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An Alternative Mechanism for the Delivery of Scholarly Journal Articles: ReadCube Access at the University of Utah

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Abstract

Traditional collection management of serials through site licenses and subscriptions is increasingly unsustainable due to rising costs and steady or falling library budgets. The ensuing gaps in access have led to widespread illicit file sharing, resulting in the disintermediation of libraries and the devaluing of publishers. It has therefore become essential to explore alternatives for the delivery of journal literature. We report on the exploration of a new mechanism for the provision of scholarly articles using patron-driven acquisition (PDA). During the 2012–2013 academic year, the University of Utah Marriott Library, ReadCube, and Nature Publishing Group collaborated on the development and testing of ReadCube Access, an article delivery service designed to allow researchers to immediately access individual articles at a cost lower than traditional interlibrary loan, pay per view, or document delivery.

The goal of this session is to explore the economics of collection management from the perspective of supplying needed scholarly articles and discuss how new technologies like ReadCube Access and PDA can support that aim. The session will involve a frank discussion of the effects of and attitudes toward illicit file sharing, from which the audience will learn about the scale of file sharing and how it affects the perceived value and, therefore, funding of libraries. An interactive workshop on cost-per-use assessment for various acquisition mechanisms will elucidate how the economics of acquisition mechanisms change with demand and under which conditions PDA will save libraries money while increasing patron engagement and satisfaction.

Introduction

Traditional collection management in academic libraries is coming under increasing pressure as unsustainable. Stable or falling library budgets accompanying rising costs for subscriptions constitute the two incompatible trends that make up the continuing serials crisis.

Reduced library funding does not reflect a reduction in the need for content. The total number of academic journals in publication is increasing at an annual rate of about 3.5% per year (Mabe & Amin, 2001) in an approximate linear relation to both the number of knowledge workers and number of articles being put out. The average number of articles being read per academic year is also steadily increasing (Tenopir, King, Edwards, & Wu, 2009). These trends are partly responsible for increases in serials expenses.

Since resources are declining while demands are increasing, an apparent devaluation of library services is occurring. It seems reasonable to these authors that a disintermediation of the library and a reduction in patron engagement with library services are both a cause and a consequence of this situation.

Channels for obtaining unsubscribed content are becoming increasingly diverse, ranging from traditional approaches, like interlibrary loan (ILL), to newer methods, such as searching gold and green open access databases. Scholars also use file sharing as a means for acquiring articles and coping with growing access gaps.

In this article, the authors will briefly describe some aspects and consequences of the shifting role of libraries in academic institutions, including the apparent disintermediation of libraries through patron file sharing. We will go on to propose that a patron-driven acquisition (PDA)
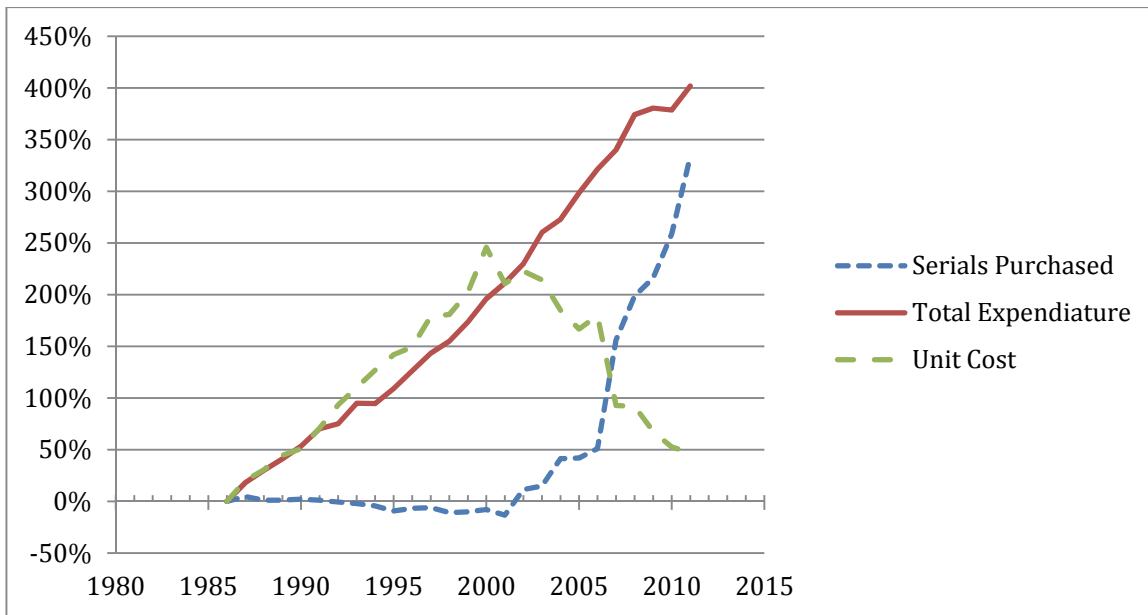
Figure 1. The Total Number of Serials Purchased Has Risen Dramatically Since the Introduction of the Big Deal. Despite This, the Total Expenditure Continues to Rise Unabated

system that enables scholars to instantly obtain unsubscribed content at a lower cost than traditional ILL or document delivery will provide one of the collection management and patron engagement solutions of the future.

The Economics of Site Licenses and Open Access

The multijournal, multiyear site license, or "big deal," was an attempt to address the problem of rising subscription costs and spiralling journal cancellations (Poynder, 2011). Data gathered by the Association of Research Libraries (Kyrillidou, Morris, & Roebuck, 2012) shows the big deal succeeded in increasing the amount of content that librarians were able to offer their patrons and dramatically reduced the cost per journal (Figure 1). However, the overall amount paid for serials by libraries has continued to rise unabated. For example, the Marriott Library's serials expenses increased 14% between fiscal year 2010–2011 and fiscal year 2012–2013.

Some libraries are finding big deals to be unsustainable and are starting to abandon them (Nabe & Fowler, 2012). Other libraries are canceling subscriptions from smaller publishers to sustain large package deals.

Open access and author-pays models are proposed as another solution to the serials crisis and the rising costs for libraries. In principle, treating the cost of dissemination as an additional cost of doing research means that libraries and individuals would not have to pay to access publicly funded research. However, the Finch Group reported the U.K. open access policy may require as much as $75 million to $85 million in extra funding (Accessibility, Sustainability, Excellence, 2013). According to SCOPUS, the United States publishes about 3.6 times as many academic articles as the UK. A simple calculation will show that an all-gold open access policy might cost U.S. academia $288 million in additional funding to implement. Obviously, some of this funding may come from library budgets.

Disintermediation of the Academic Library

We might expect ILL usage rates would increase as access gaps grow. While ILL experienced a dramatic growth between 1984 and 2007, borrowing has since begun to fall (Behr & Hayward, 2008; Kyrillidou, 2012). This drop in use suggests that scholars are looking to resources outside of the library to achieve their literature needs.
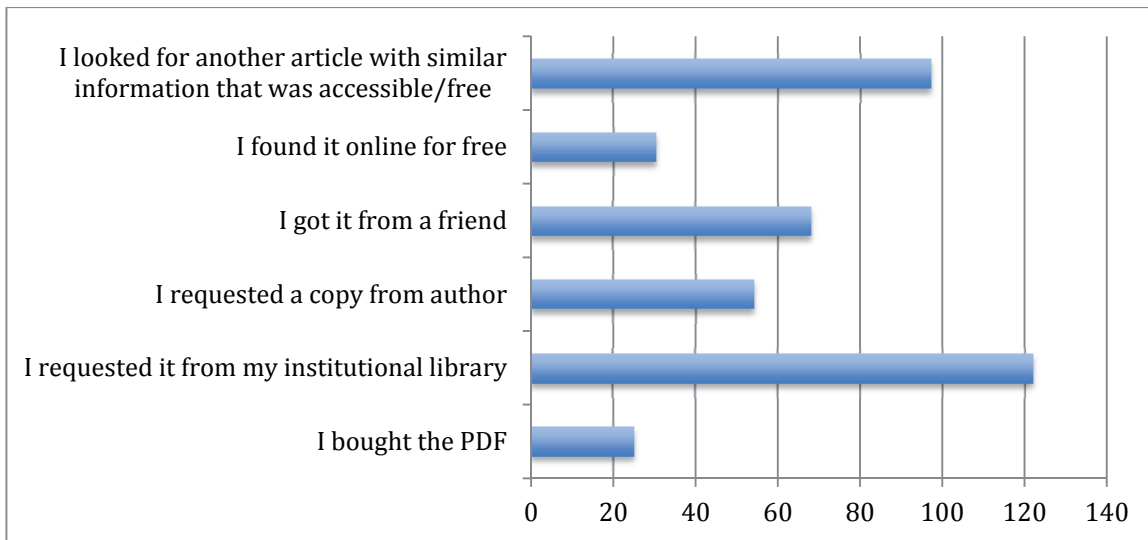
Figure 2. Critical Event Analysis of Pay Wall Events. We Asked ReadCube Users What They Did the Last Time They Encountered a Pay Wall. Forty-Three Percent of Respondents Found the Content Without Using Library Services

In 2012, ReadCube conducted a survey into access gaps among their registered users. The results were reported earlier this year in the proceedings of the 2013 NASIG Conference in Buffalo, New York (England & Jones, 2014). We discovered that respondents to the survey encountered pay walls on average 2.8 times per month and that the single most common coping response was to use some form of file sharing to find the article.

Earlier this year, we conducted another survey. Again, we asked users how many times per month they encountered pay walls, and 290 users responded. Surprisingly, 8.9% (26) of respondents claimed to encounter pay walls more than 10 times per month. Since that band had no upper bound in our survey, it is difficult to obtain a good estimate for the average number of pay wall events experienced by respondents. If we estimate that those users experienced an average of 15 events per month, we arrive at a figure of 3.1 occasions per month. This is largely in agreement with our previous survey and suggests that there are significant gaps in access experienced by researchers.

To measure coping strategies for such events, we used an improved "critical event methodology" (Access to Scholarly Content, 2011, p. 24) in which respondents were asked to think about the last time they encountered a pay wall and report their specific action in that case.

The results of the survey are shown in Figure 2. Only about a third (34%) of respondents approached their library when unable to gain access to the content that they needed. If we combine the numbers of those who found the content online for free, requested it from a friend or colleague with access, or by e-mailing the author, we find that 43% of respondents obtained access to the content in a way that did not involve their library. A similar study in the UK in 2011 (Access to Scholarly Content, 2011) reported that when researchers at universities and colleges were faced with a pay wall, they requested an ILL only 20.6% of the time.

Very little work has been put into estimating the scale of illicit Internet file sharing of published academic literature. In 2010, Ken Masters, publishing in The Internet Journal of Medical Informatics, reported a study of file sharing on an unnamed medical networking site (Masters, 2010). By monitoring requests for PDF copies of articles and their fulfilment, the author estimated the annual value of content shared through the one web site at $1.4 million per year. Anecdotal evidence suggests that file sharing occurs through professional networking sites and also through personal e-mails and social networking platforms such as Twitter, notably via the hashtag, #icanhazpdf. The Access to Scholarly Content study (2011) reported that 17.5% of the time, researchers will check with a colleague to obtain
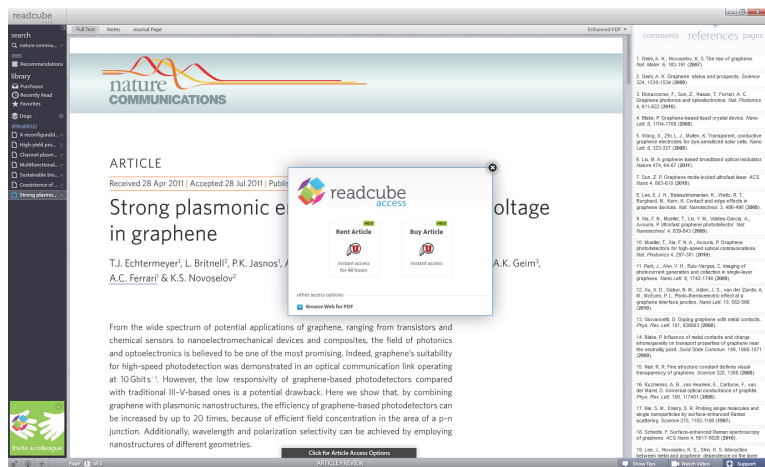
Figure 3. The ReadCube Application Showing the Article Purchase Choices

an article when faced with a pay wall, and 19% of the time, researchers will look for a version of the article on the web.

We suggest that with the rise of both legitimate open access repositories, such as PMC, and of social networking sites that encourage file sharing, libraries are becoming increasingly disintermediated in ways that, more often than not, they have no means of knowing about.

To combat this trend, we propose that new, innovative approaches should be taken to supply patron needs for unsubscribed content. To encourage people to use library services, such approaches must involve truly instantaneous delivery of content with minimal barriers against use. These approaches must be easier to use than e-mailing a colleague and must be effectively free for the patron.

ReadCube Access Pilot at the University of Utah

At the beginning of 2012, Massachusetts-based Labtiva, Inc. approached the University of Utah and Nature Publishing Group (NPG) and asked if they would like to participate in the development of ReadCube Access—a novel approach to purchasing unsubscribed content at a lower cost than ILL, pay per view, or document delivery.

Labtiva develops next-generation reference management software and reading platforms under the brand name ReadCube. ReadCube has two components: (1) the freely available

ReadCube application (www.readcube.com), which enables users to find, download, and organize content, and (2) ReadCube Web Reader, a software as a service (SaaS) reading platform. Both components provide an "enhanced PDF" reading experience that combines the value-added content normally found on full-text HTML pages, such as supplementary information and hyperlinked references, within the portable, typeset PDF. In addition, the platform provides reverse citation, altmetrics, multimedia, and social sharing features.

The ReadCube application also provides Internet search and direct PDF download capabilities, making use of Google Scholar, PubMed, Microsoft Academic, or PMID and DOI identifiers.

Labtiva currently maintains relationships with several publishers that link to the ReadCube platform from article pages. Currently, ReadCube is connected to article pages on Nature Publishing Group, Palgrave, Wiley, Frontiers, PeerJ, and eLife, with the imminent addition of SciELO.

ReadCube Access was designed to provide researchers with instantaneous access to scholarly journal articles at a reduced price in exchange for carefully defined usage restrictions. Two price points were created for a pilot study last year at the University of Utah: an article rental at $2.99 and a purchase tier at $7.99. Conventional pay per view from NPG is generally $32 per article. Royalties to the Copyright Clearance Center for NPG content are currently $35.50.

For both options, the article could be downloaded to any personal computer with the ReadCube application installed, provided the patron logs in with the same credentials; however, the article could only be read within the ReadCube software. Rented content became inaccessible after 48 hours, while purchase content remained available indefinitely. Articles could not be printed.

At the time of the trial, the University of Utah held site licenses to 79 of the 108 journals available from NPG. Back issues of some of those journals, however, were not available. ReadCube Access enabled access to all years of all NPG journals using a cascading log in approach that made use of subscription access when available. If the article was not available through subscription, it was immediately available using ReadCube, and the library was charged directly at the discounted rate.

The trial ran for one academic year with approximately 1,320 faculty, postdoctoral fellows, and graduate students in science and engineering invited to participate.

The trial was designed to answer a number of questions. Would a PDA model for journal articles result in unsustainably heavy use? Would PDA be accepted as an alternative to subscription? Would patrons accept digital rights management (DRM) technology applied to journal articles? Would the requirement to install a client application to read and store the articles be accepted by patrons? Would the cost of ReadCube Access compare favourably with other means of obtaining content? How would use of ReadCube Access compare with ILL requests for NPG content, and which would researchers prefer?

Most users found ReadCube simple to use and articles easy to acquire. Users appreciated the ability to instantaneously obtain articles, but some users requested additional search providers beyond Google Scholar and PubMed. The version of ReadCube Access used in the initial trial required the use of the ReadCube desktop application, but many participants asked for a web-based solution or a version compatible with mobile devices. The trial involved the cooperation of NPG only, and some users requested content

from other publishers. A handful of complaints regarding the DRM restrictions were received with some users stating they needed printing or sharing functionality. The required installation of the desktop application and the need to register to utilize the service was seen as a hindrance by many users.

Labtiva has developed a new version of ReadCube Access incorporating much of the feedback from the trial. The new version integrates ReadCube Access into the Web Reader allowing users to access content directly from the publisher's web site and removing the need to install the desktop application. Using cloud technology, content will automatically be synchronized across the web, the desktop, and the new mobile application. The new version of ReadCube can rely on IP authentication in the same way as site licenses. Printing of articles is now available in the purchase tier, and a third option has been added: an unrestricted PDF.

Before the trial, the Library had some fear of runaway costs due to the popularity of NPG content. However, use of the service was surprisingly lower than expected. Just under 10% (102) of the 1,320 invited users registered to use ReadCube Acesss. Forty-three article transactions occurred, two of which were rentals. Lower than expected use was attributed to two causes. First, the University of Utah subscribes to most of the NPG content. Second, many of the unsubscribed titles were in medical subjects, and many medical researchers from the medical school and hospital did not participate in the trial.

Use of ReadCube Access correlated well with ILL requests for NPG articles. Before the ReadCube Access trial began, subscriptions to both *Nature Climate Change* and *Nature Communications* had been requested by patrons. During the year-long trial, library patrons used ReadCube Access to acquire 12 articles from *Nature Climate Change* while only three ILL requests were filled. Twenty-five articles were acquired from *Nature Communications* using ReadCube Access; the library filled 30 ILL requests from that journal.

As shown in Table 1, ReadCube Access was found to be more cost effective than subscription, pay per view, or ILL for these two high-cost, low-use

Title	Subscription cost	ReadCube uses Sept.–June 2013	ReadCube costs Sept.–June 2013	ILL uses Sept.–June 2013	ILL costs Sept.–June 2013
Nature Climate Change	US$4,985	12	US$96	3	US$16
Nature Communications	US$3,525	25	US$195	30	US$982

Table 1. Cost Comparisons for ReadCube Access, ILL, and Journal Subscriptions for Two NPG Journals. (England & Jones, 2014)
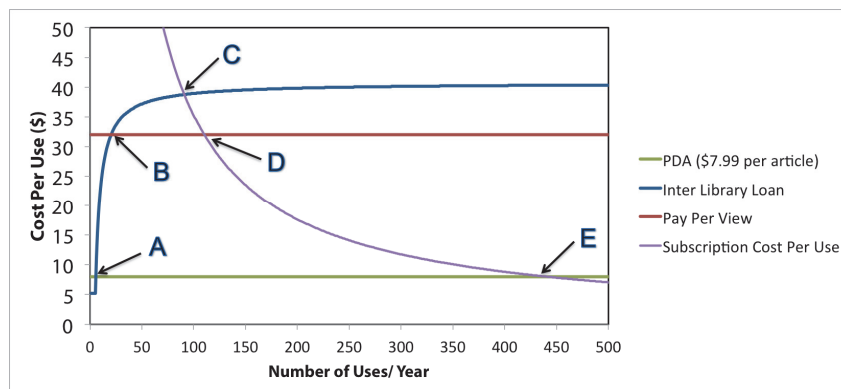

Figure 4. The Results of a Simulation of Effective Costs Per Download for *Nature Communications* at the University of Utah Using a Variety of Access Pathways. (England & Jones, 2014)

journals. ILL costs were calculated based on the Leon and Kress study (2012) and included staff, software, equipment, and management tool expenses.

Choosing the Right Access Pathway

Academic libraries already use a variety of mechanisms to provide unsubscribed content to patrons, including ILL, document delivery, and pay per view. The question arises as to which access pathway is most cost effective for each journal title.

We performed a simulation to compare the effective cost per download of academic articles for a given journal title as a function of the number of downloads per year.

We used *Nature Communications* at the University of Utah as an exemplar. Usage levels and site license fees vary from journal to journal. Cost per download as subscribed content (purple) is defined as the cost of a subscription (in the case of *Nature Communications* for the Marriot Library:

$3,525) divided by the number of article downloads. Lines for pay per view (red) and ReadCube's PDA model (green) are flat because cost per download does not vary with the number of purchases.

For a very low-use journal title, ILL is highly cost effective. According to Leon and Kress (2012), costs of ILL, including internal workflow expenses, lending library charges, and Copyright Clearance Center fees, average $7.93 per article; however, for demand levels that exceed the CONTU Guidelines, costs increase due to the required royalty or pay per view fees. In the case of *Nature Communications* at the Marriott Library during the 2012–2013 academic year, workflow costs were approximately $5.21 per article, and Copyright Clearance Center fees ranged from $33.50 to $35.50 per article. As simulated demand rises, the effective cost per ILL fill will asymptotically approach $40.71.

The difference between the average cost of ILL reported by Leon and Kress and the predicted cost in our simulation suggests that ILL tends to be

used at low levels per journal title. This implies that scholars find alternative methods to acquire articles from journals that they use regularly but the library cannot provide via a subscription.

A number of key points are marked on the graph in Figure 4. As explained above, ILL is highly cost effective at very low usage levels. When demand rises to six articles per year or greater, ILL becomes significantly more expensive than ReadCube Access (A) and rises very quickly. ILL becomes more expensive than pay per view (B) after only 22 requests. The site license finally becomes more cost effective than ILL after 91 requests or downloads (C). At 111 uses per year, the subscription becomes cheaper than pay per view (D), but does not become the cheapest solution overall until demand rises to greater than 442 downloads per year. PDA via ReadCube Access, as deployed at the University of Utah during the trial, is the most cost-effective way to obtain access to *Nature Communications* if demand ranges between six (A) and 442 (E) uses per year. The greatest cost saving for ReadCube Access is at 111 articles per year. At this demand level, the saving offered by ReadCube Access is $2,646 for *Nature Communications* alone.

Conclusion

PDA is a highly promising way to provide access to low-demand, high-cost content. PDA of articles can also help re-engage patrons with libraries and possibly reverse the trend of disintermediation and devaluation.

In our economic analysis, using *Nature Communications* at the University of Utah as an exemplar, ReadCube Access was found to be the most cost effective for uses between six and 442 article uses per year.

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