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Library of Cards: Reconnecting the Scholar and the Library

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Abstract

This paper is based on a presentation I gave at the Access Conference in Toronto, Ontario on September 10th, 2015. Both the presentation and this paper are explorations in three parts. The first part is a short history lesson on the use of paper cards by scholars and librarians, which led to the introduction of the “Scholar’s Box.” The second part asks the question: Can we consider Zotero as the Scholar’s Box of the digital age when it cannot capture important metadata such as Linked Open Data? It is recognized that this is not just a shortcoming of Zotero: research is surprisingly still very difficult to share between scholars, libraries, and writing tools. This is due to an inability to capture the “invisible text” when we copy and paste citations from one application to another. The third part establishes that the digital card is now the dominant design pattern of web and mobile, and notes that these systems are largely restricted to proprietary platforms, which restricts the movement of cards between systems. This paper then suggests how we might transform the historical Scholar’s Box, by using HTML5 index cards from Cardstack.io as a means to bring new forms of sharing on the web, and, in doing so, reconnect the scholar to the library.

Keywords

Citation management, scholarship, user experience, apps, open web

Introduction

According to my Goodreads account, I read Markus Krajewski’s *Paper Machines* (2011) between March 20th and 28th of 2015. According to the notes I keep in Evernote, I first bookmarked *Why Cards Are the Future of the Web* (Adams, 2014) on June 1st, 2014. Sometime between March 20th and the March 27th deadline for presentation proposals for the 2015 Access Conference, I was struck by the idea that the digital card was much more than just a familiar design pattern that the mobile web was seemingly racing towards (and that the library was slowly retreating from). I realized that the ability of the Twitter card to embed a remarkable amount of metadata (Perez, 2010) could be repurposed to capture bibliographic metadata, if only Twitter would accommodate a card standard that was open to all.

In the course of my research, I discovered a card platform built on the open standards of HTML5. Thus, the systems that libraries and scholars have built, based on paper cards, still holds the potential to reconnect the ideas of the scholar and the library. When I first put forward my proposal, I did not intend to use the occasion to introduce and explore such ideas as Linked Data and unAPI, but I found that context necessary to explain why – in an age when it is so very easy to share video and photos with friends – it is still so very difficult to share references to scholarly research.

This paper is divided into three parts. Part one gives a history of the index card and its role in information organization by both libraries and scholars. The second part of the paper considers whether the citation management software Zotero can be considered a “Scholar’s Box” for the digital age. It is through the examination of the shortcomings of the current platforms that host and manage bibliographic records that we see where our scholarly and library platforms need development and investment. In the third section of the paper, the rise of the card as a convergent user interface design pattern in smartphone interfaces and web-based applications is outlined.

But before we can consider how the card can bring libraries and scholarship into the future, we need to understand how the card was a foundational element in their shared past.

Part One: The Paper Machine

Before I had read Markus Krajewski’s *Paper Machines: About Cards & Catalogs, 1548-1929* (2011), I was under the misunderstanding that it was Melvil Dewey who, in addition to his myriad of accomplishments, had invented the index card. On reading *Paper Machines*, I realized my error. Dewey, through his for-profit side business The Library Bureau, had been largely responsible for the standardization of the index card to its still-familiar dimensions of 3 by 5 inches, “or rather 75 millimeters by 125 millimeters. (He was a tireless advocate of the metric system)” (Tenner, 2005). But Krajewski (2011) makes the case that the origin of the index card is as far back as 1548, when Konrad Gessner first published a description of how to process large amounts of data using paper. This process involved cutting up a sheet of handwritten notes or printed work into slips of paper with one fact or topic per slip, and arranging as desired.

Markus Krajewski is an Associate Professor of Media History at the Bauhaus University in Weimar and his works draw extensively on European historical sources. In *Paper Machines*, he describes how, in Vienna around 1780, the contents of the Imperial Court Library were described on slips of paper that were then fixed into a book. As such, Krajewski claims we should consider this as the first library catalogue in history (2011, p. 34).

Many histories situate the invention of the card catalogue just slightly later in time: in 1789, in revolutionary France (Nix, 2011). The French revolutionary government had just decreed that it could confiscate all religious property, including library holdings. In order to better understand what it now owned, the French revolutionaries in Paris made

preparations to inventory all of these newly acquired books (Hopkins, 1992, p. 380). The instructions for how this inventory would be conducted was the French Cataloging Code of 1791. First, the code instructed that all the books were to be numbered. Next, the number of each book as well as the bibliographic information of each work were to be written on the back of two playing cards – this was possible because, at that time, the backs of playing cards were blank. The two sets of cards are then put into alphabetical order and fastened together. One set of cards was to be sent to Paris, while a copy remained in each library (Smalley, 1991).

As significant as the development of the first national cataloguing code was, there is good reason to look farther back, to the work of Gessner. The reason why Gessner was making all those slips in the first place was to construct the *Bibliotheca Universalis*, a bibliography of around 3,000 authors in alphabetical order, describing over 10,000 texts in terms of content and form, and offering textual excerpts. As such, Gessner is considered the first modern bibliographer (Krajewski, 2011, p. 9). Gessner's *Bibliotheca Universalis* wasn't just a bibliography. According to Krajewski, the book also provides instructions to scholars on how to properly organize their studies through keeping excerpted material in useful order. Gessner was describing an already established practice: some scholars had started keeping slips or cards in a "Scholar's Box." When they had the need to write or give a lecture, they would take the cards that fit their theme, arrange those thoughts, and temporarily fix them in order using devices called "hybrid books." These hybrid books had guiding threads that stretched over the page, so that two rows of paper slips could be inserted and supported by paper rails (Krajewski, 2011).

Until the Romantics came around and made everyone feel embarrassed about taking inspiration from other people, scholars such as Gottfried Leibniz actively used what was known then as an "excerpt cabinet" or "Scholar's Box" to store and organize quotations and references:

Leibniz's method of the scholar's box combines a classification system with a permanent storage facility, the cabinet. So in a way this is similar to the use of Zotero or other citation management systems, but instead uses loose sheets of paper on hooks. The strips are hung on poles or placed into hybrid books (Worthington, 2015).

Not only is there is a common ancestor to the library catalogue and the scholar's bibliography to be found in the index card, there is the Scholar's Box, which is the historic precedent to bibliographic management software such as Zotero. The next section of this paper will consider the constraints that prevent bibliographic systems such as Zotero from reaching their full potential, which digital systems can allow, if designed accordingly.

Part Two: The Scholar's Box

There are authors today who still use index cards to piece together their novels or theses. Or they arrange and rearrange digital index cards, with writing tools such as

Scrivener. I don't write this way myself, but I do use Zotero as one of the tools to keep track of citations, bookmarks, saved quotations, and excerpts of text that I have used or might use in my own work. Zotero is a free and open source alternative to commercial citation management software, such as RefWorks or Endnote, developed by the Roy Rosenzweig Center for History and New Media of George Mason University. I use Zotero because I find it simply works better at capturing bibliographic information from reference sources on the web.

Can we call Zotero a Scholar's Box for the digital age? I think we can, but we need to recognize that the citations we have are still stuck in a box, in many ways. We cannot copy citations from library databases and drop them into a word processor without using a bibliographic manager like Zotero as an intermediary to capture the structured data that might be useful to my computer when I need to format a bibliography. This section will explain why we are still in this situation.

Zotero is third-party software that can be integrated into the Firefox browser as an add-on, so it can act as an extension of your web-reading experience. If you use Zotero you can easily capture citations from a page, in one of two ways. One, someone who supports Zotero has already developed a custom text scraper called a *translator* for thousands of databases and websites commonly used by scholars (Kornblith, 2012). It is also possible that the citation has been marked up with text that's invisible to the human eye, but can be found in the HTML `` tags that surround the citation, using a microformat called COinS. COinS stands for ContextObject in SPAN; it is a convention that allows bibliographic metadata to be embedded in a website that allows elements of a citation to be captured by third-party applications such as Zotero.

Zotero also allows scholars to back up their citations to their own WebDAV (Web Distributed Authoring and Versioning) server or to zotero.org, where they also have the ability to share their citations by making their Zotero libraries public. Alternatively, a researcher can share their library or chosen bibliography on their own website using the Zotero API, which is so simple and powerful, you can embed a bibliography styled in APA with a single line of code (Williams, 2012).

Zotero out of the box also allows the scholar to generate reports of one's bibliography that mimics the appearance of index cards, with one citation per page. When I have a stack of books that I need to locate in my library, I find it is easier for me to select and generate a report of cards from my Zotero collection rather than to search, select, and print the items using my library's expensive ILS system.

There is a terrible irony to this situation. As I learned from Dorothea Salo (2015), the design problem given to Henriette Avram, the inventor of MARC records, was to "let computers print catalog cards." As Salo says in her piece:

Avram was not asked to design a computer-optimized data structure for information about library materials, so, naturally enough, that is not what MARC is at heart. Avram was asked solely to make computers print a record intended

purely for human consumption according to the best card-construction practices of the 1960s. She did that, brilliantly (Salo, 2015).

Recall that one of the reasons why Zotero is able to import citations easily is because of COinS and Zotero translators, both of which allow Zotero to extract metadata from known websites and databases. In the case of COinS, the metadata is provided by the author or publisher and is hidden in the `` tags of the web page. In the case of Zotero translators, it is helpful to think of them as special filters that have been developed specifically for a particular website, that associate particular traits in the CSS with particular fields in Zotero. In either case, the metadata imported into Zotero is ingested as strings of text. For example, a string of text that we would think of as “an author’s name” is tagged by Zotero with the code AU to designate that the text should go in the Author field. While this ability makes it possible for Zotero to generate a variety of bibliographies in a variety of citation styles, this functionality is not enough if you want to produce Linked Data.

Luckily, Zotero is open-source software and was designed to encourage extensions of its use. Librarian Dan Scott did just this. He wrote code (openly available to others on GitHub) to export a bibliography from Zotero, that can then be served online, readily allowing the addition of Linked Data identifiers using *Schema*, a set of vocabularies that can be found at <https://schema.org> (Scott, 2015). When I showed the result of Dan Scott’s work on the *Labour Studies Index* (<http://labourstudies.ca>) to a co-worker of mine, she couldn’t understand why I was so impressed with it. I had to reveal the HTML code behind a page displaying a citation to show her that this citation database contained identifiers such as VIAF (The Virtual International Authority File). I explained to her that, by using these numeric identifiers, computers will not only be able to find matching text in the author field, but be better able to find the one particular author with that name.

It is worth mentioning that, when we are on the web, we don’t share citations (at least not in emails and social media). Instead, we share the URL that points to the publisher or third-party server that hosts said paper, or the PDFs themselves. We still have to manually rekey data into fields when we want to do such things as add an article to an Institutional Repository.

The authors of “Introducing unAPI” (Chudnov et al., 2006) recognized and named the many reasons why cutting and pasting citation metadata is so infuriatingly difficult in the scholarly suite of tools:

Common Web tools and techniques cannot easily manipulate library resources. While photo sharing, link logging, and Web logging sites make it easy to use and reuse content, barriers still exist that limit the reuse of library resources within new Web services. To support the reuse of library information in Web 2.0-style services, we need to allow many types of applications to connect with our information resources more easily. One such connection is a universal method to copy any resource of interest. Because the copy-and-paste paradigm resonates with both users and Web developers, it makes sense that users should be able to

copy items they see online and paste them into desktop applications or other Web applications. Recent developments proposed in weblogs and discussed at technical conferences suggest exactly this: extending the 'clipboard' copy-and-paste paradigm onto the Web. To fit this new, extended paradigm, we need to provide a uniform, simple method for copying rich digital objects out of any Web application. (Chudnov et al., 2006)

As a remedy, the authors suggested a new microformat called the unAPI, defined to be made up of three components:

1. An HTML convention for identifying objects in web pages;
2. An HTML <link> tag for autodiscovery of an unAPI service relevant to items on a given page;
3. An API consisting of three HTTP functions to retrieve objects by their identifiers in any available format. (Chudnov et al., 2006)

But the unAPI microformat was not well adopted, for reasons that are unclear. Perhaps it was due to the particular technical decisions behind unAPI (for example, its choice to use XML as a response format instead of the more developer-friendly JSON). But it is more likely that, as wide-scale adoption would have required action and some investment by the commercial entities that provide the software for libraries and publishers, the reason why unAPI was not adopted was because the problems that unAPI would resolve were not seen as a priority to these commercial vendors. In other words, the reader's problems are not necessarily the problems of the vendor. Regardless of the reasons, our inability to support the easy use and reuse of citations and other forms of scholarly textual data remains.

But what if there was another paradigm we could try? What if the future is in the cards?

Part Three: Machines and the Scholar

I have an idea about we might add and share citations from our modern Scholar's Boxes. But I'll need to explain how the digital card has been used in interfaces in recent history, and how cards are already being used, on the web and on our tablets and smartphones, as it is an extension of this work.

In 1987, Apple started bundling Hypercard, an app for making apps, with its Macs. "It used a card-based metaphor, not unlike a presentation deck in Keynote, but vastly more powerful, since you could not just make buttons active to move from card to card, but also do rich, complex programming using some simple, English-like commands" (Phin, 2014). As Apple moved from its hobbyist market to a more general consumer market, it neglected to update Hypercard. It is not clear whether current card-themed user interfaces were influenced by Hypercard, but it's worth noting that many of those who reminisce about Hypercard praise its intuitive look and feel.

Cards as a design pattern return to the user interface with the development of the smartphone. The Palm Pre smartphone of 2009 featured the WebOS operating system,

which featured cards to manage multitasking and to represent apps (“WebOS,” 2015). Fast forward to today: If you look at social media sites such as Twitter, Trello, Instagram, and Pinterest, and pay attention to the design patterns used, you will quickly notice that many of these sites use cards as a user interface design pattern. Social media is collectively made up of individuals sharing objects—of text, photos, video, slide shows—and they share these objects with friends and to a larger public. Many of these objects are framed within cards.

This has largely come about because cards work well with the screens of the mobile device. A single card fits nicely on a mobile screen while on larger surfaces, such as tablets and desktops, cards can be arranged through responsive web design in a vertical feed, as in Facebook or Twitter, arranged as a board, like Pinterest does, or like a stack, such as Google Now or Trello (Tse, 2014b). And since companies like Google want to present a unified design theme to their users whether they are using a smart phone, tablet, or desktop, they have invested in design frameworks like the Google’s Material Design, that feature cards as an important design element (Google, n.d.).

It is important to realize that the cards on the web are fundamentally more than just a design pattern. If you are familiar with Twitter, you may have started to see cards that don’t just contain 140 characters. While you frequently find cards that loop GIFs, or play short snippets of video, one can now also find Twitter cards that allow for playable music from Soundcloud, or LinkedIn slideshows that you can read through without leaving Twitter (Twitter, n.d.). You can even download third-party apps from Twitter advertising cards (Twitter, n.d.). When the business presses say that Twitter is a platform, it’s not just marketing hype (Morrison, 2014).

It is not unreasonable to expect that the functionality of cards will grow: instead of merely being an interface design that can be used to organize apps, the cards on screen will start acting like apps themselves:

When done right, a card looks like responsive web content, works like a focused mobile app, and feels like a saved file that you can share and reuse. As these “cards” become more interactive, they go from being just concentrated bits of content and turn into mini-apps that can be embedded, capture and manipulate data, or even process transactions (Tse, 2014a).

But the reason that most people generally don’t think of cards as separate programs defined by their types of functionality is that cards are contained in walled gardens. Your Google Now cards can travel between your Google applications but don’t interact with anything in Facebook or your Apple iOS. This is not a trivial problem.

To remedy this split of the open web and the walled app garden, Chris Tse founded Cardstack.io. The mission of CardStack is to “to build a card ecosystem based on open web technologies and open source ethos that fights back against lock-in” (CardStack, n.d.). CardStack wraps single-page JavaScript applications as a reusable card that can be embedded in native apps and other web apps. CardStack itself comprises other

JavaScript libraries, most notably Conductor.js and Oasis.js, that, when combined, create a solution that more securely embeds content than the IFrames of widgets past. According to Tse, Cardstack.io HTML5 cards will be able to move between apps, between devices, between users, and between services.

When I first stumbled upon Chris Tse's presentations about CardStack, I was really excited by his vision. A new system of cards, to allow movement between siloed applications, programs, and operating systems, that could work in mobile or desktop environments, would indeed be wonderful. I wanted to see it in action to understand its capabilities.

One of the challenges of promoting a new sort of framework is that you can't really show it off until you have some content to showcase. You need a proof of concept. When I checked in to see how CardStack was doing as I was drafting my Access presentation, I noticed that Chris Tse had become the CTO of a new platform that was using Cardstack.io as a component.

This new platform has its origin in the art world at Rhizome's *Seven on Seven* conference. The *Seven on Seven* conference pairs seven visual artists with seven technologists for a twenty-four-hour hackjam; in 2014, artist Kevin McCoy was paired up with technologist Anil Dash. They worked on a proof of concept of a new service that would allow visual artists to register and transfer ownership of their digital works using Namecoin blockchain technology (Dash, 2014). Blockchain technology is code that generates a distributed untamperable database to keep track of millions of transactions, and Namecoin blockchain code is a variation that allows for the additional storage of data in its transaction database ("Namecoin," 2015). Over a year later, this idea has grown into its own platform. Two things particularly impressed me about this new endeavour. First, the platform now allows artists to decide for themselves whether to have the ownership transferred over to someone else for a royalty fee, or to set the license so that the work is placed in the Creative Commons, and whether derivatives of their work are allowed. The other thing I love about this project is its name, which is very clever. The platform is called Monegraph.

It is here we can find an example of how we can build a new Scholar's Box for the digital age. With Cardstack.io, we have a framework of cards that allow for a wide range of functionality beyond containing metadata along with text. These cards could be read and manipulated in mobile and desktop spaces and work in any environment that allows for HTML5, regardless of operating system. Furthermore, we can imagine how it might be possible that the scholarly sphere could incorporate the blockchain to keep track of citations as just another form of transaction from one scholar to another.

And, as we now know, you build a monegraph / monograph with cards.

Conclusion

As libraries continue to invest in crucial new endeavours in the digital realm, such as digitization, digital publishing, and digital archiving, it is essential that librarians find new ways to make these resources more discoverable and allow them to be shared effortlessly (Dempsey, 2015). Libraries must find the means by which scholars can save and sort, use and reuse the resources they find from our collections, or faculty will gravitate to for-profit research platforms that will resolve these problems but within a proprietary and private space.

Libraries are part of a generative process. Cards of single ideas are written, rearranged, and stacked to help build theses, which, in turn, help build books which, in turn, form bibliographies, which fill libraries. I'd like libraries to find a way to back to Gessner's *Bibliotheca Universalis*, a place where the library and the scholar are connected.

After all, a scholar is a library's way of making a new library (Dennett, 1990, p. 128).

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