For collection development purposes, records display global title histories showing how many customers received the book on approval, compared to customers who received only notification slips for that title.

GOBILink, used in conjunction with GOBI, can create bibliographic and order records in a local library system from orders entered into GOBI, eliminating the need to re-key item-by-item. Libraries can down-load data which will trigger encumbrance, order, receipt and payment transactions in the local library system.

For cataloging support, GOBILink can facilitate the overlay of order-level records with cataloging records directly from YBP or through **OCLC PromptCat**. GOBI ordering screens provide space for libraries to communicate local data to be included in the cataloging fields. YBP is beta-testing shelf-ready materials for libraries with call numbers provided by OCLC via PromptCat.

Available since January 1996, GOBI continues to evolve and a list of enhancement ideas appear on the Website. A picture of GOBI (bird) and imaginative description also appears on the Website, adding a sense of humor to the electronic environment. 🌳

Back Talk

them, causing all sorts of troubles. and yet, it is in the future where our greatest leverage is. We can't change the past, although if we are smart, we learn from it. ... If we learn to anticipate the future better, we need not fear it. In fact, we can welcome it, embrace it, prepare for its coming, because most of it will be the direct outgrowth of our own efforts." (p. 18).

The proponents of the Yale classical curriculum were able to hide behind its historical legitimacy. Are we hiding behind the historical legitimacy of print research? Me?

I am good at attacking digital foolishness: I mouth the "you can't read a computer in the bathtub or bed" clichés. But do any of us really believe that this steady growth in the amounts spent on electronic resources is going to end or even slow down? Do we really think the generation of kids flocking to the Internet (whose fragile minds I worried about in a previous column) are going to reverse direction? So are we the people shifting the gears from how information is acquired, processed, stored and preserved now to how it will be done in the future? Or are we some loose nuts and bolts in the gears, trying to stop or slow down the process? 🌳