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ABSTRACT

JSTOR (Journal STORage project) began as a project of The Andrew W. Mellon Foundation designed to help libraries address growing persistent space problems. JSTOR was established as an independent not-for-profit organization with its own Board of Trustees in August 1995. This paper summarizes how JSTOR's economic model was developed, lessons learned along the way, and future challenges. In developing a plan for cost recovery, JSTOR's first step was to define "the product." For nonprofit organizations like JSTOR, a key guidepost for choosing an appropriate display format is the organization's mission; having a clear understanding allows for flexibility in a rapidly evolving environment. Once the basic parameters of what would be offered were framed, the question of economic viability needed to be addressed. JSTOR learned that costs fell into basically six categories: production; conversion; storage and access; software development; user support; and administration and oversight. For the most part, production and conversion are one-time (capital) expenditures; the costs in the other categories are incurred regardless of whether new journals are added to the database and are thus a reflection of the ongoing (operating) costs of the enterprise. In JSTOR's case, to define a pricing plan, the benefits to participants of providing a new and more convenient level of access to scholarly material were evaluated; cost savings of allowing participants of JSTOR to free expensive shelf space were also calculated. Once JSTOR had decided to offer a range of price levels, an objective classification method was chosen to place institutions in different price categories. The positive reaction of the library community to JSTOR has raised expectations and created new challenges to be addressed in the future. (AEF)

Scholarly Communication and Technology

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JSTOR: The Development of a Cost-Driven, Value-Based Pricing Model

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In the spring of 1996, when I was first approached to participate in this conference and was informed that the topic I was to address was pricing and user acceptance, I remember thinking it was quite a leap of faith, since JSTOR had neither a business model with prices, nor users. And we surely did not have user acceptance. Much has happened in a relatively short period of time, most notably the fact that JSTOR signed up 199 charter participants during the first three months of 1997. Our original projections were to have 50 to 75 participating institutions, so we are very encouraged to be off to such a good start.

The purpose of this brief case report is to summarize how JSTOR's economic model was developed, what we have learned along the way, and what we think the future challenges are likely to be. JSTOR is a work-in-progress, so it is not possible, nor would it be wise, to try to assert that we have done things "right." The jury is out, and will be for quite some time. My goal is only to describe our approach to this point in the hope that doing so will provide useful "experience" for others working in the field of scholarly communication. In providing this summary I will try not to stray far from the organizing topic assigned to me -- pricing and user acceptance -- but I think it is impossible to separate these issues from more general aspects of a not-for-profit's organizational strategy, and particularly its mission.

History

JSTOR began as a project of The Andrew W. Mellon Foundation designed to help libraries address growing

and persistent space problems. Couldn't advances in technology help reduce the system-wide costs associated with storing commonly held materials like core academic journals? A decision was made to test a prototype system that would make the backfiles of core journals available in electronic form. Mellon Foundation staff signed up journal publishers in history and economics and, working through a grant to the University of Michigan, began to create a database with associated controlling software that was made available to several test site libraries. It became evident very soon that the concept was both extremely complicated to implement and that it held great promise.

JSTOR was established as an independent not-for-profit organization with its own Board of Trustees in August 1995. From the outset, JSTOR was given the charge to develop a financial plan that would allow it to become self-sustaining -- the Mellon Foundation was not going to subsidize the concept indefinitely. At the same time, JSTOR is fortunate to have had Mellon's initial support because enormous resources have been invested in getting the entity launched that never have to be paid back. Apart from the direct investments of funds in the development of software, production capacity, and mirror sites through grants to Michigan and Princeton, there were large investments of time and effort by Mellon Foundation staff. JSTOR has received, in effect, venture capital for which it need not produce an economic return. We have tried to translate these initial grants into lower prices for the services that we provide to JSTOR participants.

Defining "the Product"

Although JSTOR does not have to repay initial investments, it must have a mechanism to recover its ongoing costs. In developing a plan for cost recovery, our first step was to define exactly what it is that our "customers" would pay for -- what is the "product"? On the face of it, this step sounds simple, but it is anything but that, especially given the rate of change of technology affecting the Internet and World Wide Web. For example, those publishers reading this paper who are working to put current issues in electronic form will know that even choosing the display format can be extremely difficult. Should the display files be images or text? If text, should they be SGML, PDF, HTML, SGML-to-HTML converted in advance, SGML-to-HTML converted on the fly, or some combination of these or other choices? The format that is chosen has far-reaching implications for present and future software capabilities, charging mechanisms and user acceptance. It is easy to imagine how this decision alone can be paralyzing.

For nonprofit institutions like JSTOR, a key guidepost for making decisions of this type is the organization's mission. Nonprofits do not set out to maximize profits or shareholder wealth. In fact, they have been created to provide products or services that would not typically be made available by firms focused on maximizing profit. Consequently, not-for-profits cannot rely solely on quantitative approaches for decision-making, even when such decisions are quantitative or financial in nature. Without such tools, having a clearly defined mission and using it to inform decisions is essential.

A good example of how JSTOR has relied on its mission for decision-making is the question mentioned briefly above -- choosing an appropriate display format. We have decided to use a combination of images and text for delivery of the journal pages. We provide the images for display - so a user reads and can print a perfect replication of the original published page - and in the background we allow users to search the full text. This decision has been criticized by some people, but it is an appropriate approach for us, given the fact that our goal is to be a trusted archive and because JSTOR is now chiefly concerned with replicating previously published pages. There would be benefits to tagging the full text with SGML and delivering 100% corrected text files to our users, but because we also are committed to covering our costs, that approach is not practical. We are building a database of millions of pages and the effort required to do so is enormous. Digitizing even a single JSTOR title is a substantial undertaking. I have heard some people wonder why JSTOR is including "only" 100 journals in its first phase when other electronic journal initiatives are projecting hundreds, even thousands of journals. Presently, the 20 JSTOR journals that are available

online have an average run of over 50 years. So any calculation about the effort required for converting a single title needs to be multiplied thirty to fifty times to be comparable to the effort required to publish an electronic version of a single year of a journal. That imposes very real constraints.

Having a clear understanding of our fundamental mission has also allowed us to remain flexible as we confront a rapidly evolving environment. It is a never-ending task trying to keep up with the technology. We work hard to remain open to change, and at the same time we are committed to using the appropriate technology to fulfill our objective - no more, no less. Progress can grind to a halt quickly when so much is unknown, and so much is changing, but our simple goal is to keep making progress. We recognize that by pushing forward relentlessly we will make some mistakes, but we are convinced that we cannot afford to stop moving if we are to build something meaningful in this dynamic environment.

So we established goals consistent with our mission and have made adjustments as we have gained experience. As mentioned previously, one of our fundamental goals is to serve as a trusted archive of the printed record. That means that output produced by the database has to be at least as good as the printed journals. A key determining factor in the quality of JSTOR printouts is the initial resolution at which the journal pages are scanned. Our original inclination was to scan pages at a resolution of 300 dots-per-inch (dpi). Anne Kenney[1] was a key advocate for scanning at 600 dpi when most people advised that 300 dpi was adequate and 600 dpi too expensive. Kenney made a strong case that scanning at 600 dpi is not just better than scanning at 300 dpi, but that, for pages comprised mainly of black-and-white text, there are rapidly diminishing perceivable improvements in the appearance of images scanned at resolutions beyond 600 dpi. It made sense, given the predominance of text in our database, to make the additional investment to gain the assurance that the images we were creating would continue to be acceptable even as technologies continued to improve. We are pleased that we made this choice; the quality of output now available from the JSTOR database is generally superior to a copy made from the original.

Another illustration of how it has been important for us to remain flexible concerns delivery of current issues. In the early days of JSTOR, several scholarly associations approached us with the idea that perhaps we could publish their current issues. The notion of providing scholars with access to the complete run of the journal - from the current issue back to the first issue - had (and has) enormous appeal. On the face of it, it seemed to make sense for JSTOR also to mount current issues in the database and we began to encourage associations to think about working with us to provide both current issues and the back files. It was soon evident, however, that this direction was not going to work for multi-title publishers. These publishers, some of which publish journals owned by others such as scholarly associations, justifiably regarded a JSTOR initiative on current issues to be competition. They were not about to provide the backfile of a journal to us only to risk that journal's owners turning to JSTOR for electronic publication of current and future issues. Again, we had to make adjustments. We are now committed to working with publishers of current issues to create linkages that will allow seamless searches between their data and the JSTOR archive, but we will not ourselves publish current issues.[2] If we are to have maximum positive impact on the scholarly community, we must provide a service that benefits not only libraries and scholars but also publishers of all types, commercial and not-for-profit, multi-title and single-title. It is part of having a system-wide perspective, something, which has been a central component of our approach from JSTOR's first days.

Determining Viability

Once we had framed the basic parameters of what we were going to offer, the key question we had to ask ourselves was whether it could be economically viable. Unfortunately, definitive answers to this question are probably never known in advance. The fact of the matter is that during their earliest phase, projects like JSTOR, even though they are not-for-profit, are still entrepreneurial ventures. They face almost all of the same risks as for-profit start-ups and the same tough questions must be asked before moving forward. Is

there a revenue generating "market" for the service to be provided?[3] Does the enterprise have sufficient capital to fund up-front costs that will be incurred before adequate revenue can be generated? Is the market large enough to support the growth required to keep the entity vibrant?

Pursuing this analysis requires a complicated assessment of interrelated factors. What are the costs for operating the entity? That depends on how much "product" is sold. How much product can be sold, and what are the potential revenues? That depends on how it is priced. What should be the product's price? That depends on the costs of providing it. Because these factors are so closely related, none of them can be analyzed in isolation from the others; however, it is natural for a not-for-profit project focused on cost recovery to begin its assessment with the expense side of the ledger.

Defining the Costs

When the product or service is one that has not previously been offered, projecting potential costs is more art than science. Even if one has some experience providing a version of the product, as JSTOR had because of the Mellon initiative, one finds that the costs that have been incurred during the initial start-up period are irregular and unstable, and thus not reliable for projecting beyond that phase. Even now, with nearly 200 paying participants, we still have much to learn about what stable running costs are likely to be.

What we have learned is that our costs fall into basically six categories. They are:

1) *Production*: identifying, finding and preparing the complete run, defining indexing guidelines to inform a scanning sub-contractor, and performing quality control on the work of the scanning sub-contractor;

2) *Conversion*: scanning, OCR and inputting of index information to serve as the electronic table of contents (performed by a scanning sub-contractor);

3) *Storage and access*: maintaining the database (at a number of mirror sites), which involves continuous updating of hardware and systems software;

4) *Software development*: migrating the data to new platforms and systems and providing new capabilities and features to maximize its usefulness to scholars as technological capabilities evolve;

5) *User support*: providing adequate user help desk services for a growing user base;

6) *Administration and oversight*: managing the overall operations of the enterprise.

Some of these costs are one-time (capital) expenditures and some of them are on-going (operating) costs. For the most part, production and conversion (#1 and #2 above) are one-time costs. We hope that we are digitizing from the paper to the digital equivalent only once.[4] The costs in the other categories will be incurred regardless of whether new journals are added to the database and are thus a reflection of the ongoing costs of the enterprise.[5]

Because the most visible element of what JSTOR provides is the database of page images, many people tend to think that the cost of scanning is the only cost factor that needs to be considered. Although the scanning cost is relevant, it does not reflect the total cost of conversion for a database like JSTOR. In fact, scanning is not even the most expensive factor in the work done by our scanning contractor. During the conversion process, JSTOR's scanning vendor creates an electronic table of contents, which is just as costly as the scanning. In addition, because creating a text file suitable for searching requires manual intervention after running OCR software, that step has proven to be even more expensive than scanning. All told, the direct

incremental costs of creating the three-part representation of a journal page in the JSTOR database (page image, electronic table-of-contents entry and text file) is approximately $0.75 to $1.00 per page.

Payments to the scanning bureau do not represent the complete production cost picture. Converting 100,000 pages per month requires a full-time staff to prepare the journals and to give the scanning bureau instructions to insure that table of contents and indexing entries are made correctly. At present production levels, these costs are approximately equal to the outlays made to the scanning bureau. On average then, JSTOR production costs approach $2.00 per page.

Other costs of operating JSTOR are less easily segregated into their respective functional "departments." Our present estimates are that once all of the 100 Phase I journals are available in the database, operating costs (independent of the one-time costs associated with production) will be approximately $2.5 million annually.

Defining Pricing

On the one hand, the obvious goal is to develop a pricing plan that will cover the $2.5 million in projected annual expenses plus whatever one-time production related expenses are incurred in converting the journals. This of course depends upon the rate at which the content is being digitized. For projects designed to recover costs by collecting fees from users, it is also important to assess whether the value of the service to be provided justifies the level of expenditures being projected.

In JSTOR's case, we evaluated the benefits to participants of providing a new and more convenient level of access to important scholarly material, while also attempting to calculate costs that might be saved by participants if JSTOR allowed them to free expensive shelf space. A central part of the reason for our founding was to provide a service to the scholarly community that would be both better and cheaper. That goal is one that remains to be tested with real data, but it can and will be tested as JSTOR and its participating institutions gain more experience.

Our initial survey of the research indicated that the cost of library shelf space filled by long runs of core journals was substantial. Using a methodology devised by Malcolm Getz at Vanderbilt and cost data assembled by Michael Cooper at UC-Berkeley, we estimated that the capital cost for storing a single volume ranged between $24 and $41.[6] It follows that storing the complete run of a journal published for 100 years costs the holding institution between $2,400 and $4,100. In addition, operating costs associated with the circulation of volumes are also significant and resources could be saved by substituting centrally managed electronic access to the material. Estimates of these costs for some of our original test site libraries indicated that costs in staff time for reshelving and other maintenance functions ranged from $45 annually for a core journal at a small college, to $180 per title at a large research library with heavy use. These estimates of savings do not take into account the long-term costs of preservation, or the time saved by users in finding articles of interest to them.

Although these estimates were not used to set prices, they did give us confidence that a pricing strategy could be developed that would offer good value for participating institutions. We set out to define more specifically the key components of the service we would offer and attempted to evaluate them both in the context of our mission and our cost framework. We found that deciding how to price an electronic product was extraordinarily complex and it was clear that there was no correct answer. This is by no means an exhaustive list, but some of the key factors that we weighed in our development of a pricing approach included:

* Will access be offered on pay-per-use model, or by subscription, or both?

* If by subscription, will the resource be delivered to individuals directly or via a campus site license?

* If by site license, how is the authorized community of users defined?

* Will there be price differentiation or a single price?

* If the price varies in some way for different types of licensees, what classifying approach will be used to make the determinations?

In making decisions we weighed the merits of various options by evaluating which seemed most consistent with JSTOR's fundamental objectives. For example, we wanted to provide the broadest possible access to JSTOR for the academic community. Because pricing on a pay-per-use model usually yields prices higher than the marginal cost of providing the product, we determined that this was not consistent with our goal. We did not want to force students and scholars to have to decide whether it would really be "worth it" to download and print an article. We wanted to encourage liberal searching, displaying and printing of the resource. In a similar vein, we concluded that it would be better to begin by offering institutional site licenses to participating institutions. We defined the site license broadly by establishing that authorized users would consist of all faculty staff and students of the institution, plus any walk-up patrons using library facilities.[7]

Another decision made to encourage broad access was our determination that different types of users should pay different prices for access. This is an approach called price differentiation, which is very common in industries with high fixed costs and low marginal costs (like airlines, telecommunications, etc.). We decided to pursue a value-based pricing approach that seeks to match the amount institutions would contribute to the value they would receive from participation. By offering different prices to different classes of institutions, we hoped to distribute the costs of operating JSTOR over as many institutions as possible, and in a fair way.

Once we had decided to offer a range of price levels, we had to select an objective method to place institutions into different price categories. We chose the Carnegie Classification of Institutions of Higher Education for pricing purposes. Our reason for choosing the Carnegie Classes was the fact that these groupings reflect the degree to which academic institutions are committed to research. Because the JSTOR database includes journals primarily used for scholarly research and would therefore be most highly valued by research institutions, the Carnegie Classes offered a rubric consistent with our aims. In addition to the Carnegie Classes, JSTOR factors in the FTE enrollment of each institution, making adjustments that move institutions with smaller enrollments into classes with lower price levels. We decided to break higher education institutions into four JSTOR sizes: Large, Medium, Small and Very Small.

Having established four pricing classes and a means for determining what institutions would fill them, we still had to set the prices themselves. In doing so, we thought both about the nature of our cost structure and the potential for revenue generation from the likely community of participants. We noted immediately that the nature of JSTOR's cost structure for converting a journal -- a large one-time conversion cost followed by smaller annual maintenance costs -- was matched by the nature of the costs incurred by libraries to hold the paper volumes. In the case of libraries holding journals, one-time or capital costs are reflected in the cost of land, building and shelves, while annual outlays are made for such items as circulation/reshelving, heat, light and electricity. We decided, therefore, to establish a pricing approach with two components: a one-time fee (which we called the Database Development Fee, or DDF) and a recurring fee (which we called the Annual Access Fee, or AAF).

But what should those prices be? As mentioned previously, the long-term goal was to recover $2.5 million in annual fees while also paying the one-time costs of converting the journals to digital formats. Because it was

impossible to model potential international interest in JSTOR, we limited our plan to U.S. higher education institutions. We conducted an assessment of the potential number of participants in each of our four pricing classifications. The number of U.S. higher education institutions in each category is shown in Table 1.

Table 1. Number of U.S. Higher Education Institutions by JSTOR Class

JSTOR Class	Number of Institutions
Large	176
Medium	589
Small	166
Very Small	471
Total	1,402

After thorough analysis of various combinations of prices, participation levels and cost assumptions, we arrived at a pricing plan we felt offered a reasonable chance of success. One other complicating aspect that arose as we developed the plan was how to offer a one-time price for a resource that was constantly growing. To deal with that problem, we defined our initial product, JSTOR-Phase I, as a database with the complete runs of a minimum of 100 titles in 10-15 fields. We promised that this database would be complete within three years. Prices for participation in JSTOR-Phase I are shown in Table 2.

Table 2. JSTOR Prices - Phase I

JSTOR Class	One-time Database Development Fee (DDF)	Annual Access Fee (AAF)
Large	$40,000	$5,000
Medium	30,000	4,000
Small	20,000	3,000
Very Small	10,000	2,000

These prices reflect the availability of the complete runs of 100 titles. That would mean that, for a Large institution, perpetual access to 80 years of The American Economic Review (1911-1991) would cost just $400 one-time and $50 per year. For a Small institution, it would be only $200 one-time and $30 per year. For comparison, consider that purchasing microfilm costs an order of magnitude more but offers far less convenient access. Also, if it proves to be possible to move copies to less expensive warehouses, or even to remove duplicate copies from library shelves, institutions will capture savings of some or all of the shelving and circulation costs outlined earlier in this paper. (For 80 volumes, that analysis projected capital costs of between $24 and $41 per volume, or $1,920 to $3,280 for an 80 volume run. Also, annual circulation costs were estimated as $180 per year for a Large institution.)

We purposely set our prices low in an effort to involve a maximum number of institutions in the endeavor. We are often asked how many participating institutions are needed for JSTOR to reach "breakeven." Because the total revenue generated will depend upon the distribution of participants in the various class sizes, there is no single number of libraries that must participate for JSTOR to reach a self-sustaining level of operations. Further, since our pricing has both one-time and recurring components, breakeven could be defined in a number of ways. One estimate would be to say that breakeven will be reached when revenues from annual access fees match non-production related annual operating expenditures (since the production related costs are primarily one-time). Although this is a useful guide, it is not totally accurate because, as mentioned previously, there are costs related to production that are very difficult to segregate from other expenses. Another approach would be to try to build an archiving endowment, and to set a target endowment size that would support the continuing costs of maintaining and migrating the Phase I archive, even if no additional journals or participants were added after the Phase I period. Our plan combines these two approaches. We believe it is important to match the sources of annual revenues to the nature of the

purposes for which they will be used. We require sufficient levels of annual inflows to cover the costs of making JSTOR available to users (user help desk, training, instruction, etc.). These should be collected by way of annual access fees from participants. There is also, however, the archiving function that JSTOR provides which is not directly attributable to any particular user. Like the role that libraries fill by keeping books on the shelves just in case they are needed, this is a public good. We must build a capital base to support the technological migration and other costs associated with this archiving function.

As with other aspects of our organizational plan, we remain open to making adjustments in pricing when it is fair, appropriate and does not put our viability at risk. One step we took was to offer a special charter discount for institutions that chose to participate in JSTOR prior to April 1, 1997. We felt it was appropriate to offer this discount in recognition of participants' willingness to support JSTOR in its earliest days. We also have made minor adjustments in the definitions of how Carnegie Classes are slotted into the JSTOR pricing categories. In our initial plan, we included all Carnegie Research (I and II) and Doctoral institutions (I and II) in the Large JSTOR category. As we spoke with librarians and administrators, it was clear that including Doctoral II institutions in this category was not appropriate. There proved to be a significant difference in the nature of these institutions and the resources they invest in research and so an adjustment was made to place them in the Medium class. In cases where we make adjustments of this nature, it is not for a single institution, but for all institutions that share a definable characteristic. In order to be fair, we do not believe in negotiating special deals.

There is a component of our pricing strategy that needs some explanation because it has been a disappointment to some people; that is, JSTOR's policy toward consortia. JSTOR's pricing plan was developed to distribute the costs of providing a shared resource among as many institutions as possible. The same forces that have encouraged the growth of consortia -- namely, the development of technologies to distribute information over networks -- are also what make JSTOR possible. It is not necessary to have materials shelved nearby in order to read them. A consequence of this fact is that marginal costs of distribution are low and economies of scale substantial. Those benefits have already been taken into account in JSTOR's economic model. In effect, JSTOR is itself a consortial enterprise that has attempted to spread its costs over as much of the community as possible. Offering further discounts to large groups of institutions would put JSTOR's viability, and with it the potential benefits to the scholarly community, at risk.

A second significant factor which prevents JSTOR from offering access through consortia at deep discounts is that the distribution of organizations in consortia is uneven and unstable. Many institutions are members of several consortia, while some are in none at all (although there are increasingly few of those remaining). If the consortial arrangements were more mature and there was a one-to-one relationship between the institutions in JSTOR's community and consortial groups, it might have been possible for JSTOR to build a plan that would distribute costs fairly across those groups. If, for example, every institution in the United States was a member of one of five separate consortia, a project like JSTOR could divide its costs by five and a fair contribution could be made by all. But there are not five consortia; there are hundreds. The patchwork of consortial affiliations is so complex that it is extremely difficult, if not impossible, to establish prices that will be regarded as fair by participants. JSTOR's commitment to share as much of what it learns with the scholarly community as possible requires that there be no special deals, that we be open about the contributions that institutions make and their reasons for making them. Our economic model would not be sustainable if two very similar institutions contributed different amounts simply because one was a member of a consortium that drove a harder bargain. Instead, we rely on a pricing unit which is easily defined and understood -- the individual institution. And we rely on a pricing gradient, the Carnegie Classification, which distributes those institutions objectively into groupings that are consistent with the nature and value of our resource.

Conclusion

The initial response to JSTOR's charter offer in the first three months of this year is a strong signal that JSTOR will be a valued resource for the research community; however, it is still far too early to comment further on "user acceptance." Tom Finholt's research (also presented at this conference) into usage at the test site libraries provides a first snapshot, but this picture was taken prior to there being any effort to increase awareness of JSTOR in the community and on the specific campuses. There is much to learn. By the conclusion of the 1997-1998 academic year, there will be more to say about whether the availability of JSTOR has any impact on the use of older journals. JSTOR is committed to tracking usage data both for libraries and publishers and to providing special software tools to enable users to create usage reports tailored to their own needs and interests. We will continue to keep the academic community informed as we learn more.

While we are encouraged by the positive reaction of the library community to JSTOR, we recognize that this good start has raised expectations and has created new challenges. In addition to reaching our 100-title goal before the end of 1999, trying to encourage the next 200 libraries to participate, and keeping up with changing technologies, we face other complex challenges, including how to make JSTOR available outside of the United States, and how to define future phases of JSTOR. Addressing these issues will require the development of new strategic plans and new economic and pricing models. In creating those plans, we know that we will continue to confront complicated choices. As we make decisions, we will remain focused on our mission, making adjustments to our plans as required to keep making progress in appropriate ways.

REFERENCES:

[1] Anne Kenney is the Associate Director of Preservation at the Cornell University Library. She has also authored a paper for this conference. It is entitled "Digital Image Quality: From Conversion to Presentation and Beyond."

[2] We did agree to work with three scholarly associations, the Ecological Society of America, the American Economic Association and the American Political Science Association to provide access to current issues through JSTOR. We stand by our commitments to these organizations, but our goal is to learn more about the technology required to make linkages between current issues and the archive, not to build the capability for JSTOR to become a publisher of current issues.

[3] In the not-for-profit context, that market need not consist solely of paying customers, it could include other types of indirect funders like government agencies or foundations.

[4] This is not precisely accurate. Not all of the production costs are one-time. We add another volume of each journal title to the database as each year passes, so there is an on-going element of the production costs, but they represent a small fraction of total production expenditures.

[5] There is a caveat here as well. Some of the administrative and overhead costs are higher because JSTOR is adding titles. Negotiating agreements with publishers is a time-consuming task, as is overseeing the

production operation converting 100,000 pages per month. It is not practical, however, to allocate exactly the portion of general administrative and other costs that pertain directly to production.

[6] For a more complete description of these estimates, see "JSTOR and the Economics of Scholarly Communication," a paper by William G. Bowen, which is available at http://www.mellon.org/jsesc.html.

[7] For a more complete description of the evolution in the development of JSTOR's library license terms, see "JSTOR: An IP Practitioner's Perspective," by Sarah E. Sully, D-Lib, January 1997.

For additional information about the conference, or The Andrew W. Mellon Foundation's scholarly communication initiatives, please contact Richard Ekman. For additional information about ARL or this web site contact Patricia Brennan, ARL Program Officer at (202) 296-2296.

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