Optimizing Academic Library Services in the Digital Milieu

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Optimizing Academic Library Services in the Digital Milieu

Digital devices and their emerging trends

BRENDAN RYAN

List of abbreviations

ACLU	American Civil Liberties Union
ACS	Adobe Content Server
ADE	Adobe Digital Editions
AJAX	Asynchronous JavaScript and XML
API	Application programming interface
ARL	Association of Research Libraries
AZW	AmaZon Word
BIOS	Basic Input/Output System
CC	Creative Commons
CC REL	Creative Commons Rights Expression Language
CTEA	Copyright Term Extension Act
CIS	Critical Information Study
CS6	Adobe Creative Suite 6
CSS	Cascading Style Sheet
DAISY	Digital Accessible Information SYstem
DMCA	Digital Millennium Copyright Act
DRM	Digital Rights Management
DTB	Digital Talking Book
DOAJ	Directory of Open Access Journals
DCL	Douglas County Library
EFF	Electronic Frontiers Foundation
EULA	End User Licensing Agreement
EUCD	European Union Copyright Directive
FWK	Flat World Knowledge
FSF	Free Software Foundation
GNU	Recursive name for Linux
HELIN	Higher Education Library Information Network
HTML	HyperText Markup Language
IE9	Internet Explorer 9
ICML	InDesign Copy Markup Language

IDPF	International Digital Publishing Forum
IDA	International Documentary Association
iOS	iPhone Operating System
JISC	Joint Information Systems Committee
MIYO	Make It Your Own
MOOC	Massive Open Online Course
NIST	National Institute of Standards and Technology
NTP	NonTraditional Publishing
ODB	Ohio Digital Bookshelf
OLPC	One Laptop Per Child
OCF	Open Container Format
OEBPS	Open eBook Publication Structure
OER	Open Education Resources
OPF	Open Packaging Format
OS	Operating System
P2PU	Peer to Peer University
P2P	Peer to Peer
PLS	Playlist format
PRD	Personal Reading Device
POD	Print On Demand
PLoS	Public Library of Science
RIC	Rhode Island College
REL	Rights Expression Language
SDK	Software Development Kit
SSD	Solid-State Drive
SSML	Speech Synthesis Markup Language
TPM	Technological Protection Measure
UM	University of Michigan
USO	University System of Ohio
VOIP	Voice Over Internet Protocol
W3C	World Wide Web Consortium
WHATWG	Web Hypertext Application Technology Working Group
WOFF	Web Open Font Format
WIPO	World Intellectual Property Organization
XML	eXtensible Markup Language

Acknowledgments

Preface

Evolving services

The library as solely a physical space will not survive in the digital milieu. Services should be directed towards user needs and desires in the current academic climate. The period when an academic library could function solely as a quiet place to study and a large repository of physical items to be examined is not viable with methods of pedagogy, research, or social relations in the current context. Rather than solely providing a location for print to be housed and the reference services to physically locate items, libraries in the digital milieu must facilitate access to content through technology. There are a variety of new situations and potentialities librarians need to be cognizant of. With these new challenges come new opportunities. Librarians can do far more to enhance education and integrate activities into the entire academic climate. They can work with faculty to create course materials, academic support, and collections that reflect the educational priorities in their environment. The library can be a central part of the community in supporting education.

It is clear that the digital age presents academic libraries with a number of contingencies to support. The range of skills necessary to support the array of digital formats, devices, rights issues, and other considerations is outside the realm of even the most highly budgeted and staffed institutions. The rapid development of technologies in the digital age presents libraries with many potential problems in conjunction with

solutions. If issues facing libraries in the digital milieu are to be broadly broken down they tend to fall into one of the three following categories: rights matters, file and device formats, and vitality and vibrancy in the digital academic community.

Part 1 or this book will discuss rights matters. This will provide readers with a general overview of copyright law and rights issues specifically as they relate to digital content. The primary consideration when dealing with digital rights presently is the Digital Millennium Copyright Act (DMCA) of 1998. Best practices relating to digital content and copyright will be examined.

Part 2 will focus on the anatomy of eContent, particularly eBooks. The various components of and differences between file formats will be addressed. An explication of the logistical functioning of digital rights management will be provided, both in relation to hard and soft-use measures. The discussion of this issue will be informed greatly by the understanding of rights issues gained in Part 1. Digital works are composed of three parts: container, content, and context. eBooks will be viewed through this lens and the components present in each layer will be explored. The creation and construction of eContent will be explained.

Part 3 will focus on how the changes in society in general and academia in particular will allow libraries to evolve and provide new services. For academic libraries to remain vital in the educational environment they must adapt to new demands and provide the services necessary on a networked campus. The course materials of the future will be digitized. The first two parts will provide librarians with an understanding of the legalities and logistics of eBooks and the final part will focus on an emerging technology that should play a large role in higher education in the coming years, digital textbooks. The tools used to enhance education in the digital milieu will change and expand. By offering expertise in DRM and facilitating

digital content creation, academic libraries can ingrain themselves in the pedagogical community of the twenty-first century. Additionally, libraries can prove their worth by leveraging their presence in the publishing economy as content aggregators and database subscribers to pressure the industry and nation to recognize the essential nature of fair use and open access in intellectual development and scientific progress.

About the author

Brendan Ryan is a librarian at Rhode Island College in Providence, RI. He worked at Providence College in an access services capacity prior to his work at RIC. There he designed a mobile website for the library and published on the initiative. He works in the Reference Department and in Digital Initiatives at Rhode Island College. Brendan graduated with a Masters in Library and Information Sciences from the University of Rhode Island in 2009. He is interested in open scholarship and helping the library to facilitate learning in the digital age. He is enthralled by the possibilities presented by digital technology to democratize and enhance education.

Part 1
Rights

A thorough understanding of copyright issues relating to digital content is an essential skill librarians must possess if they are to capably assist users in navigating the digital milieu. While matters are still fluid there are certain aspects of copyright law as it pertains to digital content that librarians need to be aware of. The Digital Millennium Copyright Act is at the locus of copyright law at present. A librarian would benefit greatly by understanding and possessing a basic understanding of copyright law and particularly fair use as it is delineated in the 1976 U.S. Copyright Act. A familiarity with these concepts will allow librarians to properly advise patrons. This part will ground readers in these ideas so that they may make better use of the content to follow regarding file formats and evolving services.

Copyright basics

Abstract: An introduction to copyright law in the United States. Copyright law is territorial, and the significance for a global academic community is addressed. An explanation of the concept of fair use and the nature of fair use defense are also given. The criteria mployed by the judiciary system in addressing fair use claims is explored so that scholars may act accordingly. An overview of the public domain as it relates to digital materials is provided. The Creative Commons project and the implications for digital content presently are explored. Readers are apprised of what constitutes copyrightable material.

Key words: copyright, fair use, public domain, Creative Commons, Copyright Term Extension Act, Digital Millennium Copyright Act.

Copyright was initially devised to spur creativity. In the United States the legislative involvement in this process stems from Section 8 of the U.S. Constitution, which places the onus on Congress to "promote the progress of science and other useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries" (U.S. Const. Art. I, §8).

There are two rationales for copyright: the moral rights argument and the economic rights theory. The former carries more weight in Europe and places value in the intangible relation between creator and product. While this line of thinking is present in U.S. discussions of copyright, it is most valued among opponents of copyright law as currently

constituted, notably Creative Commons. Copyright law was initially devised to respect both reasonings by giving creators the ability to claim authorship with the economic benefits it would entail while providing them with some legal recourse for the unintended uses of their creation. The last 20 years of law regarding copyright, most conspicuous in the Digital Millennium Copyright Act (DMCA) and the Copyright Term Extension Act (CTEA), placed the priority on economic considerations when assessing copyright matters. The primary considerations when dealing with copyright and law in the U.S. at this time revolve around economics.

The Copyright Extension Act of 1998 was devised to do exactly what the name implies, extend the term of coverage of copyright. There is the fear that this extension is merely a precursor to further extensions that would prolong copyright terms indefinitely. The constitutional clause that grants Congress the ability to prescribe copyright only identifies copyright as guaranteeing rights for a limited term. This prevents Congress from extending rights indefinitely yet they can effectively do so by continuously extending the term.

An element of copyright law that has markedly influenced recent legislation in the U.S. is its territorial character. Use of any work, regardless of point of origin, within the United States is subject to the rules and stipulations expressed in domestic copyright law. As will be identified later in this chapter, the territorial nature of copyright was the main impetus for developing sovereign laws (exemplified by the DMCA) at the end of the twentieth century that aligned with the 1996 World Intellectual Property Organization (WIPO) Copyright Treaty.

Public domain

The public domain is the legal area wherein "no permission is needed to draw upon or use (that) work" (Lessig, 2004,

"Content", para. 16). There are two basic ways that work can enter the public domain: the creator forfeits all copyrights or the duration of copyright has expired.

As mentioned earlier, copyright in the U.S. is only supposed to last for a limited term. Once the duration of copyright expires, a work enters the public domain. If a work is still under copyright yet the copyright owner cannot be located or identified it is considered an orphan work. This presents a problem for all individuals seeking to use said works. Often a determination is made not to use the work for fear of economic consequences should the copyright owner seek remuneration. The existence of orphan works often inhibits intellectual freedom and hampers scholarly developments.

An increasingly popular method of placing works in the public domain upon creation involves a Creative Commons license. The Creative Commons project began in 2001 with support from the Center for the Public Domain. In 2002 it released its first set of copyright licenses to the public. These are free and easy-to-use tools that allow people to issue their work without strict copyright constraints. The Creative Commons website has a tool that allows anyone to analyze their preferences regarding copyright and determine what license works for them. Creative Commons does not just provide the legal expertise that allows individuals to make their work available, but also performs advocacy measures on behalf of academia and intellectual freedom in regards to copyright. It endorses the development of an open set of standards concerning science data and sharing. Creative Commons supports the Open Data project, a partnership between a number of publishers and institutions, among them the Massachusetts Institute of Technology Libraries, BioMed Central, and the Public Library of Science (PLoS), to disseminate scientific research.

There are several innovative characteristics present in a Creative Commons license. The structure of the licenses is pragmatic and prescient. Licenses are composed of three layers: legalese, a Commons Deed, and a layer tailored to search engines and software. The first layer, the legal code, is a standard legal document that presents the proper legal language and justifications for operation. The deed provides an explanation of the license and is not unlike the `README.txt` document enclosed with software. It is meant to properly explain the rights and elements at a level that is easily interpretable by users. The third layer represents an ingenious development. Creative Commons developed a CC Rights Expression Language (REL) to readily announce to software and search engines the copyright status of a work. The idea behind this license was to develop an identifying mark that is easily readable and allows users to take this factor into account when searching for CC-licensed material on Flickr or Google, for example. This should be an extremely positive feature in education as instructors seek to put together their own course texts composed of open educational resources.[1]

Creative Commons has simplified the process by which content creators express right to works. It provides interested parties with videos, text, and other tools to assist users in selecting a license. An interactive tool has even been developed for selecting a license and is available for free use at *http://creativecommons.org/choose/* The entire task has been simplified to the point where there only two questions an author needs to answer:

1. Can others use the work in for-profit environments?

2. Can users modify the work, and how?

There are six different categories of Creative Commons licenses that are fairly easy to understand. The licenses all

revolve around commercial use, derivation, and sharing. The commonality in respecting all licenses revolves around proper attribution. Like the ARL document *Best Practices for Fair Use in Academic and Research Libraries*, which will be examined in detail later in this section, the central feature of these licenses revolves around a practice librarians have always performed, citation.

A new project has just been announced in partnership with the Mozilla Foundation–sponsored P2PU dubbed the School of Open. Only begun in October 2012, it remains to be seen what will develop from the project. It provides free courses relating to open academic resources through the web-based P2PU. Interested parties are free to signup and participate at *https://p2pu.org/en/schools/school-of-open/* Presently, courses are offered in Creative Commons licenses and teaching with open content. The project is in its formative phase but bears watching.

Fair use

Digital content is a novel form, carrying with it many new potentialities, and the relation to fair use doctrine is still being determined. The 1998 Digital Millennium Copyright Act (DMCA) sought to address issues relating to copyright and digital material. This act expressly does not address the issue of fair use. It is concerned primarily with the technological protection measures associated with digital content. The DMCA works with copyright law in regards to access. Rather than muddy the waters, it will best serve the purposes of identifying copyright law in light of digital content to give an overview of fair use as defined under the 1976 U.S. Copyright Act initially.

A crucial element of the 1976 U.S. Copyright Act is the principle of fair use. Fair use is the right to use copyrighted

material under certain circumstances without economic remuneration. The Supreme Court has identified the existence of a fair use provision as essential in ensuring the constitutionality of copyright law. If the fair use defense did not exist, copyright law could be seen as placing unconstitutional constraints upon free expression (Adler et al., 2012, p. 6). Librarians should view fair use not as a privilege but a right as guaranteed by the First Amendment. The continued use of this right will establish it as a central feature of society in the digital milieu.

When the 1976 U.S. Copyright Act was written, legislators felt that unlimited copyright may impinge upon fair uses, limit creativity, and inhibit public discourse. Therefore, all copyrighted content must enter into the public domain at some point. Fair use only applies to work that is under copyright and has not passed into the public domain. Scholars are free to use the ideas present in a work to inform their own ideas without considerations of copyright and fair use. Of course in the academic community, it is expected that any use will be accompanied by proper attribution and citation. Concerning scholarly work, it is acceptable to quote or cite a work so long as the author provides proper attribution.

Fair use is explicitly outlined in the 1976 U.S. Copyright Act in § 107 of Title 17. Prior to this, a doctrine of fair use had been developed over the years in the legal system based upon rulings. In § 107 it states "the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright".[2] The inclusion of the phrase "by any other means" is significant in the digital milieu, for it shows that the law was designed to incorporate newly developed methods of reproduction. Librarians can infer

that digital means of reproduction are plausibly defendable under fair use. The DMCA does not address fair use provision (as will be detailed later in this section) and it is likely that this was by design in protecting the ownership of digital content through technological protection measures (TPMs) because it was not possible through legal means.

The fair use defense in copyright cases is an affirmative defense. Unlike typical court cases where the burden of proof is on the prosecution, in order to use a fair use claim the defendant must prove that the use was fair. This is an important consideration in academia and the Code of Best Practices in Fair Use for Academic and Research Libraries developed by the Association of Research Libraries (ARL) relating to this matter shows a solid understanding of this fact in its recommendations.

When assessing fair use claims, the four primary considerations judges take into account when deciding on a case are the nature and purpose of the use, the nature of the work used, the extent of use, and the economic impact of the use. These are important areas to examine when determining if use is possible.

There are three primary considerations evaluated by U.S. courts regarding libraries in determining if a use is fair. It must be determined that the use and distribution is made without the intent of commercial advantage, the library or archive must be open to the public or other researchers in the field, and the use does not compromise the commercial viability of the material. The one consideration that is specific to libraries is that for a use to be considered fair the work must be accessible to the public or scholarly community. The ambiguity present in fair use doctrine is a positive feature, allowing for interpretation and judicial discretion.

The 1976 U.S. Copyright Act states "it is not an infringement of copyright for a library or archive, or any of its employees

acting within the scope of their employment, to reproduce no more than one copy or phonorecord of a work" (§108). In light of the terms of the special dispensation for photocopying 1976, special dispensation needs to be further developed in relation to digital copies of material. Because the cost of digital copies is exponentially smaller than the cost of physical copies and the labor involved in digital copies is minimal, copyright law must account for this in ensuring that rights are respected.

Because fair use is not a Manichean matter, it cannot possibly be controlled through digital means. At the fundamental level of computer operations all information is stored as either a 0 or 1. This is a large part of what makes computers such amazing and powerful tools, yet the strength present in making dualistic determinations negates the possibility of making judgments on a case-by-case basis. Towards the end of this section the issue will be explored in depth, yet noting the impossibility of using digital technology to make gradated judgments regarding fair use is sufficient at this point.

What is copyrightable?

When copyright law was initially devised in the United States it was intended to protect eight categories: literary works, musical works including any accompanying words, dramatic works including any accompanying music, visual artworks, sound recordings, architectural works, audiovisual works, and pantomimes and choreographic works. These categories liberally encompass many works that would not initially be interpreted within their scope. For instance, computer programs are classified as literary works,[3] whereas maps and architectural drawing are considered visual artworks (Bielefield, 2007, p. 25).

Certain material is ineligible for copyright protection. There are a number of items and an awareness of what is ineligible

will free librarians up to make use of them. Language in and of itself is not copyrightable. This means that names, words, short phrases, and lists of ingredients or contents are fair game. Much of the material that is not copyrightable is common property. Typeface cannot be copyrighted. This is a difficult concept to grasp. An artist can copyright the particular way type is written in the form of a font, yet the basic characters constituting that font are not subject to copyright. This also follows with common symbols, such as a †, *, +, $, or %. In addition, "charts, graphs, and tables that do nothing more than express underlying data are not the proper subject matter of copyright protection" (Copyright Office, n.d., para. 3). This quality is particularly important for librarians working in the scholarly community. For scholars doing research and preparing to publish material containing visual representations of data from other material they do not need to worry about paying for copyright. Standard forms represented by time cards, bank checks, order forms, and the like are also not subject to protection. The physical character of an object is not copyrightable either. An idea is not copyrightable, yet the expression in language is. The plans or way that an object is expressed in writing can be copyrighted. An axle is not copyrightable, yet diagrams explaining the various parts and functions of the axle are.[4]

Notes

1. This material is culled from this Creative Commons page: *http:// creativecommons.org/licenses/* The entire site provides plenty of detailed information and rights. They even have an interactive feature that allows users to choose the license that is best for them.
2. 1976 U.S. Copyright Act, p. 19, §107.
3. Bielefield, A. (2007) *Technology and Copyright Law: A Guidebook for the Library, Research, and Teaching Professions*, 2nd edn. New York: Neal-Schuman Publishers, p. 25.

4. The Copyright Office at the University of Michigan Library (*http://www.lib.umich.edu/copyright/copyright-info/*) provides excellent support material regarding copyright in academia. Much of the content of this paragraph is based upon their resources.

Digital rights management and the Digital Millennium Copyright Act

Abstract: What is copyright law in relation to digital content? How do content provider rights holders safeguard their property through technological protection measures. The DMCA is primarily concerned with legally prohibiting circumvention and stopping the trafficking of circumvention-enabling technologies. The ways that this effects libraries in loaning material are discussed. The means of access control relating to different platforms are explained and the impetus for the Digital Millennium Copyright Act of 1998 is discussed. The major influences behind this act are addressed and the rulemaking process is elaborated on.

Key words: DMCA (Digital Millenium Copyright Act), digital rights management, technological protection measures, WIPO, EUCD, tethering, trusted system, encryption, Adobe Digital Editions, iBooks, rulemaking, access controls.

Digital rights management (DRM) refers to the barriers copyright holders put in place within their content to prevent unauthorized use. DRM is alternately referred to as technological protection measures (TPMs). These measures are the means "by which rights holders prevent the use of the digital content they license in ways that could compromise the commercial value of their products" (Kasprowski, 2010, p. 49). This chapter will examine this and investigate the methods of TPM. Implications for academic librarians will be addressed and workarounds will be suggested where possible.

DRM comes in many forms, but to simplify the issue methods can be grouped into two categories, soft and hard restrictions.[1] Hard restrictions will be classified as any means that are used as a gateway to access. Typically, these methods are employed through encryption and other coding controls. Any measure that seeks to influence or inhibit user behavior after access has been granted will be classified as a soft restriction.

Soft and hard restrictions are not mutually exclusive, and often they are employed in concert for various purposes related to rights. Soft restrictions are qualitatively different from hard measures because these methods do not prevent access. They serve to limit uses to those prescribed by the rights holder through the interface. Hard restrictions are designed to channel access, particularly through preferred interfaces and devices. Generally, they are found in two forms, encryption and a tethered or trusted use system. Encryption presents a barrier to access and affects the character of the file. Tethered DRM is another level of security built into a file with encryption. Its purpose is to limit the number of devices a digital file can be accessed on. When used jointly, these measures serve to enforce rights issues with a remarkable degree of security. This topic will be investigated in more detail later in this chapter.

With the advent of digital content, copyright holders (in particular, corporations or holding companies with large economic stakes invested in copyrighted materials) use DRM to secure copyright rather than seek protection through legal means. As Gillespie (2007) points out "a fundamental shift in strategy, from regulating the use of technology through law to regulating the design of technology so as to constrain use" (p. 6) is occurring in the digital milieu. There are no improprieties evident in the practice. It makes more economic sense to protect something at the point of use rather than retroactively through legal means. It is vital for librarians to understand these issues so

that they may provide workarounds for patrons to engage with digital content according to all the rights users have been granted to copyrighted material in the 1976 U.S. Copyright Act.

Digital Millennium Copyright Act

The Digital Millennium Copyright Act (DMCA) of 1998 and the 2001 European Union Copyright Directive (EUCD) were written with the intention of bringing sovereign laws regarding copyright into accordance with two 1996 provisions of a World Intellectual Property Organization (WIPO) treaty. Prior to this legislation, copyright law in the United States had directly addressed the developments enabled by digital information. The intention of the DMCA is to prevent circumvention of TPMs. A major point of contention centers on the lack of fair use provisions in the act. The DMCA is the major legislation pertinent to copyrights in the digital milieu, and understanding it is central to library practices concerning digital materials.

Perzanowski (2007) provides a clear summation of the DMCA in his article "Evolving standards & the future of the DMCA anticircumvention rulemaking" where he states that:

> The DMCA regulates two classes of activity: (1) circumvention – the act of descrambling a scrambled work, decrypting an encrypted work, or otherwise disabling, removing, or avoiding a technological measure without the permission of the copyright owner; and (2) trafficking – the manufacture, distribution, sale, or offering to the public of devices, tools, or technologies that enable circumvention (p. 3).

In §1201 the DMCA specifies how copyright law in the United States will pertain to TPMs. The section outlines three key prohibitions that bar individuals from using technology to circumvent access controls, sell access control technology, or traffic in copy control technology (Baesler, 2003, p. 5). The use of material protected by TPMs is not possible provided the letter of the law is followed. This makes it easier to deal with the issue of fair use claims. The use may be fair, but the act of accessing the material protected by DRM is a direct violation of copyright law. There is no way to claim a fair use defense or guarantee use to content previously protected by the 1976 act.

According to the DMCA, users cannot use technology to circumvent access control. Functionally, this means that they cannot use programs so that access is granted to materials using different interfaces. For instance, the Rhode Island College (RIC) James P. Adams Library subscribes to several databases providing full text eBooks, among them eBrary. These collections of eBooks all function in the same way, with slight variations. An authorized user from RIC is able to access and download texts from this library. In order to borrow the content they must go to the institution's eBrary webpage and create an account. To use borrowed materials on personal devices, users must authorize the content with Adobe Digital Editions to satisfy DRM. The Adobe program is involved in the process because the Adobe Corporation provides publishers with DRM methods through the Adobe Content Server. After this process is complete, users are granted a loan period and can access the content via a browser or the eBrary app. They are not free to read and highlight the text using the program of their choosing. This is extremely frustrating to users for a number of reasons. Not only does this constrain scholarship, it also presents an intimidating barrier when the patron is making use of library content. Material is not portable and syncable through a cloud provider like Dropbox or Sugar

Sync. This process places unwarranted obstacles in the path of scholarship for questionable economic benefit to content producers.[2]

DRM results in a convoluted and complicated process that presents a barrier to the adoption of eBook lending libraries in academia. The process of engaging with eContent containing DRM is cumbersome and restraining. It is not nearly as simple as picking a book off the shelf and reading the material. With digital content, a similar method may be selecting a file and reading it with the help of a digital device. The loaning of eContent is in its infancy when compared with print content and it does not function seamlessly or optimally. Hopefully, as time allows the process to mature, a standardized set of simple protocols will diffuse. As libraries seek to provide users with as wide a variety of content as possible they will increasingly become involved in the distribution of digital content. The danger to the scholarly community is that the laws put in place by the DMCA will stunt the diffusion of knowledge by preventing a development of best practices regarding the distribution of digital content. A disincentive to this is the reification of TPMs to solidify the primacy of the market in the distribution of scholarly literature.

Rather than discuss the qualities of various programs, it is more informative to address the issue in the abstract. Users are unable to interact with materials they have been granted access to as they choose, constraining intellectual freedom. The upcoming section on soft restrictions ("Soft-use measures" on p. 27) will elaborate more on this matter. Avid users may need to constantly access materials across several different platforms. Unfortunately, with eBrary material they are only able to access it via the provider's accepted options. Not only does this wrest control from the user, but it also diminishes the power of the lending institution to have agency over their collection. This is a particular problem for libraries with

regard to digital texts, and certain institutions, in particular the Douglas County Library system in Colorado, have attempted to take novel approaches in order to remedy this situation. This will be addressed in more detail in Chapter 9 (on publishing).

As has been stated previously, the DMCA does not protect fair use provisions. The legislation serves to enhance and codify laws concerning the access control technologies present in digital content. This is troubling because in order to claim a fair use defense, access must be possible. If access is prevented by TPMs or, more likely, infringed upon by these measures, fair use is rendered impossible. Uses often impeded by soft TPM can include copying, pasting, and printing. While there are certainly situations where these uses can represent infringement under the 1976 act, there are others, specifically preservation and scholarship that are allowed by a fair use justification. For instance, if a rare audio recording is only available in one digital file, fair use grants a justification for libraries to make three copies for preservation purposes provided they maintain the initial file as a preservation artifact. Under the DMCA, if this audio file exists on a CD with a TPM that prevents copying, it is a violation of the law to circumvent this TPM to produce preservation copies. This is a rather stark example and the situation has been amended subsequently in the rulemaking process, yet it illustrates the dangers of reliance on TPM for the legal regulation of rights matters. This act runs counter to the 1976 U.S. Copyright Act and infringes upon the rights initially granted by it.

It is informative to examine the major influences in shaping the DMCA. The design of the DMCA was heavily affected by a report from the Intellectual Property and National Information Infrastructure working on intellectual property rights.[3] Bruce Lehman, a former lobbyist for the software industry, chaired this group. It focused heavily on the prohibition of TPM circumvention. The main thread running through the report

revolved around the Internet being a vibrant marketplace for information. This point is crucial in understanding the findings of the group and resulting nature of the DMCA. In an introductory section to elucidate the purpose of copyright, the report quotes a Supreme Court case from 1985 that points to the impetus for copyright resting in "the economic incentive to create and disseminate ideas" (USPTO, 1985, p. 20). This sentiment runs counter to a prevailing view that copyright has been established to create a vibrant intellectual community and incentivize creation through protection.

The concept that the market needs to be the primary consideration in regulating digital content jars with the interests of advocates of the open Internet. Often referred to as "Netizens", these advocates are often the developers, programmers, and technophiles who figured prominently in the development of the networked world. The views are expressed through the efforts of such groups as the Electronic Frontiers Foundation (EFF), the Mozilla Foundation, the Free Software Foundation (FSF), and Creative Commons.

Rulemaking and the DMCA

A prescient feature of the DMCA regarding the fluid nature of the digital milieu is the provision of rulemaking ability for the Librarian of Congress. This decision showed an understanding on the part of Congress for the fluid nature of copyrighted material in the digital milieu. Critics would argue that it is ineffective and does little more than present a veneer of public involvement in the process of developing copyright law in the digital milieu. Since implementation of the DMCA in 2000 rulemaking has taken place triennially. Rulemakings begin with a Notice of Inquiry, which solicits public comments, and propositions regarding areas the process should address.

Many advocates of open access submit proposals, among them the Electronic Frontiers Foundation and Creative Commons. The proposals are accepted early in the calendar year and then evaluated by the Copyright Office. These evaluations are provided to the Librarian of Congress who then issues rulings after advisory. In each instance until 2009 the Librarian has adopted the recommendations of the office (Perzanowski, 2007, p. 6).

The rulemaking process allows the Librarian of Congress to modify the terms of the act as new considerations with digital technology made themselves apparent. The DMCA was passed in 1998 and when it went into effect in 2000 the initial rulemaking took place. Since then the Librarian has issued four other rulings, in 2003, 2006, 2009, and 2012. The Librarian is charged with assessing the DMCA in relation to the availability of copyrighted works for use and the impact of this availability on news reporting, criticism, and scholarship when rulemaking. The Librarian is also responsible to ensure that works are available for nonprofit preservation or educational purposes. The DMCA should be analyzed to ensure that it has not had a negative effect on the marketplace for copyrighted works. Any other factors the Librarian deems pertinent to the DMCA and copyright are also to be accounted for in deliberation. Exemptions allowed for in each triennial ruling are only specified to last until the next rulemaking in three years. In this way the exemptions have been refined and updated.

The DMCA rulemaking in 2009 was widely considered a favorable one for academia. Six rules were issued, many with direct implications for higher education. The most affirming regarding fair use provisions involved the copying of digital video content for scholarly or critical purposes involving instruction. The 2006 rules afforded media studies and film professors the right to circumvent DVD encryption in order

to copy video clips for classroom purposes. The 2009 rulemaking extended this right to all professors, documentary filmmakers, non-commercial videographers, and media studies and film students. While this does not extend fair use provisions universally, it moves in that direction.

This exemption, in many ways a positive one for academia, is still problematic due to the narrow definition of acceptable circumvention. It is only allowed with DVDs and not content present in iTunes, Blu-ray disk, or other digital content provision (Decherney, n.d.). This situation is indicative of a major shortcoming in the rulemaking process. In order for a use to be evaluated the proposed exemptions must be able to be classified as at least one of the categories of work described in §102 of the 1976 Copyright Act. There are additional limitations on proposals based on category making it difficult for the process to account for novel forms in the digital milieu. BlueRay, iTunes, and other streaming digital content forms would present themselves as novel forms that are not covered in this exemption.

The process is ambiguous with regard to the evidence necessary to base rulemaking on. It is highly subjective and rulings are intended to be based upon the precedent established since the DMCA (Perzanowski, 2007, pp. 6–7). This prevents it from drawing on the history of copyright legal precedents and creates an entirely new category of law based upon digital content. Essentially it is extricating digital content from the traditional right guaranteed. The entire process is only marginally effective and leaves control of copyright matters relating to digital content in the hands of the DMCA. It is unlikely that significant changes and amendments can be made to the act with the ineffectual process outlined for rulemaking.

As other means of providing content spread and gain in popularity there are sure to be more issues. This is one of

many examples indicating that the rulemaking process is insufficient in addressing matters of copyright in the digital milieu. Another area where rulemaking does not meet the needs of users at present lies in the 2012 exemption regarding "jailbreaking" digital devices. Jailbreaking refers to the act of hacking an Apple device to gain access to the entire file system. This has been a matter regarding digital devices for quite some time, yet it has become more prevalent in relation to cellphones and tablets. The iOS system, along with several others relating to mobile devices and carriers, presents a layer of security preventing buyers from making full use of a purchased device according to their preferences. This can present an impediment to users selecting service providers, transferring files, using files with preferred applications, and many other operations. The 2012 rulemaking exempts users from the DMCA when jailbreaking cellphones but does not extend that privilege to other devices, most strikingly to tablets. Perhaps in the next rulemaking, scheduled for 2015, jailbreaking privileges extending to other touchscreen devices will be allowed for. While this is certainly possible, a three-year period relating to digital products presently is an elongated period in compressed time. The glacial pace of legislative actions concerning digital products is troubling.

TPMs and fair use

Technical protection measures are inherently incapable of evaluating fair use. The gradated nature of fair use defense prevents it from being assessed simply by pass/fail metrics. It is far too intangible a subject for dualistic qualities. Under copyright law, the nature of fair use is vague. In light of this, Congress makes no allusion to fair trade in the DMCA.

Encryption and tethering

Encryption is a security technique that has its roots in military intelligence. In combination with DRM, it presents "controls... on access and on use rather than on copying" (Coyle, 2003, p. 3). It relies on altering digital information mathematically so that it is scrambled without the proper authorization. The most simple and familiar example of encryption is the cable television system in the United States. Digital content is scrambled by the providing entity prior to being broadcast. This ensures that only users with the authorized equipment will be able to receive the information and render it in a watchable form. The same basic principle applies to encrypted digital content. A user needs a "key that precisely reverses the mathematical distortions (so that) the original data can be retrieved; without the key the data is meaningless" (Gillespie, 2007, p. 51).

The security weakness of encryption is a basic element. No matter how distorted or scrambled the information is, the digital content is still copied. Unauthorized users are still able to access some form of the file. This provides interested parties the opportunity to hack the information and render it legible in some form with enough ingenuity and skill. All encrypted files can be decoded. Once a file is decoded digitally, copies of the unscrambled content can be made and proliferated with relative ease.

There is an additional barrier to security related to encryption. The file can be decrypted with a provided key. When a user purchases an encrypted work, for the sake of example an ePub, and is provided with the attached decryption key, there is nothing that prevents them from copying the encrypted file and decryption key. Once this is done, they can readily distribute the fully functioning file as a combination of the ePub and key that negates the effects of DRM. Taking the example further, the content provider

could attempt any number of other security measures such as a password or key buried in the file or user's computer. The buried key may be more secure in most cases, but content providers seek to provide keys that will be secure in the most likely cases against ingenious computer users. The ease of distribution and copying in the digital milieu necessitates this. In order to alleviate this concern content providers have enlisted a trusted system. This represents the most secure way that the publishing industry has devised to this point with distributed content.

A trusted system is the most commonly used form of tethered content management. These systems seek to attach the encryption key of purchased content to an authorized user's computer or identity. Through this DRM users can access materials on several personal devices while being restricted from sharing this content with other users. This is the same mechanism that is used when library material is loaned to a patron. The borrowed copy is attached to the patron's device (or app account in the case of eBrary, OverDrive, and other lending programs) and must be authenticated through the trusted system to be accessed. When the content is delivered to the purchaser the provider retrieves some information from that user's device that serves as a decryption key. This piece of information must be something that readily identifies the computer and is static. Often, the content provider retrieves a number such as the hard drive serial number or a bit of information from the BIOS. This would seem to serve the content provider's needs for a secure DRM yet the proliferation of personal devices has added another wrinkle to the issue. The main drawback of the system as originally constituted was the inability to account for a trusted user's other devices, be they new or auxiliary. Ideally, a trusted system would not tie content to a device but rather a user. That way a user could

access purchased material across multiple platforms and devices.

As the digital environment matures, content distributors and device makers are developing new methods that make attaching purchased content to personal identification possible. The more pervasive examples are the iTunes store, Kindle store, Google Play, and Nook bookstore. It should be noted that the content linked to users can be any type of purchased digital content ranging from software and apps to eBooks and audiovisual materials. Some of these systems, most notably the Kindle store, tie material to specific software interfaces. Books purchased from the Kindle store can only be viewed using the Kindle or a Kindle app on another device. Kindle books are only available in AZW format, viewable on Amazon devices or with the Kindle app. Should the reader desire to read the book on a reader equipped for ePub, such as iBooks or Stanza, this is not possible with the purchased file. However, they can use a third-party software program, among them Calibre Library, to convert purchased Kindle files into another format such as ePub or PDF. Other marketplaces, such as the Nook bookstore or Google Play, will provide buyers with ePub that are not DRM protected after purchase and may be used with the device or interface of choice. Interestingly, the iBookstore on iTunes sells books in `.ibooks` format. This format is only renderable using an Apple device and the iBooks app. It cannot be converted using any other software to a form renderable by another device in the same way as an AZW file can be. The iBookstore also sells DRM-restricted ePubs. All materials purchased there, including open formats like ePub, will only render correctly in iBooks.

The above methods are common in the marketplace and librarians may wonder how they relate to library content. In the event that there is not a direct relation presently, it is informative to look at the way that for-profit entities are directing their efforts concerning digital security. As these

methods become more common, and in turn less expensive, it is likely that they will trickle down through the marketplace to other arenas where digital content is managed like libraries. Additionally, many of the initial court cases surrounding digital property rights are litigated between corporations.

Adobe Digital Editions

Adobe Digital Editions (ADE) is a common gateway program that allows libraries to manage loan periods and DRM with eBooks. Such database systems as eBrary, EBL, and OverDrive require a desktop edition of ADE to process loans. This is a freely downloadable program that only requires an Adobe account to use. Most libraries have some form of web-based instruction that assists patrons in employing this technology. It is wise to create a LibGuide or audiovisual guide that helps patrons to navigate this often tricky process. Adobe Digital Editions allows end users to view materials borrowed on the desktop through the reading program and creates a temporal copy renderable by various applications, specific to each database system. The presence of ADE in rights issues with library-loaned materials exists because much of the DRM purchased by publishers is derived from Adobe.

iBooks

iBooks represents a unique and powerful approach to TPM on the part of Apple. The TPM found in typical eBooks, be they in PDF or ePub format, can be easily subverted with lightweight programs acquired for free through a Google search. The DRM implicit in AZW files can also be compromised by free programs such as Calibre so that they can be formatted as ePubs. The AZW files are essentially MOBI files with some proprietary

information. Once this information has been removed, it is simple to make use of the file content with different devices and applications.

The iBooks format presents an altogether different problem to readers. It is not renderable on any devices other than Apple products supporting the iBooks application. There are only slight differences between an .ibooks file and an ePub, yet due to proprietary tags Apple has added to the code they are not platform agnostic. This topic will be addressed in great detail in Chapter 6, but the significant point in reference to trusted systems lies in the lack of parity inherent in the format. Rather than attempt to control access through TPM, Apple has opted instead to construct a format that is unable to be parsed by other programs. While this is prescient market strategy for Apple in ensuring their products are vertically integrated and they can act as a one-stop shop for people seeking to purchase media, it compromises intellectual freedom. If a corporation controls both the means of production and consumption of intellectual content (in this case eBooks), the discourse is severely limited. There is no immediate threat of the eContent market entering into this state, but librarians would do well to be cognizant of the methods content vendors use and the possible outcomes when viewing the market of ideas. Being aware of the actions corporations are taking in order to protect their content will help librarians to navigate and negotiate under copyright laws.

Soft-use measures

Soft use measures entail protections placed upon eContent within an interface. They occur after the conditions imposed by encryption and tethering measures have been met. These restrictions are imposed on content residing on a server. Soft

measures are fundamentally different from hard measures because they occur within an interface and are not a component of the file. They do not prevent access but rather limit agency during use. Soft-use restrictions are common in the academic environment when accessing articles from a database. Because there are numerous academic databases and dozens of combinations of browser and operating system (OS) configurations a full explication is not possible, but hopefully these examples can illustrate some of the common problems and solutions associated with PDFs in the academic environment.

Methods of soft TPM are typically more palatable to librarians than hard TPM because they can be hacked. An ability to properly assess the digital learning interface enables a librarian to assist patrons in attaining desired results. A developed vocabulary and collection of best practices to facilitate patron use of digital learning interfaces will allow librarians to quickly and effectively assist patrons with eContent.

In her excellent article "Every library's nightmare? Digital rights management, use restrictions, and licensed scholarly digital resources," Eschenfelder (2008) identifies six methods of soft TPM typically employed:

1. Extent-of-use: a publisher's server blocks a user from accessing content after a certain IP address visits the content a certain number of times.

2. Frustration or "chunking": breaking content (particularly eBooks) into chunks, making it difficult to utilize for various purposes.

3. Obfuscation: discouraging uses by making them hard to get to or hidden in the interface.

4. Decomposition: content does not render properly without access to a large collection of files or folders.

5. Interface omission: particular uses are not available using the program supplied by the content provider.

6. Warning/threat: pop-ups or other alerts that try to scare users away from particular uses like saving images.

Eschenfelder goes on to add another two "hard TPMs" that also take effect after access is granted to content. Eschenfelder's vocabulary is slightly different, yet the focus on features that inhibit and impede use is the same in her work.

It will be beneficial to provide examples of each common method so as to more fully explain it and address strategies to subvert it. The common extent-of-use method encountered at Rhode Island College regards databases of eBooks. When using the eBrary database provider of eBook lending, users are able to browse through books in the collection. They can view the table of contents and metadata for items in the collection for an unlimited amount of time. However, extent-of-use is present when viewing the contents of a book. Users are able to access the content of books online after meeting authorization requirements, but are only allowed a five-minute viewing period. They are then prevented from accessing the title for any longer without going through a borrowing procedure. After borrowing the material, they are then provided with a loan period that varies according to institutional settings. There is not a way for librarians to hack this system without violating the terms of the vendor contract or the DMCA, yet adequate use is afforded with such measures. The best way to provide adequate support to patrons using this and similar databases is to provide resources that will apprise users of such restrictions.

Frustration or "chunking" is common with regard to eBooks. When accessing an eBook through the eBrary webpage, users are give the option of borrowing the book in DRM-protected form or downloading a section of up to 60 pages as a PDF.

Often, users can get all the material they need from a particular work within that 60-page restriction but there are certainly exceptions. In this case they are afforded the opportunity to borrow the complete work for a 14-day period. After 14 days the content is rendered inaccessible to them due to DRM effects. This shortened loan period provides several problems such as affording insufficient time to engage with the work or providing a form unconducive to the desired use. A user can download the complete book as sections in PDF form, yet this process is time intensive.

Obfuscation is another difficulty commonly encountered by a user when accessing journal articles in a database. Perhaps a user wants to highlight sections of an article housed in the Sage Journals collection. When viewing a full text PDF in the browser this ability is not afforded, but access to the article as a localized PDF is provided if a user saves the material to a desktop. Once this material is stored locally it can then be accessed by any number of programs, among them Adobe Reader, GoodReader, and RepliGo, and marked up according to user desire. Chapter 8 (on tablets) will discuss applicable programs. The analog method of highlighting, still possible in the digital milieu, is also an option. Users can print out the article and mark it as they choose. This problem is simple to deal with, as it just requires that the desired material is saved locally and then accessed.

Decomposition is a problem when accessing webpages as saved files without Internet access or media files without dependencies. If a library seeks to store a collection of interactive webpages on the server it must have the necessary files or dependencies. These provide instruction and reference so that the webpage can display the proper interactive behaviors. Perhaps the media contained in the page requires some scripting files or data collections housed in locally accessible databases. For the library to make these pages functional, it must

ensure that access to all necessary files is readily available at the specified location. This example is not necessarily related to rights, but illustrates the concept of dependences well. In practice, an academic librarian may encounter decomposition when seeking to put educational materials that are interactive online. It is not enough to upload a content file, supporting files need to be arranged as well. A familiarity with file structures and page elements helps getting this done correctly. However, it is not necessary. All librarians, even the digital novice, can use organizational skills learned through experience and education to properly structure files.

Interface omission is present when attempting to view and mark up a PDF using iBooks. The program does not provide the user with the option of making notations in a PDF. This is not a problem with DRM, rather it is a functionality not provided by the application. In order to annotate a PDF on an iOS device plenty of options are available. Kobo Reader or Acrobat Reader, both free options, allow a user to make notes in a PDF saved locally. There are other options that are not free, most notably GoodReader, that provide increased notation options and sync with cloud-based data storage such as Google Drive, Box.net, and Dropbox.

The warning or threat present in soft-use measures generally involves pop-up windows that prevent users from performing certain functions. These could be present when a user attempts to copy a section of text or image when in an database interface. Often this can be worked around by using a browser extension such as Snaggit or Google Image Grabber. Text can be copied using a different interface. For instance, a scholar may save an article as a PDF and then work on it locally.

The examples of soft TPM discussed above are often implemented using JavaScript. This means that these restrictions are not inherent in the digital makeup of the

content yet are present in the interface. As a general rule of thumb, if difficulties occur using a file as desired it is best to save the material locally. Content can then be accessed by another program in order to attain the desired results. A common difficulty occurs when text in a PDF cannot be highlighted or selected. This usually can be remedied by using the Optical Character Recognition (OCR) function present in Adobe Reader. It is found under `Tools >> Text`. The exact location of this selection can vary depending on versioning and operating system. Users can then open this file and manipulate it using a desktop program such as Adobe Reader or Preview for more functionality. With PDF files downloaded from a database, the file is free of TPMs. PDF is an open-standard renderable text with a large number of programs ranging from desktop versions of Adobe Reader to mobile device applications like GoodReader. If users seek to access an article through EBSCOHost Academic Search Complete using the Safari browser they are unable to copy text from a PDF from within the browser. Conversely, if they seek to copy text from a standard HTML page they are able to do so. EBSCOHost is able to limit this functionality when accessing a PDF they hold the rights to in the browser window. There are a couple of ways that a user can copy text from a PDF accessed on EBSCOHost servers and they take a small degree of effort: either by working with the file using the OS or by downloading the article locally to their machine. Highlighting the desired content and then right-clicking on it enables copying text.

Notes

1. This vocabulary is very similar to the terms used by others, most notably Karen Eschenfelder, in describing technological

approaches to digital rights. Her work has been very informative in this conception.

2. A thorough analysis is done by Kirk Biglione in his chapter "Analyzing the business case for DRM" in *Book: A Futurist's Manifesto* (McGuire and O'Leary, 2011).

3. USPTO (1985, September). Intellectual Property and the National Information Infrastructure. Available from: *http://www.uspto.gov/web/offices/com/doc/ipnii/* [accessed 1 December 2012].

Types of digital content

Abstract: In order to assess copyright issues in light of digital content it is important to properly identify and understand a variety of mediums. Once each form is identified and described the implications of copyright law and the Digital Millennium Copyright Act relating to academic use will be expounded upon. Digital content will be grouped into three fluid categories: the Internet, databases, and eBooks. While each medium is distinct, they are not mutually exclusive and many works fall into more than one category. Having an understanding of the scope of works as well as the particular characteristics of each form will provide librarians with the ability to ably assist scholars in the digital milieu.

Key words: Internet, eBooks, databases, Digital Millennium Copyright Act, copyright, YouTube, Creative Commons.

The digital milieu has given rise to new forms of content. The U.S. Copyright Act was not designed to address these categories. In 1998 the Digital Millennium Copyright Act was formulated in order to compensate for these fresh forms along with the means of protecting and controlling copyright that were devised with them. It will be informative to illuminate three forms of digital content that play a prominent role in libraries in the digital milieu.

Internet

Materials on the World Wide Web present a novel form of content for copyright law. The Internet can be viewed as a giant digital collection. The implications for librarians are

immense and copyright law as it pertains to the Internet is very fluid. Content on the Internet comes in innumerable types and there is the possibility that digital content will evolve in such a way as to be indistinguishable from the Internet. To paraphrase and expand upon the thoughts of Hugh McGuire, founder of PressBooks, there is no necessary reason that eBooks are not webpages. The various file formats, excluding PDF, that are commonly used for eBooks are merely a packaging of XML files in one form or another. This will be explored in more detail in Part 2, yet the structure and mode of conveying content has minimal differences from a run-of-the-mill webpage. The abundance of streaming audiovisual media, notably from YouTube, is also an area in which the distinction between Internet and content is blurred.

Streaming content often features heavily in the material disseminated by an academic library. Educational support websites, as exemplified by the Springshare product LibGuides, provide librarians and faculty with the opportunity to create academic support materials and guides on particular topics.

YouTube provides a tremendous amount of content and a familiarity with terms of service will benefit academic libraries. It is standard practice in the digital milieu to provide academic support websites, often in course management systems like Blackboard and Sakai or open-content management networks like LibGuides. Blackboard and Sakai require user authentication to gain access while LibGuides provides access to anyone with a browser and the proper links. Both broad groupings allow for the incorporation of streaming audiovisual media. While it is possible and common to locally host media or attain it from sources other than YouTube, both the ubiquity and size of the YouTube catalog make it a content source with copyright terms librarians need to be familiar with in the digital milieu.

Uploading material to YouTube is a simple process. Users need to register an account and then are able to place videos on the hosting servers free of charge. They will then be able to provide access to them via links. It is important to remain cognizant that any material under copyright is not able to be uploaded. This means that an instructional video could be blocked from the site if the background music is copyrighted. It is a minor detail, yet will prevent access and utilization of this tool.

After users upload material to the YouTube server, they are given the choice to publish under the standard YouTube license or the Creative Commons BY license. If they desire to publish under the Creative Commons license, they are given the option of selecting it. The default setting is to use the standard license. The Creative Commons BY license allows anyone in the YouTube community to remix or appropriate parts of the video uploaded provided they attribute the work correctly. In order to publish under this license, all content of the video must be eligible to be housed under it. Users cannot publish other material on YouTube not licensed as CC BY under this license. Only material that is entirely user created, in the public domain, or has already been issued as CC BY can adopt this license. The standard license is detailed in the Terms of Service but it basically grants YouTube the right to broadcast a video while allowing the creator to retain copyrights. Issues of linking content are relevant when evaluating the digital milieu and rights issues. Linking and framing of copyrighted content is an area that has been examined by courts in relation to copyright law.

Databases

The most familiar area of technological support in libraries at present involves databases housing journal and eBook

collections. The ability to assist users with journal articles tends to be far easier and more direct than eBooks, due to the lack of DRM present in most journal articles. eBook collections are far more complex because of both the hard and soft restrictions placed on them through TPMs.

Difficulties relating to journal articles tend to be rooted in two issues relating to soft-use restrictions. Often, users will be unable to view articles with a specific browser. More often than not, these problems result from some glitch in the browser interface. When addressing issues in viewing and printing articles, a quick and simple solution that is often effective lies in switching browser. The most common Windows browser of choice among adult learners at Rhode Island College is Internet Explorer. Unfortunately, this browser also seems to be the most error prone by a wide margin. Internet Explorer has long been the bane of web design. It is the least accepting of changes in standards issued by the W3C. An illustrative example that relates particularly to mobile learning is the inability to recognize and interpret the common CSS3 property `border-radius` in all versions prior to IE9. This property formats boxes that are a typical design element, especially for buttons, in websites. All other prominent browsers, such as Google Chrome, Mozilla Firefox, Apple Safari, and Opera recognize this element. This example just serves to illustrate one of many common problems that Internet Explorer users encounter. This is not to say that patrons do not encounter problems with other browsers. Firefox, in particular the current version at the time of this writing (Firefox 16), has difficulty rendering PDFs. This problem presents itself when attempting to do research using electronic databases. When a link to a PDF file is clicked it will by default send it to be opened by a desktop application, usually Adobe Reader on Windows OS and Preview in Mac OSX. While it does not make the file any less readable, and often has the advantage of allowing scholars to avoid soft-use restrictions present in

the browser interface, this presents an occurrence to be aware of.

eBooks

Electronic books are a form of work that is difficult to classify. To strictly define an eBook, it is a collection of words and sentences packaged so as to be deliverable to an application. There are several different file formats and a full explication of said formats will be available in Chapter 6. Of note is the ePub format of eBook, which is the most ubiquitous format of eBook content. As will be shown in the section on HTML5, developments in HTML5 may render the need for an eBook as a packaged file obsolete. The content and markup language of an ePub is slightly different than a webpage or journal article. As is common at present, journal articles in digital form are represented as PDF files. PDFs are basically an image that can be interpreted by a document viewer, be it Adobe Reader, MS Word, Preview, Google Docs, or other. The PDF does not resize for the screen or device whereas eBooks are designed to do so. It serves to follow that as digital devices become more common, content comprised of journal articles delivered through databases will be optimized for varying screen sizes. As digital content and devices proliferate it is likely that eBook formats will become the default mechanism for delivering written content, be it a novel, journal article, or other.

The line between the Internet and eBooks is even less concrete than the difference between journal articles and eBooks. The primary building blocks for both eBooks and webpages is HTML, as will be elaborated on in Part 2. Fundamentally there is no difference between the text in an eBook and the text in a webpage. The difference lies in the packaging. Webpages are delivered without any excess packaging, purely in the form of content renderable through

a browser. An eBook is content delivered in a package. In order to make use of this content, the user must have an application that satisfies two criteria. It must be capable of reading the file format the book is delivered in, be it AZW, ePub, MOBI, or other. After this initial condition is met, the DRM enclosing the content must be satisfied. Depending on vendor, delivery method, and device this could require a specific app, password, and/or the satisfaction of trusted system requirements. This convoluted process is required to view contents that are renderable by a simple web browser.

eBooks exist presently in many formats, yet the predominant file formats are ePub, AZW, iBooks, and MOBI. These represent packaging of a file format that allows content to be resized for each individual screen. They are basically a bundle of HTML, XML, CSS, and (sometimes depending on file format) proprietary code delivered to the user in a readable format. Some individuals involved in the publishing field, most notably Hugh McGuire, have put forward the idea that the distinction between webpages and eBooks will disappear in time. This is certainly likely in the future, yet the methods of delivering content in a complete package without network access will need to be sorted out. Of course, there is the possibility that books could be delivered as print material, eBooks, and webpages. This would allow for the most possibilities in terms of use.[1]

Note

1. The collection of essays edited by McGuire and O'Leary (2011) in *Book: A Futurist's Manifesto* contains an essay entitled "Why the book and the Internet will merge" by Hugh McGuire. This essay was very influential in the composition of Part 1 of the current book. The entire text includes essays, which reimagine the book and its function in a digital world. Librarians would benefit greatly from familiarizing themselves with it.

Best practices regarding copyrights and digital content

Abstract: In 2012 the Association of Research Libraries published a code of best practices concerning fair use. This was done by the professional association to safeguard and limit liability to copyright lawsuits on the part of rights holders. The code is investigated in detail and examples of situations are provided. The legal precedents concerning digital content and fair use are discussed.

Key words: Association of Research Libraries, fair use, best practices, DMCA (Digital Millenium Copyright Act), digital rights management, technological protection measures (TPMs).

In 2012 the Association of Research Libraries (ARL) published a Code of Best Practices in Fair Use for Academic and Research Libraries in an attempt to create a professional accord recognizing how these issues would be dealt with in the academic community. The impetus behind this document was both practical and theoretical. By taking the initiative and outlining professional codes of conduct the ARL was protecting the academic library community from legal liability. Additionally, by creating a collection of best practices and publishing documentation to spread understanding of fair use rights amongst librarians these rights were more likely to be protected upon entering into contracts with vendors of collection material. It is an important document and any academic librarian concerned

with copyright and digital content would do well to become familiarized with it.

The document was compiled with input from working academic librarians and then reviewed by copyright experts. In collecting the views of various academic librarians, the authors took care to get representation from a broad swath of geographic areas as well as various types of institutions, ranging from Ivy League universities to rural colleges.

The creation of a code of best practices concerning fair use was particularly influenced by work done in other professional communities. Established best practices have been shown to have a prophylactic effect on copyright legislation, most notably in the documentary film community. In fact, one of the authors of the ARL best practices code, Pat Aufderheide, worked extensively on the code for the International Documentary Association (IDA).

Written documentation of established sector protocols makes challenges to fair use less likely. In addition, §504.2 states:

> The court shall remit statutory damages in any case where an infringer believed and had reasonable grounds for believing that his or her use of the copyrighted work was a fair use under §107, if the infringer was: (i) an employee or agent of a nonprofit educational institution, library, or archives acting within the scope of his or her employment (§504.2).

The establishment of best practices would provide librarians with an excellent justification for fair use even if they are found to infringe upon copyright. At a minimum, best practices guard against financial risk. Adler et al. (2012, p. 9) point out that no "community with a code has been sued successfully for actions taken within its scope."

The ARL Code of Best Practices in Fair Use for Academic and Research Libraries is comprised of eight common situations

where fair use matters and digital content converge. The code is structured so that an aspect is identified and elaborated on, then justified through fair use with stipulations. The recommendations are compressed into two areas of focus: access services and digital commons. For a detailed analysis, it is best for librarians to become familiar with the ARL document.

The first practice examined is supporting education by providing access to library materials via digital technology. This is a crucial function of academic libraries, especially regarding electronic reserves and scholarly databases. The code identifies two means of justification via fair use for the digital dissemination of library content: time shifting theory and concurrent use for educational purposes.

The idea that library-owned materials can be distributed in one digital copy for every material copy is referred to as time-shifting theory. In the 1984 Supreme Court case Sony Corporation of America v. Universal City Studios, Inc. the court found that videotaping television shows was justified as fair use provided it was not done for profit. This is an essential case relating to digital copies and serves to inform much legal work relating to digital copies. To show this, it is useful to examine cloud music storage as it relates to libraries disseminating digital copies. A blog posting by Kevin Smith from the Office of Scholarly Communications at Duke University likened the University of Michigan's digital access initiative to cloud music provider Google Music regarding fair use. In Google's amicus brief using fair use as a justification of its cloud storage plan, they allude to the 1984 decision and cite time shifting as a legitimate reason for operating a digital storage locker for customers' music. Provided this justification holds libraries will have excellent grounds for loaning digital copies. The initiative at the University of Michigan library lends out one digital copy of each orphan work the library has digitized. In

justifying this practice, the UM alluded to the reasoning Google used in claiming a fair use defense regarding music stored in the Google Music cloud. As opposed to the iCloud, the Google Music cloud and Amazon Cloud Services, both similar ventures, are not liable for copyright infringement by holding copied work in the cloud. The difference is small, yet vital. Google and Amazon both directly copy digital music from the users' computers, whereas the iCloud presents a huge catalog of music and users are granted access to any content they personally have a copy of. The Apple model does not present unique copies of each individual files, but rather licensed content from the Apple repository. Apple has negotiated licenses with publishing corporations so that they are not held liable according to copyright. Essentially, Apple and Google are taking different paths with the same result. Since libraries are unlikely to have the resources necessary for contracts with publishing companies, they can rely on the time-shifting defense used by Google to provide digital copies of content to patrons. The UM justification is far stronger than that of Google because it is nonprofit. Mr. Smith believes the time-shifting theory of fair use justification may be extensible to all library print content. If a library owns a physical copy of an item there is no reason a copy cannot be made available digitally for criticism, scholarly purposes, or inclusive access measures. In this case, the physical copy would need to be archived or stored. Theoretically, the library could offer the option of an instant digital loan on all content. If the content is loaned, the physical copy would need to be removed from the stacks so that it could not be loaned out simultaneously.

A key justification[1] lies in the previous quote from §504 of the copyright law that the use is in nonprofit education. In addition, the content made available to the library can be justified provided it is directly related to the course. In §110.2 work that is mediated can be made available to students in a

course via the library and digital transmission. In order for the use of digital course materials to be fair said materials must be appropriately tailored to authenticated users. The users must be contemporaneous, eligible students. The instructor through adaptation must tailor the material to the course. It is not appropriate to simply make digital copies of books available digitally. To limit liability, the library is advised to require that faculty provide full attribution for the material along with a written justification for use. In addition, faculty should review and update material to be distributed regularly. The librarian is responsible to properly advise students and faculty of their legal obligations concerning the material.

Libraries are permitted to digitally reproduce material to increase access in light of disabilities. Once again, the ARL recommends that libraries assess the marketplace to ensure that suitable material is not available. Only then are libraries able to undertake digitization efforts to grant ''access that is equivalent to the access afforded to students without disabilities'' (Adler et al., 2012, p. 21). The library must place stipulations on loan periods so that it has the same time limits standard material does. Libraries will also benefit from acquiring written documentation of need from the appropriate institutional bodies (learning accommodations, disability services, etc.).

One issue identified with fair use identified by the ARL, regarding publicizing library events, straddles the line between access services and digital content and really encompasses the entire scope of the library. Institutions are entitled to use the fair use defense in order to publicize library events. Appropriate selections of exhibited material allow the library to promote public awareness of collections and new scholarship. Librarians should be cognizant of providing appropriate citations for the work. Utilizing more material than is necessary for promotional purposes brings the

fair use claim into question. The use is easier to justify in the case of free events. In the event that images or other material are displayed on a website libraries should attempt to prevent downloading through TPMs. Creators or rights holders should be provided with the opportunity to voice concerns regarding the use.

Preserving material is a key function of libraries. The advent of the digital milieu has created an entirely different set of conditions for preservation. Rather than taking care to preserve physical copies of works, librarians are able to make digital copies for preservation and use. The ARL found that making digital copies is justified fair use provided that the physical items are likely to deteriorate or are outmoded for access purposes. It is important that libraries assess the market for works they wish to preserve. The use is justified only if comparable items are not available in the market at a reasonable price. In addition, the preservation copy and the original artifact should not be distributed at the same time. The fair use doctrine does not provide libraries with the agency to make additional digital copies of items in the collection for loan. Works that are preserved digitally should be completely and appropriately cited.

An institutional digital commons is justified on the basis of fair use. It provides insight into the institution and the scholarly activities. Care should be taken to treat material in digital commons in the same way as other parts of special collections. This means that complete works as the author composed them should be presented. The library should make no efforts to censor or abridge the works for any reason.

In the interests of preserving complete special collections through digitization, fair use is justified. Often institutions have large collections of archival and primary documents organized around specific topics. The scholarly usefulness of such collections is compromised by the limited access

necessitated by preservation concerns. In addition, scholarly access must occur in person. Therefore, digitization can have a highly transformative relationship with the original works. Digital collections or groupings allow librarians to actively contribute to an innovative and rapidly developing academic field. The ARL identifies the practice of creating groupings in digital form for nonconsumptive analysis as justifiable by a fair use defense. This material can then be analyzed for heuristic purposes or its metaqualities. The important consideration for librarians in ensuring their fair use rights is identifying digitized items of this class as strictly for nonconsumptive use. Librarians may need to enable soft TPMs to help ensure that items are only being used for these purposes. The qualifications of this case as justified by fair use can be enhanced "adding criticism, commentary, rich metadata, and other additional value and connect to the collection will strengthen the fair use case." The ARL is simply referring to archival collections in this quote, but it can be extrapolated to refer to all digital content made available by a library.

This use feeds into another aspect of digitization identified as justifiable by the ARL, collecting web-based material and making it available. It is recommended that Internet material not be altered in any way, but merely captured for scholarly purposes. Because the web is ephemeral, scholars often gain insights and knowledge by viewing a website as it appeared on a certain date or as it evolved to learn about an area of study. The more comprehensive the collection, the better the fair use case will be.

It is fair use to make works available in comprehensive form. Provided institutions do not selectively digitize special collections content they are able to put up complete digital repositories. This has significant academic value because often these items have marginalia, notes, and other elements that will benefit scholarly work. The library should develop

clear policies and directives concerning citation and use for scholars and students. Individual consultations for interested parties should be available with librarians concerning use.

General best practices

The commonality among all situations is an emphasis on the importance of appropriate attribution in fair use defense. By performing the functions librarians have always done they are acting in a way congruent with fair use. To paraphrase a well-known real estate adage, the three most important aspects of fair use are attribution, attribution, and attribution. Once this is done, there are two other best practices librarians should adhere to regarding fair use: open and responsive communication with rights holders and making digital files available with the same content as they contained when issued.

Maintaining good relations with creators and rights holders will help to ensure the library remains in accordance with copyright law. At the same time, librarians do not want to support negative liberty. Fair use is a right and in order to ensure that continues to be respected, librarians may need to lean more towards bulking up the case for forgiveness and not work towards acquiring permission at the outset.

There is reason to assume that these present best practices may be revised and expanded upon in the coming years. The issues Mr. Smith brought up regarding digital copies of print collections promises to be one around which some best practices must be developed. Additionally, the incorporation of numerous features that increase access in ePub3 will certainly lead to several new methods for making print material accessible to a wider population despite limitations. If librarians are to work to increase access to publishing technologies they will need to be aware of developing

interpretations of fair use regarding this area. In order to meet the recommendations in the ARL document, librarians will also need to familiarize themselves with basic TPMs they can place in loaned materials. Although this may be anathema to the many personal philosophies in librarianship, it may be necessary to do so to ensure that the fair use right continues to be respected in the digital milieu. Librarians also need to devise new ways of communicating the rights and obligations of patrons regarding digital content. A consistent, written set of institutional policies relating to copyright and digital content will do on a local level what the ARL project has done on a national level. It will provide a fallback for librarians as to copyright law.

Note

1. *http://blogs.library.duke.edu/scholcomm/2011/07/27/ why-can%E2%80%99t-i-digitize-my- institution%E2%80%99s-library/10/22/12.*

Challenges to fair use

Abstract: The dangers relating to the DMCA and fair use rights are addressed. The ways that the DMCA impinges upon preservation are addressed. The elements of access control that the DMCA reifies lead to platform fragmentation. The financial efficacy of DRM is discussed.

Key words: critical information studies, peer-to-peer (P2P), fair use, binary code, technological protection measures, access controls, platform limiting.

The present relation between copyright and digital content is extremely problematic for a number of reasons. The rights guaranteed under the 1976 U.S. Copyright Act are compromised under the DMCA. The reification of access controls wrests power regarding these rights from advocates of fair use, creating a precarious situation for libraries in the digital milieu. Preservation, historically a central function of libraries, is no longer protected as a right in all circumstances because the rights to access have been so encumbered by TPMs. The new means of distribution of and mechanism for viewing content enabled by digital technology bring more issues to the fore that are not currently resolved by the DMCA. The legislation regarding copyright and digital materials does far more to guarantee property rights than rights to access.

Preservation

Material that has DRM presents problems in preservation. A false dichotomy has been created by the DMCA in regulating digital content differently than print content. Fair use regarding preservation is still a right granted under copyright law, yet access to much digital content is controlled by TPMs. There is not the possibility of fair use without the right to use, and often this is impinged upon by TPMs. Additionally, eContent cannot be preserved solely as material unless it is extracted from TPMs. This is often not possible on the part of libraries or other institutions. This presents major problems for the preservation of intellectual freedom in society. If intellectual content is owned and copyrighted by private entities and that content has TPMs placed upon it, preservation in open formats is at the discretion of said private entity. Traditionally, Western society has entrusted libraries, museums, and other noncommercial entities with the preservation of intellectual capital. If preservation and its attendant forms are in the hands of for-profit entities, it calls into question the process.

Compromises and fair use

Copyright law presents a multitude of obstacles to intellectual freedom in academia. The present state of legal discourse on the issue, reflected most notably in the DMCA, severely impinges on the agency of academic institutions in the digital milieu. The matter is very fluid yet the regulations that Congress has enacted, under the influence of content vendors and publishers, call into question the continued existence of the fair use right. The DMCA reifies obstacles to access, rendering use, and in turn fair use, impossible. The fundamental legal orientation that treats the Internet as a

marketplace fails to recognize it as a dynamic, developing, and rapidly changing community.

The DMCA does not address the issue of fair use. A right that is guaranteed by and central to copyright law is subverted in this act. This will become more problematic in the digital milieu as content increasingly is only issued digitally. Journal articles, eBooks, and streaming audio–video material will be introduced initially with TPMs. The DMCA prevents any measure that circumvents these controls. Use will be constrained by this law to only those prescribed as acceptable by content vendors, whose priorities are not necessarily in accordance with content creators. Corporations and entities that operate as businesses have one overarching priority, profit. While these vendors may share many of the same concerns as advocates of intellectual freedom, they are only free to support these matters provided their financial security is ensured. No matter how pure the intentions, the precedence of the market in the profusion of academic materials presents a severe impediment to fair use rights. The DMCA provides a means for the priorities of content vendors to dictate the terms of fair use.

Interestingly, there is little to suggest that DRM is of economic benefit to publishers. The method employed on the part of publishers to procure DRM tends to be contracting with the advent of Adobe Content Server (ACS). According to Kurt Biglione, in his chapter "Analyzing the business case for DRM" in McGuire and O'Leary's (2011) *Book: A Futurist's Manifesto*, publishers "can expect to pay Adobe an initial license fee of $6500, plus an additional fee of $0.22 per e-book sold" (see section entitled Investing in DRM, para. 2). The presence of this DRM supplied by Adobe is the reason so many eBook libraries, such as eBrary and Overdrive, need to be used in conjunction with Adobe Digital Editions. Most eBooks in the United States are sold through Amazon on the Kindle platform. Amazon imposes their own form of DRM on these

eBooks, as does Apple when eBooks are sold through the iBookstore. There is no explicit DRM cost presented to publishers using either of these marketplaces, yet they are required to pay 30% of each sale to the aggregators. Additionally, publishers are not provided with information about consumers or the inner working of the marketplaces. In effect, publishers are confronted with the choice between either contracting with Adobe or limiting their choice of venues for sale.

DRM also inhibits innovation in digital publishing. By placing restrictions on how content can be accessed as well as what can be done with it, many potential uses never get explored. The provisions of the DMCA expressly prohibit circumventing technology in nearly all circumstances. The supposedly moderating feature of the DMCA, the rulemaking process, is of questionable efficacy.

Binary nature of code

Fair use and copyright considerations cannot be determined digitally. The binary nature of code that is fundamental to the operation of computers is incapable of making gradated judgments. The issue of fair use is widely considered one that is far too complex and nuanced to be considered in absolute terms. This is the likely reason legislation surrounding content and copyright in the digital milieu did not seek to address fair use. This point is important to emphasize when approaching the issue. If the rights guaranteed to us in the 1976 Copyright Act, derived from Constitutional clauses, are to be preserved new methods of sharing information that do not rely on technological restrictions will need to be developed so that the right to fair use is preserved. If material is only disseminated with TPMs then the anticircumvention

provisions of the DMCA will have the net effect of rendering fair use impossible.

P2P

Peer-to-peer (P2P) distribution is seen as fundamentally altering the way intellectual content can be distributed. The traditional power of capital to dichotomize between the information producer and consumer is negated by the possibilities enabled in the digital milieu. P2P distribution refers to a method of distributing digital files between users. Essentially, it enables a host computer that has traditionally operated as a client to become a server as well. This process is best illustrated by the example of Napster. In *The Anarchist in the Library*, Siva Vaidhynathan identifies five unique components of P2P networks:

1. These networks have an "end-to-end" design. All vital functions take place at an end point, in most cases a personal computer.

2. It is a decentralized system. There is no hub a user needs to visit to get a desired file.

3. There is no central authority. Although some users may be more skilled, no one entity is in charge.

4. P2P networks are extensible. They present open access to all provided any user works within the protocols of the system.

5. They are extremely difficult to manage.

(list from Vaidhyanathan, 2004, p. 17)

These qualities make them an extremely powerful tool for the distribution of content. In a networked community where any

number of users are available at all times, the diffusion of scholarly information can be accomplished largely through a combination of P2P networks and digital commons repositories. Open networks of information, generally the Directory of Open Access Journals website and the library and information science community's *First Monday* journal, have been developed that provide the authorization presently in use by journal publishers.[1] Scholarly material needs to meet the standards of academic communities to be considered reliable through peer review and other standards, and not the acceptance by journal publishers such as Elsevier and Taylor & Francis. As time provides the space for new methods to develop in the digital milieu, it is likely that means of scholarly distribution will return to the provenance of the academy and not the middleman publishers who have sprung up out of necessity.

Platform limiting

The protection of TPMs instituted through the DMCA leads to more platform limitations when viewing content. The DRM involved in viewing library material on electronic devices limits choice and encourages platform fragmentation. If the anti-circumvention laws of the DMCA continue to exist, it is not beyond the realms of possibility to imagine an information dissemination system where each distributor of information has its own program to read the information. This is severely limiting and prevents open access to the production and distribution of information. Part of the reason that media such as print books and phonograph albums present such a diverse variety of content is that there is a standard way to go about producing that content. Phonorecords require a minimal amount of technological equipment, and the system is in the

public domain. The digital means of reproduction is extremely robust, yet the fragmentation of formats and dearth of standards present formidable obstacles to a truly healthy intellectual ecosystem. Fortunately, the International Digital Publishing Forum (IDPF) and other groups are working to produce open standards that will allow eContent to be renderable on any reading program. This is much like the robust system of web standards. Apart from IE by Microsoft (which is becoming more amenable to web standards in its latest iteration), all popular web browsers, Firefox, Chrome, Opera, Dolphin, have interpreted HTML and CSS according to standards put forth by the W3C. The amazingly rapid and powerful development of the Internet along with the capabilities of webpages and browser-based applications has been fostered by these open standards.

The library is a major part of intellectual life and freedom in the academy. Many of the rights associated with copyright have been established by practice and then legislated into law. With the constant introduction of new issues and technologies associated with digital content, it is important to keep that in mind. Libraries will be able to ensure copyrights well into the future provided their actions represent the amount of intellectual freedom they wish to see associated with content that does not have legislation specifically relating to it at present.

Possibilities

There are two plausible ways that advocates of the open flow of information can counteract the effects of the DMCA. The first is through legislative means. Presently, groups including the ACLU, Creative Commons, EFF, and the

Mozilla Foundation advocate more openness in the DMCA by sending recommendations to the Librarian of Congress in advance of rulemaking. While this has clearly been effective and resulted in many positive changes, it is difficult for nonprofit public advocacy groups to combat the huge financial powers of the content-vending industry. Another way that intellectual freedom and fair use rights can be nurtured lies in the production and distribution of content. There has been a profusion of amazing tools in the digital milieu allowing content producers to copy and disseminate work freely.

Tools like PressBooks present authors with a simple means to produce eBooks. This project will be explored in detail in Chapter 7 (Creating eBooks). A major development in academic libraries over the last two decades has been the promulgation of digital commons initiatives. These projects naturally dovetail with the desire for libraries in academia to assist both the production and dissemination of works. The possibilities for institutional repositories to distribute content will be examined in Chapter 9 (Publishing support).

Several examples of support for open scholarship exist, even amongst content vendors. O'Reilly Media, one of the foremost publishers in the computer area, distributes all of their eContent DRM free. They offer consumers access to books without digital rights management in the PDF, ePub, MOBI, and Daisy formats. This allows users access to purchased material on any of their personal devices. In addition, O'Reilly Media has partnered with Dropbox to sync all purchased books in the cloud with user permission. In addition, it runs Safari Online, an innovative, subscription-based library that gives users access to thousands of titles by hundreds of publishers. DRM-free downloads are available based on subscription selections and its online interface does not stop TPMs preventing users from copying or taking notes

on content.[2] O'Reilly Media has chosen to forego the typical practices of publishers with regard to DRM while remaining economically viable.

Notes

1. Other sources of open access to information that are relevant are NEPTUNE (*http://www.neptunecanada.ca/*) and e-Science Central (*http://www.esciencecentral.co.uk/*), both of which are science data repositories.
2. For a detailed overview of this feature see: O'Reilly Media. (n.d.). Dropbox Syncing & Customer Service. Available from: *http://shop.oreilly.com/category/customer-service/dropbox.do* [accessed 1 December 2012].

Part 2
Formats

Understanding the main file formats of text-based digital content will allow librarians to assist users in gaining access. The information provided in Part 1 pertaining to copyrights will allow readers to view the explication of file formats that follows through the lens of a librarian's ethical obligations in upholding author and user rights. Upon first glance, digital file formats can seem daunting to grasp yet the intent of this section is to provide readers with a primer so that they may engage with this material. Rather than delve deeply into the code and technical jargon associated with computer files, it is hoped that a general overview will provide readers with the vocabulary and skills to further engage with this area of growing importance in the intellectual space. Stripped of the initial intimidation presented by novelties, it is hoped that librarians will be able to understand ePubs and PDFs in the same way that they work with microfilm or peer-reviewed print journals.

6

Three components of eBooks

Abstract: The ways in which eBooks differ from print books are explained. The components of eBooks are explained and the relation to pedagogy is discussed. The ways that librarians can further the development of eBooks in providing context are addressed. The various file formats are compared. The ways in which a Kindle book is different from an iBook are explained. The difference between a PDF and an eBook are addressed.

Key words: eBooks, ePub, ePub3, iBooks, Kindle, PDF, AZW, MOBI, cloud computing, XML.

It is helpful to define the composition of eBooks in three parts when attempting to gain a full understanding of their place in the digital milieu. An eBook file can be said to be composed of container, content, and context. The traditional print book has two layers, container and content. The container is typically represented by some combination of materials, creating an immutable object containing content. The container is not dependent on countless variables such as file format, screen size, etc. The content of print books, while highly mutable during creation, is static once produced and printed in a containing object. In order for content to change, subsequent editions must be composed and then printed. Print books are artifacts of a particular time while eBooks can be continuously revised and updated. Context can be present as materials

exterior to print books but are not commonly added by the creators in order to enrich and enhance the materials. Context has traditionally been external to print books and added after publication by librarians performing cataloging procedures or other scholars creating peer reviews, bibliographies, indexes, etc.

Container, context, and content combine to create an eBook. Much like a computer is comprised of three layers that are interdependent, an eBook also operates in the same way. The content is reliant on container to be utilizable and relies on context to provide valuable enhancements.

Container

Print books have two dominant components: content and container. The container is markedly different in print and electronic books. When creating a print book, the container is determined and set prior to creating content. Whether it is a periodical, novel, or newspaper, the container is static and the content is designed to fit in a specific container with only minute differences. These differences, such as typesetting, paper composition, paper sizing, and ink type, are static once the basic determination has been made. Electronic books, on the other hand, are completely different regarding container. Allowances must be made and contingencies planned for in creating content for a multitude of containers. An overriding consideration when creating content must be in making it adaptable to any number of devices. This changes the creation process at the outset. Container and context play vital roles in the creation and dissemination of eBooks.

Container refers to the actual device particular eContent is viewed on. This is dependent on a multitude of factors, the most important of which is file format. eContent files

generally exist as a `.pdf`, `.epub`, or `.mobi`. Larger works or books are usually found as `.epub` or `.mobi`, often both. The MOBI format is the proprietary Amazon means for delivering content for use with Kindle devices or apps. It is not an open format and cannot by sold or distributed without some involvement from Amazon. It is also not renderable on other eReaders or in other eReading apps.

PDF is a file format typically found in shorter texts, such as magazine or journal articles. PDF is an excellent choice for certain uses and it faithfully reproduces the look of the page. It is not uncommon for eBooks to be issued in all three formats, yet PDFs have two distinct drawbacks as a file format for long texts to be read on eReaders or tablets. First, it is not compatible and readable by Kindle devices, although PDF files can often be converted for use on Kindles. The preeminent factor in PDFs not being a suitable eBook format relates to text sizing and the static nature of content in PDFs. The pages cannot adjust to container screen size and require effort on the user's part to view. PDF is much like an image of a particular size placed in a picture frame that has no necessary relation in size to that of the original image. In order for a section of the picture to be viewed it has to be manipulated within the frame to be viewed. PDF files require resizing and zooming depending on varying device characteristics. This is a problem that can be dealt with when reading shorter texts, yet it can be averted in longer works by placing texts in file formats such as `.mobi` or `.epub`. In addition, shorter texts can be placed in these formats, but it is not commonly done with scholarly databases such as EBSCOHost or ProQuest. In the future, as eReading becomes more ubiquitous, it will be more common to see a broad range to texts offered in all three formats.

The reason PDF files cannot resize to device characteristics is due to the fact that PDFs are written in the PostScript language. The other formats are written and based in elements of the

browser stack (HTML, CSS, and JavaScript). These formats both contain the same elements as webpages. This is a tremendous advantage in several ways. For developers, authors, and publishers these formats do not require any particular knowledge of computer languages apart from a basic familiarity with the structure of the World Wide Web. Tying the format to these languages ensures their currency and relevance in the technology world. In addition, it allows them to develop along with the dominant form of information dissemination present in the world. From a practical standpoint, the browser stack is optimized for legibility and functionality across screen size. It has evolved over time to be accessible on a vast proliferation of devices. It is the ideal means of delivering content to eReading devices. Reliance on the PostScript language is a severe disadvantage for the PDF format and may prevent it from remaining relevant in emerging technologies. It does present an excellent format for print on demand (POD) purposes though. That may well be where the future lies for PDF.

ePub

The ePub file format is the primary open file format for electronic books. Nearly all eReaders and apps accept this format, regardless of the source of acquisition. If devices fail to read a particular ePub it is most likely due to internal qualities of the file. The file may contain some form of digital rights management (DRM) or other attribute that makes it unreadable by specific programs. In addition, specific programs may be incapable of reading specific files due to some technological protection measure (TPM).

The creation of a standardized format was first begun in 1999 by the Open eBook Authoring Group. In 2007 the

group, now known as the International Digital Publishing Forum (IDPF) released a version named ePub2. It is designed so that text and images can be resized depending on container characteristics to create a more fluid reading experience for the user. This has particular value when reading on devices with very small screens, such as smartphones. This is presently the format used by most works, but an ePub3 standard has just been developed and introduced that should allow the format to remain very useful with new and developing tablet technologies and digital textbooks.

The IDPF is "the global trade and standards organization dedicated to the development of electronic publishing and content consumption" (*idpf.org/about-us*). It develops and maintains the ePub format. IDPF members include publishers in all formats, booksellers, authors, and software developers involved in eContent. Among the hundreds of members are disparate entities like Apple, Aptara, the Open University, McGraw-Hill, Google, and the University of Michigan Library.

The ePub format, at its core, "was always intended to be a general-purpose document format" (Garrish, 2011, p. 12). Fortunately, a cursory knowledge of HTML, XML, or other web standards will provide a familiarity with the basis of ePub. Working in the format and creating a file does not require knowledge of another set of protocols or languages specific to the format. ePub is built on the browser stack, a combination of HTML, CSS, and JavaScript. When discussing webpages, this is something of a trinity that combines to create a whole, functioning entity. HTML is a means for delivering content. This content will then be formatted and its appearance will be determined by CSS. Through the course of use and interaction, a webpage's behavior will be manifested by the JavaScript code it is linked to. While ePub has been tied to web standards since its

inception, much of the updating present in ePub3 pertains to behavior.

The ePub2 format is comprised of three main parts. The three standards, in the form of files and folders, are delivered in an Open Container Format (OCF) in the form of a zip file archive. This format can be expanded by any windows operating system or any other modern operating system using a utility. The three components of the ePub are contained in the zipped file. First, a simple file exists that identifies the package of files as an ePub. The other two components come in the form of folders. The first folder, referred to as the Open Packaging Format (OPF), contains all metadata relating to the content and structure of the eBook. All files related to digital rights management and encryption, of primary concern to librarians when providing access to materials, are present in this folder. The other folder, the Open eBook Publication Structure (OEBPS) contains all the content of the book.

The IDPF announced the formation of a working group to create an ePub3 standard. According to the standard's charter, there were 14 reasons the ePub standard had to be updated. Of these 14 reasons, 3 themes stood out. There was a desire to make the standard a global format. ePub as presently constituted was largely absent from Asia and other areas where text did not flow in the Western Roman-inspired format. EPUB 2 could not always accommodate Arabic, Chinese, and other non-Western forms of writing. There were impediments relating to text flow and nonlinear characters. The market for eBook devices has changed considerably since the introduction of ePub2 with the advent of smartphones and tablets. Devices like the iPad, Galaxy, and Windows tablet brought new features and abilities that were not accounted for or even addressed by ePub2. The format did not make allowances for content integration, multimedia, and linking capabilities. In addition, publishers wanted to use the

format for other media than literary books, notably periodicals, newspapers, and text-based books.

In the creation of the ePub3 standard care was taken to incorporate existing technologies already incorporated in ePub and add widely used web-based utilities to them. The step to incorporate new improvements and functionality is very prescient on the part of the IDPF. In order to maintain its viability as a file format in the fast evolving digital environment, the IDPF wisely made sure that ePub was able to adapt and utilize new abilities. Learning from the lessons provided by such obsolete technology products as WordPerfect, MySpace, and Netscape Navigator, the IDPF has worked to ensure that the ePub format will remain vibrant.

ePub3

In 2010 the IDPF began a working group dedicated to updating the ePub standard. The working group was chaired by an IDPF board member and featured employees from Google and Adobe. Several corporations, such as Apple, Sony, and Google, were active in the development process. The IDPF also tried to make the process as open as possible by posting code on a public Google site and inviting interested parties to participate in the revision process. The fact that the standard was developed with the input of people active in the ePublishing field ensures continued involvement with the format and its usefulness going forward.

The ePub3 standard marks the first step toward eliminating distinctions between apps and eBooks. For a time, those who wanted to make interactive and fully featured eBooks were forced to undertake the app development process or enlist the help of a developer. ePub2 and other eBook formats were primarily optimized for novels and text-based books. The need

to expand the palette of the book to enhance a wide variety of book types was beginning. Certainly one can see that nonfiction books such as cookbooks, textbooks, and instruction manuals could be greatly enriched by additional content, and formats needed to evolve to accommodate this. ePub3 can be seen as a move towards inclusion. The IDPF not only sought to enrich materials but also make them more accessible through accommodation measures for disabilities. It would also include many of the capabilities present in apps in the eBook.

When the working group was set up in the summer of 2010 it was not clear initially if it would come up with another version of ePub2 or a drastic change from the previous incarnation. After much deliberation it was determined that the outcome they sought would build on the existing ePub format to create an entirely revised version, to be dubbed ePub3. This development shared the basic structure of ePub2 while incorporating multimedia, rich texts, and HTML5.

ePub3 incorporates all of the previous functionality present in ePub2 while adding features to work with HTML5 and tablets. A conscious effort was made to create new faculties in ePub3 while remaining backward compatible. ePub3 documents are able to work with devices with limited capabilities. In much the same way that a computer running MS Office 2003 can still work with an MS Office 2007 Word document legacy eReaders can work with ePub3 even if they do not have proficiencies with JavaScript. The possibilities with ePub3 files will only be enhanced with newer devices, but the same content and raw material will still be present.

The improvements in ePub3 are down to its ability to incorporate in eContent files all three aspects of the browser stack, JavaScript, HTML, and CSS. ePub2 worked with the content, in the form of XML rather than HTML, and CSS to deliver reflowable text and allow for variation in containers. While ePub2 could contain some contextual material, mainly

in the form of links, ePub3 greatly expands the ability of creators to incorporate much more media in eContent. Functionally, this was done by greatly expanding the vocabulary present in ePub3. ePub2 supported XHTML 1.1, CSS2, XML, and ZIP standards. These features are all included in ePub3 and greatly expanded upon. It includes support for newer versions of XHTML and CSS (5 and 3, respectively). In addition, it incorporates new support for JavaScript, SVG 1.1, TrueType, WOFF, SSML/PLS/CSS3 Speech, SMIL3, and RDF vocabularies. All of these additions address two distinct goals set by the working group in developing ePub3.

The new standards for ePub were designed with accessibility in mind. Integrated audio and video support provide functionality for those with disabilities. Fundamental to the process was an understanding on the part of the IDPF that eContent had far greater abilities than were presently being explored. Also, there was an understanding that for eContent to be a central pedagogical tool moving forward any new standards developed had to take into account learners with different abilities. Improved text-to-speech rendering was accomplished with the incorporation of SSML/PLS/CSS3. Better audio playback for those with vision difficulties was allowed for in the use of SMIL3. In order to increase accessibility, global language support mechanisms were also expanded upon. Additional fonts and different texts were supported with the additions of TrueType and WOFF. When combined, these additional accessibility features should have broad applications in library spaces. Knowing that these new features are present should help librarians in guiding patrons in device adoption. They make tablets far more appealing in comparison with eInk eReaders when working with students with disabilities.

The other consideration when developing ePub3 was in allowing eBooks to utilize the features present in developing

devices and tablets. The new standard incorporates JavaScript functionality to augment the presence of XHTML and CSS in ePub2. An entirely new toolbox of features is now incorporated into e-books with HTML5 support. Text can be enriched with the audio and video elements now available.

ePub3 necessitates support for the agreed upon audio standard, MP3. This feature serves to accomplish both of the goals of ePub3 development. Books can now be made more accessible to the visually impaired by providing far better text-to-audio capabilities. Audio can also be used to enhance delivery of pedagogical lessons. For example, if text is on jazz, perhaps an audio clip of a particular syncopation or chord progression could be added to the ePub for additional elaboration.

Perhaps the best way to incorporate audio features into ePubs involves the use of overlays. This is not a new concept in the accessibility community, as they represent the foundation of talking books. The adoption of overlays into ePub3 can serve to enhance the learning experience by supplementing print content. The DAISY Digital Talking Book (DTB) is the file format traditionally employed in the accessibility world in order to provide learning opportunities to the visually impaired. In DTBs an overlay is directly integrated into the file. In ePub3 the implementation is different. Overlays are housed in a file separate from the content file and synced up using element IDs and mapping. In essence, they create an audiobook and a textbook that are able to work in conjunction.

Video elements provide a few sticking points in ePub3. They present problems in two main areas, file format and file size. Unfortunately, the working group that designed the ePub3 standard was unable to agree upon a single format. The IDPF is promoting two formats, H.264 and WebM, as video standards. Consensus could not be reached in the working group regarding either option. WebM was preferred by a

segment of the group because it is patent free and more in line with the desire to create an open standard. Conversely, many preferred H.264 due to its popularity and common usage. Rather than alienating either block, the question was left open.

A major potential drawback in the ePub3 standard relates to file size. While personal computers often have plenty of storage to allow for media files, developing devices and tablets often do not. eBook files have traditionally been quite small because they only included text-based files with formatting and content information. The addition of the odd video clip will not make much difference yet it can quickly become an issue. In the course of a work that may be several hundred pages long, a creator may want to incorporate dozens of files that in conjunction make file sizes unwieldy. One solution that ePub3 provides in design standards is to allow audio and video material to live outside the file container. This solution presents other potential problems. While it keeps file size down, it can prevent the use of certain content in the proper context or at the proper speed. Even if a device has wireless capabilities enabled, download and playback time for resources may be detrimental to engagement with the text. Many variables are at work when audiovisual material exists outside a containing ePub file. It is not certain how particular devices will behave when confronted with material external to a zipped ePub file, for instance. It could be that information is downloaded prior to reading the ePub, that audiovisual content is streamed, that block fetch of audiovisual content for an ePub rather than collecting it all, or any combination of these behaviors. Because the format is so new and devices are developing at such a rapid rate there is no accepted standard for how devices will operate in relation to separate audiovisual content. Even applications and devices that work with the ePub3 format are still being introduced and upgraded.

In January 2012, Apple introduced iBooks version 2. There was a considerable amount of fanfare involved in the introduction and Apple and their publishing partners focused the attention around the release towards digital textbooks. In many ways `.ibooks 2.0` incorporates many of the developments of the ePub3 format into a new proprietary format Apple will use. In conjunction with the introduction of iBooks 2.0 Apple also introduced a new program designed to help educators produce iBooks. In many ways, Apple is coopting the advances in development made by the IDPF with ePub3 and attempting to create a walled off version of them in their own file format, iBooks 2.0.

The addition of audio and video material in ePubs has tremendous potential. In order to get students more engaged, self-directed exploration of course-related content can be added. While ancillary material enhances accessibility for students with different learning conditions, it also allows content to reach students in a more direct and personally rewarding way. Text-based learners have always benefited from the printed book and will continue to do so with eContent. Now, other types of learning will also be catered for by ePub3, opening up an entirely new province for educators.

Another feature that the ePub3 format allows for is interactive and game-based learning in textbooks. Instructors and publishers will now be able to solicit interaction from students and interact with them remotely.

iBooks 2.0

Apple developed a proprietary format called iBooks to operate as an eBook app for iOS. Unlike the Kindle platform, iBooks

does properly render ePubs. Users can import ePubs to iBooks and they will be properly rendered. Additionally, ePubs imported into a user's iBooks account will sync bookmarks and notes across devices. This is extremely handy when researching and studying. However, books imported to iBooks from anywhere other than the iBookstore are not available through Apple for download from the cloud. This is not the case with iBooks purchased from the iBookstore, as they are always available to download from the cloud to an iOS device. Unfortunately, it is not possible to export notes and bookmarks made within iBooks on an ePub back to the ePub format. The file type is changed to sync with the cloud and any markings made in an iBooks version of the ePub are not viewable in any program capable of reading ePubs.

In January 2012, Apple introduced a revised version, iBooks 2.0. Prior to iBooks 2.0, the app worked well with ePub books and books in the iBooks format. Things become additionally complicated with the introduction of iBooks 2.0 regarding ePubs. The newer version supports nearly all of the features present in ePub3, while introducing new improvements in the iBooks format and authoring tools. iBooks became the first app to recognize many of the changes made with ePub3. Apple and their publishing partners focused a considerable amount of attention during the introduction of iBooks 2.0 around digital textbooks.

In conjunction with the launch of iBooks 2.0, Apple released a new authoring tool, iBooks Author. However, iBooks Author only produces files in the `.ibooks` format. It does not allow creators to import `.epub` files into the `.ibooks` format or export books into the `.epub` format from an `.ibooks` file. This development is problematic for two main reasons. The proprietary iBooks format is basically an ePub3 file with some minor changes and the end user licensing agreement (EULA) for iBooks Author is highly restrictive.

The program iBooks Author allows users to create files in two formats, `.ibooks` and `.iba`. These formats are largely interchangeable, with `.iba` representing a production format. According to a detailed review of the formats by Daniel Glazman, co-chairman of the W3C CSS Working Group and an authority on web standards, iBooks Author will not even accept valid HTML. In a lengthy analysis, Glazman also addresses many of the proprietary elements of the file format. His conclusion is that much of the HTML and CSS code Apple uses in iBooks only functions to make the format compatible with devices and software Apple produces. This is an interesting approach to DRM that will be addressed in more detail in the TPM/APPS section.[1]

Many parties in the technology world found the end user license agreement (EULA) agreement in iBooks Author unacceptable as well.[2] It guarantees Apple the right to sell all products of the program through its iBookstore. Authors are not free to sell and distribute their works by another means. Creators are free to distribute their works free of charge, which is beneficial to educators who adopt this publishing method. At the same time, it is not possible for anyone to charge any amount for an iBook without Apple's blessing. It is similar to Apple's insistence on control of apps in iOS. Unlike the Android OS, there is only one market for applications that is licensed to sell apps to iOS devices, the App Market. There is a way to breach this restriction, commonly known as "jailbreaking" a device, yet it voids the warranty and opens the user's device up to far more security risks. As Daniel Glazman has pointed out, the iBooks Author EULA is highly restrictive, yet the product of the software (an `.iba` or `.ibooks` file) is only renderable on Apple software. However, it does not restrict creation in other formats. In fact iBooks is a far more accepting app of other file formats, ePub and PDF, than the Kindle interface that only accepts MOBI files.

Two major areas of concern arise regarding iBooks and open standards, the iBooks Author's inability to or export commonly understood file formats, like ePub and XML, and the lack of a communal approach that Apple is taking in regards to eBooks (Glazman, 2012).

The truly limiting aspect of iBooks Author is the program's inability to work with different file formats. Apple has designed iBooks Author to allow for very limited file importation, making only documents in MS Word or Pages formats acceptable. Creators can use `.rtf` or other text-based files, but they need to perform all cutting and pasting manually. Apple prevents users from importing ePub, MOBI, or XML files. Once an ePub file is rendered using iBooks and annotated or bookmarked those changes are only viewable in the iBooks app. Users are locked in to working with the program if they have started reading material in it. This is a cumbersome way to operate and is unwieldy in the digital milieu, where cross-platform compatibility is a major positive feature. Apple has created an app ecosystem that is proprietary, yet many of these apps are also available in other OSs or can be browser based. Presently, iBooks is not able to work with other platforms and the incompatibility with other file formats presents further obstacles.

The iBooks Author program is very easy to work with to produce course material. Apple is known for making very intuitive programs and interfaces, and their expertise in this area is certainly shown with iBooks Author. Hopefully, this is a portent of developments to come relating to digital textbook creation. Apple's developments may spur others to move at a faster pace in developing course content creation software. There are two basic elements to iBooks, the text/content and the accouterments. Apple has created a format that should allow instructors to push content into more interactive realms. Content implementation is not noticeably
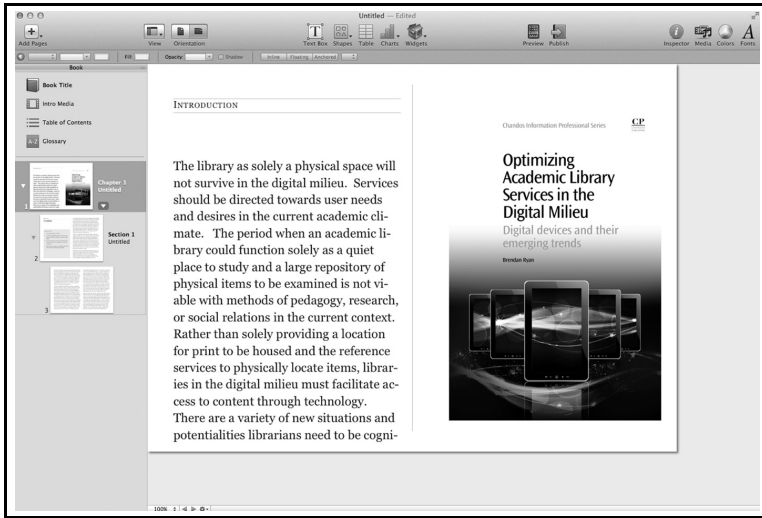
different from other programs that do basic compilation work, such as PressBooks or Scrivener.

Apple really differentiates iBooks Author by adding multimedia and interactive features. Users can attach graphs, multimedia, photo galleries, annotated pictures, Keynote presentations, Dashboard widgets, and 3D interactive images through widgets. The process is fairly simple and once content is set on the page it is able to adjust to accommodate widget boxes through wraparounds or respacing.

iBooks Author is a tool that should end up being far more disruptive in the digital publishing industry and the success of the format over time is questionable. Apple has created a closed system and will need to leverage their power as a content provider to get publishers to make content in their format. Although Amazon continues to keep the MOBI format as its private domain to sell material in, there are a number of tools that make it easy for publishers to convert ePub files into MOBI files such as Calibre and Kindle Direct Publishing. In addition, it is simple to convert files from the MOBI format to an ePub. There is no friction involved in

moving between ePub and MOBI, which undoubtedly has had a positive impact in keeping the Kindle content system robust. Apple is introducing a proprietary marketplace, just like Amazon, while also creating a great deal of friction to entry for publishers. As of this writing, iBooks textbooks are alone in making use of many of the features of ePub3, while also providing a platform for books to be displayed with all the associated bells and whistles, but this situation will change in the near future. A number of initiatives with varying methods, ranging from Ibis Reader to Inkling to Readium, are in the process of launching. When digital readers supporting the ePub3 format become readily available it will be difficult for Apple to justify the effort involved in producing `.ibooks` files for publishers.

Apple has largely incorporated into iBooks 2.0 the developments made in the ePub3 standard. The innovative development of materials for iBooks by the New York Public Library will be addressed in the following section about creating eContent. In many ways, Apple is adding to the advances in development the IDPF has made with ePub3 and creating a walled off version of them with iBooks 2.0. Later in this chapter an examination will be made of TPMs as they relate to iBooks and Kindle.

The addition of audio and video material in ePubs has tremendous potential. In order to get students more engaged, self-directed exploration of course-related content can be added. While ancillary material enhances accessibility for students with different learning faculties, it also allows content to reach students in a more direct and personally rewarding way. Text-based learners have always benefited from the printed book and will continue to do so with eContent. Now, other types of learning will also be catered for by ePubs, opening up an entirely new province for educators.

MOBI

MOBIpocket, a French company, initially developed the MOBI format. Amazon purchased the MOBI format and reader in 2005. Since the acquisition Amazon has ceased supporting the software and user support for the reading platform. The MOBI format and the Amazon word (AZW) format are the same except that AZW operates with a modified DRM scheme. Several free tools are available to create MOBI files. These files can then be renamed with `.azw` appended and essentially work as Kindle reading files.

Kindle readers are presently the most popular eReading platform. Users can either purchase a Kindle device from Amazon or download a free app for use with iOS, Android, or Windows devices. In May 2011 Amazon first reported selling more eBooks than print books (Amazon.com, 2009). Periodicals and newspapers are also available in Kindle format.

Amazon distributes the KindleGen software, a free program that allows creators to convert files into AZW files. KindleGen supports the importation of HTML, XHTML, XML, or ePub source files into a Kindle file. This is convenient for publishers and individuals seeking to tap into the market for Kindle books, in contrast to Apple's approach with iBooks Author.

The continued development of the ePub standard stands in contrast to the Kindle format. In January 2012 Amazon released a revision of the MOBI format, Kindle 8. This incorporated some features of HTML5 into the MOBI format and much of the `.mobi` functionality resides in HTML 3.2. This is due in large part to the closed system Amazon has created for its eContent. Because Amazon is the sole distributor of content while also providing the only software and devices to view it, they are able to design in this way. Even when libraries loan out books in the MOBI format, these are processed and created with Amazon's involvement.

Amazon benefits greatly from ePubs and their backward compatibility. Kindle files are often reformatted ePub files from publishers that Amazon is able to put in the `.mobi` format. These characteristics of MOBI are important for librarians to be cognizant of when creating course content and analyzing devices for library investment. While Kindle provides a great product, its functionality and adaptability moving forward are questionable.

In January 2012, Amazon released the Kindle 8 file format (`.kf8`) to optimize performance on newer devices. Essentially, it incorporates many of the features present in ePub3 while packaging it with a MOBI file. Many of the visual characteristics enabled by HTML5 are accounted for, yet it does not service multimedia files, like the ePub3 format.

The ePub2 and MOBI file formats are both products of the intentions of designers. At the time ePub2 was introduced in 2007, eInk technology was a major consideration and faithfully reproducing the look of print books was given high priority. Just as the iPad caused a huge change in the computer industry, the IDPF is wisely taking into consideration the fallout of tablet ubiquity and novel abilities in updating the ePub standard moving forward. Even though ePub3 was released less than two years ago, the IDPF is already working towards future revisions.

Content

The use of the term content in relation to books, both electronic and digital, is a reflection of the way the Internet is reshaping society. Content is a term used in the web to refer to the actual information contained in a text. Viewing books through the lens of web development, as is necessary regarding eBooks, leads one to take into consideration the components of a

book in the same way one would reflect on the components of a webpage. Therefore, materials are referred to with the same overarching vocabulary. A book's content is the information contained within.

There is little practical difference between content in a print book and content in an eBook during use. Over time, however, content in an eBook can be updated while content in a print book must be updated via different editions. Content is a different entity in electronic and print books. In print books, content is fixed on the paper page. Revision or updating content requires a different edition or appendix. This is not the case with electronic books. If updates need to be made, the file can be altered and updated.

The ability to alter content in real time is a positive development, yet it is not without some cause for concern. It certainly can lead to content being altered for ulterior motives. In addition, inaccurate information can be added or removed. This is problematic in a scholarly context because it makes citation difficult. The situation is extremely fluid and librarians must account for new contingencies. Perhaps citations must include version numbers like they presently include edition numbers for print material.

In the digital world eBook updates and revisions are akin to software updates. This is an excellent practice to examine when attempting to address how eBook content can be altered while remaining credible in the scholarly context. The terms push and pull are germane to this discussion. Software updates used to operate on a pull basis. In computer parlance, pull refers to information that a client must actively acquire. Perhaps this is best explained in reference to mail. In the early stages of the Internet, a user's client email program had to actively go to a site on the Internet to acquire new messages. It is not unlike post office box delivery contrasted with home mail delivery. In the development phase of email delivery, users had a digital PO

box they needed to go to for message retrieval. As the web developed, email moved to a push system. Email was delivered to users' digital home mailboxes without any action on their part. Presently, updates are pushed out to software users and integrated, often without their knowledge.[3] When updating software the accepted practice is to issue a list of bug fixes and an explanation of why updates were made. This needs to be a major component of eBook content updates but an additional allowance needs to be made. It is not necessarily the case that software developers will continue to make older versions of software continuously available before update. This is done for a number of reasons in the computer programming world, but needs to be accounted for by academic materials. To be a credible source, citations must be verifiable by referencing the object cited.

The onus will be on publishers to ensure that they make previous versions of an eBook accessible to scholars. This will become a consideration when evaluating a publisher for veracity. An exemplary model for such considerations may be an electronic resource not presently held in high esteem in the scholarly community, Wikipedia. The relevance of Wikipedia has nothing to do with their accuracy or scholarly credibility of site content, but rather the techniques existing therein to note and record updates. All previous versions of an entry on Wikipedia are viewable. For example, a scholar can cite the Wikipedia page on Barack Obama on 28 July 2004. Provided he notes the date of access, as is required in all formats for the proper citation of an electronic resource, the work can be assessed for accuracy based on the citation. It is possible to go to Wikipedia, search the site history, and access a link allowing the page to be viewed exactly as it appeared on that date. In addition, there is a handy feature that allows users to compare one version on the same screen with another. Editors supply notes and explanations, Wikipedia's version of bug

fixes, in the text. This reified practice in Wikipedia would be an excellent model for the scholarly community to adopt. Granted, publishers would have to budget resources for electronic resources and storage, yet substantial resources related to printing paper books would be freed up in the digital milieu.

Context

Context refers to the information extraneous to the text that is provided in an eContent file. In the first chapter of McGuire and O'Leary's (2012) *Book: A Futurist's Manifesto*, Brian O'Leary defined context "as tagged content, research, footnoted links, sources, and audio and video background, as well as title-level metadata" (para. 1). The context provided and the ability to access rich content are the major ways in which eBooks differ from print books. In the digital milieu, devices have networking capabilities that make content plentiful. There is an overabundance of content available on the Internet that is not fundamentally any different than that of eBooks.

A major way in which eBooks can be effective and valuable scholarly tools is in providing rich context. Because librarians specialize in cataloging and organizing information the natural way that they can enhance higher education in the digital milieu is in aiding authors, scholars, and institutions in providing rich context to scholarly eContent. The emerging body of open educational resources and free course content publishing tools will have a major impact on higher education moving forward. Assisting scholars and faculty in making effective use of these tools by helping to integrate context into content is a clear way that librarians can add value to higher education in the digital milieu.

Traditionally, the context related to print works has been provided by librarians, publishers, booksellers, journalists, or

sources extraneous to the work. The advent of eContent publishing has placed these functions in the hands of authors and creators. This is not to say that context will not be enriched by the contribution of other individuals, but rather that this is a function that will be essential to authorship. Creators can choose not to provide additional context, but it may weaken their product and make it less desirable.

Rich context is the most obvious place that digital textbooks can provide students with a truly enhanced learning experience. Context can provide tremendous pedagogical value in a higher education setting. Authors can link to media that explain concepts in audio and video format. Content can also be enriched in eBooks by linking to other pertinent sources of information. Current developments, research, or news can be incorporated into eContent that can serve to make subject matter far more pertinent geographically or socially. It can also be updated so that it remains current. Print textbooks often contain information that was current during the production and printing of the book, but often this is fixed in the past. History textbooks may contain photographs of Bill Clinton or Boris Yeltsin when discussing modern international affairs. The dated nature of the text impedes student engagement with the material.

Chapter 9 will explore ways in which instructors and librarians can work to enrich student experience by customizing textbooks for particular courses. The level of customization that is enabled by this and other tools in the digital milieu is so granular as to be distinct to specific sections of the same course in the same institution. PressBooks is another tool that can allow instructors to create content that is optimized through context. In conjunction with programs like Adobe InDesign and iBooks Author, the basic content with associated context files can be imported into these programs and further refined with

multimedia elements. When reading apps and devices with the capability to fully work with the ePub3 standard are introduced this will be a major area where educators can work together to create truly amazing course materials. Educators, as enabled by these digital publishing tools, "must start with context and preserve its connection to content so that both discovery and utility are enhanced with electronic course materials" (O'Leary, 2011, para. 4).

What is the cloud?

In attempting to explain the concept of cloud computing, it is best to provide a primer on computing. The most basic level of computing that occurs with the use of a personal computer is composed of three layers. The infrastructure is comprised of a physical piece of hardware, a CPU or computer unit. The attendant processors, memory chips, network cards, and other functional components are contained in this layer. At the platform, the second layer, you have the operating system (OS) that interacts with the infrastructure to provide an environment for running software. The final layer is comprised of the software that uses the platform and infrastructure to operate. All layers are interdependent and only comprise a functioning unit when combined.

This model can be applied to explain cloud computing with some fundamental changes. The software no longer is operated and run locally, but rather is accessed via a web browser. This is a tremendous benefit because it does not force users to run a particular OS. They are free to access programs and applications from their preferred device provided they are using an up-to-date web browser. Platforms are built specifically for the application and are hosted on the web. There is no need to worry about OS or versioning, making

the technological logistics far simpler from the user's perspective. The only issues that need to be addressed revolve around browser functionality. In addition the physical hardware (i.e., infrastructure) required for a web application to run is housed remotely with the platform and software. Far less is required of the user's system when accessing cloud-based applications.

One of the major way in which cloud computing is applicable to eBooks concerns file composition. Much of the context provided with content in eBooks is separate from the material of the book. If authors wish to add supplemental multimedia to illustrate issues addressed in content, as will be the case with the iBooks and ePub3 file formats, the issue of inclusion will need to be dealt with. There are competing considerations when evaluating inclusion v. remote access. Remote access requires Internet access and precludes students and researchers from fully utilizing eBooks in situations where this is not present. Inclusion presents creators with complications, largely based around file sizes and legal vulnerabilities. There are two main ways in which remote access may be preferable to including supplemental materials in the composition of eBook files.

Issues of legality, fair use, and copyright will always need to be considered when seeking to incorporate materials into files. It is clear that remote access is a far less thorny path to go down in reference to most materials that are not author created for publication purposes. Regarding material that is freely available on the Internet, such as YouTube videos or public documents, this represents the simplest solution. The content of other eBooks may need to be accessed for the purposes of an eBook. In this case it becomes extremely complex. Will we move towards a situation in which eBooks operate on the same principles as the World Wide Web where books are linked through context. For scholarly purposes, this has amazing

potential to speed up and facilitate discovery. There is much to be determined, however, because the publishing world is a major player in this arena. The industry would not necessarily be amenable to such a situation, seeing it as impinging on profits.

File size is another issue to address when considering supplementary materials. Portable eReading devices of the mobile variety, smartphones, PRDs, and tablets, do not have large storage capacities. While eBook files may not present a challenge to the hard drive capacity of a laptop or desktop computer, these resources tend to be far more limited with mobile devices. A single multimedia file incorporated into an eBook file may not present a challenge, yet a book of hundreds of pages may require dozens or hundreds of files. That will require larger file sizes. Most tablets offer between 8 and 32 GB of storage, and large eBook files will tax the system. Students or scholars who seek to have access to multiple eBooks simultaneously may not find this to be possible without access to Internet capabilities.

The National Institute of Standards and Technology (NIST) provides a comprehensive definition of cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources" (Mell and Grance, 2011, p. 2). The NIST document goes on to list five essential characteristics of cloud computing: on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. Some of these characteristics are self-explanatory, yet particular ones have an applicability to academic library services. Broad network access refers to content that can be accessed by various devices such as tablets, smartphones, or desktop computers. In the digital milieu, it will be vital to the library as an institution to provide access to information using a multitude of devices.

Rapid elasticity is a concept periodicals librarians must deal with constantly in order to ensure database resources are accessible to the academic community. In order to constantly ensure sufficient remote access to databases, institutions and consortia would need to pay for increased bandwidth. Often this is not financially feasible.

In Rhode Island, the HELIN Consortium is comprised of 11 academic libraries and 12 special libraries. In many cases, database services are accessed through a proxy server at the University of Rhode Island. During periods of heavy usage, such as midterm and final exams, remote access can be limited to authorized users. One way of assuaging the situation of limited resources is for the school to host a database internally for local network access. This allows users at the Rhode Island College or Providence College libraries to gain quick access to local resources. Searching these databases locally is quicker at all times than accessing resources through a proxy server. In situations where economic issues hold sway, it is often not possible for libraries or academic institutions to purchase sufficient bandwidth to guarantee rapid access remotely. This solution presented by many HELIN institutions represents an innovative way to deal with financial shortcomings impeding services.

eBooks v. the browser stack

All of this begs the question: Why are eBooks not simply composed of the browser stack? ePub and MOBI formats are a convenient way of packaging eContent. They can be delivered to a huge variety of devices this way. In addition, both file formats contain a section with the necessary DRM information. This information is in no way necessary for the content to function, but rather it is put there for the benefit of

publishers. As eBooks proliferate and the associated technology becomes more standardized, there is a good chance that DRM will not be a feature. Several publishers, most notably O'Reilly Media, are already publishing eBooks without DRM.

If the distribution of digital print content is viewed as similar to the distribution of digital audio content, there is a good chance that after a formative period the medium will become solidified. In that case, the file formats will merge with the browser stack. eBooks will merely be a means of delivering eContent in a packaged form rather than providing information from a remote source. That is potentially the way things are moving. As we will see, developments in ePub3 and Kindle 8 are bringing these formats closer to the stack.

Notes

1. Dan Glazman is one of the foremost authorities on web standards. He provides an excellent overview of iBooks Author in his blog at: *http://www.glazman.org/weblog/dotclear/index.php?post/2012/01/20/iBooks-Author-a-nice-tool-but*
2. A sampling of post release reaction can be found at these two links: *http://venomousporridge.com/post/16126436616/ibooks-author-eula-audacity* *http://www.ecampusnews.com/top-news/apple-ibooks-2-license-agreement-gets-icy-reception-in-higher-education/*
3. These concepts are explained well by Raymond (2001) *The Cathedral and the Bazaar*. The book presents the history of Linux and open source computing as written by one of the major participants.

Creating eBooks

Abstract: The various markup languages are explained as they relate to eBooks. An overview of the browser stack is provided. The intention is to make these technologies approachable for librarians and teachers without a technology background. Developments in HTML5 are explained and the possible effects on eBook and eReading apps are discussed.

Key words: iBooks, iAuthor, iBooks Author, PressBooks, HTML, HTML5, CSS, CSS3, Ajax, API, JavaScript, browser stack, XML, Adobe InDesign.

The browser stack

The browser stack is made by combining HTML, CSS, and JavaScript and comprises the architecture that renders nearly all electronic content. It is the fundamental building block of the web. These components work in conjunction with an interpreter, in general a browser, to supply and order content as well as determine behavior. All eReading applications that work with ePub1 and ePub2 are able to parse the HTML and CSS of a webpage or eBook file. As already discussed, the major addition to the ePub standard in version 3.0 is the functionality to interpret and render behavior as conveyed in scripting languages, most commonly JavaScript. This section will provide a simple overview of each element of the stack.

XML

XML and HTML are both markup languages and are very similar in structure and composition. The format eXtensible Markup Language (XML) is a hierarchical way to organize content. For example, libraries organize books according to content so that they will be searchable. XML is the same type of system as this, it just exists in a digital file. The contents of eBooks are delivered in the form of XML files. The markup language was initially designed for large-scale digital publishing. Like HTML, it is a markup language that can be interpreted by a browser. All modern browsers have the ability to parse XML. There are two fundamental differences between XML and HTML. The first being that XML was initially developed to store and transport data while HTML is intended to display data. Often, webpages will be a combination of HTML interacting with XML in order to gain access to data. XML is a fundamental part of the web as currently constituted. The other difference relates to syntax. The structure of HTML and XML files is fairly similar with one basic difference. In an XML file the author can create tags while in HTML tags are strictly defined and relegated to a set number of options. Tags related to content are organized semantically in XML so that category names are intelligible to users. In HTML they are defined and focused on determining appearance. For example, in HTML any element enclosed in the `<h1>` tag will necessarily be the largest heading. XML files do not include this because the intention of this structure is not to control appearance but convey and organize data. The World Wide Web Consortium (W3C) is tasked with the development of standards for XML. While many functions of XML are being supplanted by the developments included in HTML5 it still remains integral to web operations and is a fundamental part of AJAX, as will be

explored in this chapter. The new revision of HTML, version 5, blurs the distinction between HTML and XML and allows them to operate more seamlessly.

HTML5

HTML5 is the new standard for HTML being developed in order to synthesize the various markup and scripting languages that have become a part of the web currently. The previous web standard, HTML 4.01, was issued in 1999. There have been tremendous changes since then and in 2006 the W3C and the Web Hypertext Application Technology Working Group (WHATWG) began to collaborate to create a new version of the standard. Five rules were set in developing HTML5, and the ones of most concern to librarians for eContent relate to cross-platform compatibility and external plug-ins. It should be noted that the development process is not complete and the intention is not to create a fixed standard but a continuously evolving one to develop concurrently with the web.

The feature of HTML5 that relates directly to eBooks prior to enhanced eBook options brought about with ePub3 is its support for local storage. Rather than necessitate Internet access, content developed according to HTML5 standards will provide the functionality for users to store considerable amounts of data, greater than 1 GB, for offline viewing (Why HTML5 rocks, n.d.).[1] This will allow content and apps developed according to HTML5 to be stored locally and accessed regardless of Internet access. The access to content will no longer be dependent on Internet capabilities.

HTML5 is designed with the intention to render device fragmentation inconsequential. Content will be rendered properly regardless of screen size or manufacturer. It is the logical extension of the movement to a mobile web. If all

actions occur within a browser and all browsers seeking to work with Internet content adhere to the same web standards, other properties become irrelevant. When viewing content developed in HTML5 on different devices it is striking how well the content transfers regardless of device. One of the major ways that developers are addressing fragmentation with HTML5 is with the canvas element. This element allows multimedia content to be placed directly on the page. Traditionally, websites have served up such content through Adobe Flash or Microsoft Silverlight. While these tools worked well in most cases, every now and then there were hiccups depending on browser or operating system. The programs and others like them were akin to a patch on a tire. They enabled the web to show content but were not seamless. It is better to have a tire composed entirely of original rubber than one with a patch. The one with the patch will still work, yet it is not ideal. The canvas element in HTML5 eliminates the need for a multimedia plug-in.

While HTML renders Flash and other modes of media transmission obsolete, it is still tailored to function with JavaScript. This language has many benefits for webpages as will be discussed later in this chapter, yet it is not a fully featured programming language. HTML5 is extremely powerful and enables much computer work, yet more powerful apps and desktop software will still require the data access and processing power of native operating systems designed in more robust programming languages like Java, C++, Unix, or Visual Basic. Google Chrome OS provides an informative example of how HTML5 would behave as an operating system. The structure and function are largely built with HTML5. Chrome OS is functional for many common tasks such as email, word processing, and browsing yet it does not offer enough power to run a company's databases regarding inventory.

There are projects that seek to make mobile devices run entirely on HTML5. Mozilla Firefox OS has been designed with this intention. The first devices operating with this system are slated to be introduced in Brazil in 2013 yet the beta project is available at the moment. All functions of the phone along with all apps run in HTML5. Several popular apps, notably Evernote, have been developed according to these standards. In addition, the Mozilla Foundation funds numerous projects that support the widespread development and working knowledge of HTML5.

eReader apps could certainly become obsolete with the advent of HTML5. The ePub3 standard is nearly identical to many elements of HTML5. If local storage is enhanced (as it is in HTML5) there is nothing to stop all eBooks existing as webpages. The delineation between a book and webpage would cease to exist. As it stands now, eBooks are just a packaging of content rendered electronically for various screen sizes available offline. If offline storage is afforded via HTML5 would it not be simpler to issue digital books as webpages? This would expedite the process of integrating all the features present in ePub3 into eReading apps. It would render this process unnecessary because books stored on the web could then be accessed through the user's browser of choice. All browsers adhering to HTML5 standards can already render content issued under the ePub3 standard.

CSS3

Cascading Style Sheets (CSS) provides the formatting for websites. This code can be incorporated into webpages through links to another file or within `<style>` tags on a webpage. The revision to the CSS standards were necessary as previously they had been muddled. Browsers varied

regarding the acceptance of certain properties, and web designers often had to create several style sheets tailored for individual browsers. Microsoft Internet Explorer was notoriously finicky and pages often did not style properly in this browser unless a specific style sheet was designed to service it. This situation was wasteful and untenable and therefore a major revision, CSS3, has just been introduced in conjunction with HTML5. Like HTML, CSS has not been fully revised since the late 1990s. CSS3 presents a major step forward and will greatly simplify the work of web designers. Many of the features present in CSS3 will not reshape the appearance or structure of the web but rather will make the process of designing sites simpler and much more functional. For example, the `border-image` property will allow designers to create image-based borders on buttons without needing to use another program such as Adobe Photoshop to do so. This feature has been present on sites for quite some time but designers had to employ several workarounds and incorporate many more images into a simple appearance alteration. This may seem inconsequential for average web users, but the more files and associated images a webpage relies upon to function the slower it will operate in the browser. This is just one of dozens of instances where designing with CSS3 will be far more effective and simple.

CSS3 incorporates several other new properties that will make for easier styling of pages. Fonts will no longer need to be housed in an operating system to be usable on the web with new tags. Previously sites had been fairly limited regarding text font pallets. Now there are properties that will allow designers to link to freely accessible web fonts and style their site that way. For instance, the Google library of Web Fonts presently provides users with over 500 open fonts. There are several other providers of fonts on the web. The revision also works better with images and allows for layering and enhanced design. For the first time CSS3 introduces properties that will allow for

dynamic content such as transitions and animations. Website behavior is no longer solely the province of scripting languages. This represents another instance where CSS is lessening the load on the browser to go back to the server and process files. Rather than require a script to animate a simple box movement, a short string of text can now do it.

JavaScript

JavaScript is an object-oriented scripting language that is instrumental in controlling the behavior of web-based user interfaces. Prior to the introduction of the ePub3 standard, it had little to do with eBooks. If creators wanted to incorporate interactive features or multimedia content into an eBook they did not depend on creating a file that would be usable by eReading apps but rather created an app to control the behavior of the book and allow for enhanced functionality. A major new feature in ePub3 is its incorporation of JavaScript functioning, and a brief overview of how it functions in relation to the other two elements of the browser stack will help librarians to understand how it can enhance text in eBooks.

JavaScript is not a version of the Java programming language. This is a commonly held misconception and the similarity in name results from contingencies of the design process, but has little if anything to do with the Java language. An engineer, Brendan Eich, at Netscape in 1995, initially developed it. The standards have been fairly stable since 1999 while the functionality of the language has improved greatly. This is due to a number of factors including the growth and maturation of the web. JavaScript can be incorporated into a website either by linking to other files or libraries of content or by placing code within `<style>` tags on an HTML page. It is

able to reference tags in an HTML page by a number of qualities. In this way it is able to direct webpage behavior through functions and events.

The initial faculty of JavaScript has been greatly enhanced by a number of developments, the most conspicuous of which are libraries of content and AJAX. Presently, several libraries of JavaScript exist on the web. The best known and commonly used is Jquery, but there are several others like DOJO, MooTools, and jsPHP. These collections of JavaScript build on the functionality of the language and allow web designers to use simple code for complex tasks like image manipulation, user data entry, directions, and other features that are so common on the web now. Jquery even has a library specifically devoted to mobile devices. Essentially, the high level of performance attained by extremely skilled programmers is able to be referenced by novice web designers to create great sites.

AJAX

AJAX stands for Asynchronous JavaScript and XML. It is a new fusion of the tools present in the browser stack. Essentially, these tools and the way in which they cooperate have been so fine-tuned that they have enabled instantaneous occurrences on webpages. Rather than require a computer to continuously go back to the server to get more information so that a page can function, AJAX actions take place on the client's computer. It allows for data to be constantly gathered from a server without disruption of the browsing experience for the user. An individual can interact with and use a webpage while remaining unaware the client is gathering information from the server so that the page can function in real time. This is highly advantageous for maps, for instance. A user can get precise directions in real time depending on their location. It also avoids a browser from having to reload full pages, making

browsers function much faster. Many of the developments in HTML5 enable AJAX to function more cleanly.

APIs

Application programming interfaces (APIs) allow software components to communicate with each other. This seems like a fairly technical matter yet they are important to understand because they are a huge factor in the digital milieu. In addition, they present great opportunities for libraries to create a more interactive and rich web presence. If books and the web do merge, APIs can provide valuable enhancements to content. For example, they could be incorporated into textbooks to draw data from other sources or create opportunities for synchronous online discussion. The power of APIs to enrich education is very promising.

APIs are so common on the web that users may not even notice their presence. Anytime an article is viewed on a website and there are buttons enabling users to share the material via Twitter, Facebook, etc. an API is present. When users search Google Scholar and encounter a link to library content, that is another example of an API. These software–software interactions happen without the user knowing. Large Internet actors like Google, Amazon, Twitter, and others release APIs publicly so that their services can be easily used anywhere on the web. Not only do APIs enable the ubiquity of market forces in the Internet, they also greatly enhance the function and development of web projects across the spectrum. For example, if a librarian seeks to develop a service and needs to involve a calendar feature, it is no longer necessary to design the structure and function of the calendar. They can incorporate the Google Calendar API (or any of a number of options) and get an extremely well-functioning asset for their project. APIs are usually released as part of a software development kit (SDK).

These products (generally available at no cost) include APIs, programming tools, and instructional materials. Some of the more well-known and commonly used APIs, like Google Maps or Twitter, have huge and active development communities and quality support is easy to come by.

Maturation of the browser stack

Maturation of the browser stack has created an Internet that functions excellently and quickly, especially when compared with websites in the early stages of their life. The developments have simplified and refined the operation of computers. The average blog on WordPress is extremely easy to create and manage yet features functionality and appearance qualities that only the very best sites had in the late 1990s. Many of the features present now in the web were not even possible in the past. The development of HTML5 and the attendant upgrade to CSS both serve to allow computers to function more seamlessly. These developments have also eliminated many hardware barriers to performance. HTML5 has many features that augment touchscreens. It will be informative to examine the extent to which limiting network activity, or calls to the server, improves web operations. Each time a file is needed, the client computer using a browser must request, receive, and process it from a server to properly render a webpage. Computers can perform these functions in split seconds, but eliminating and streamlining the process speeds up the function greatly. A user may need to work with thousands of files in a web-browsing session, and any reduction in resources needed will improve performance. This is especially relevant when discussing touchscreen devices. Tablets and smartphones often have limited processing powers that can be overwhelmed by slow

sites. In addition, much traffic is occurring on 3G or 4G wireless networks, which can often perform slowly.

Popular tools

InDesign

The latest edition of Adobe InDesign has the added functionality of enhancing ePubs with features present in ePub3. This promises to be an important feature for eBook developers moving forward, yet at the time of this writing the only mobile device-based application with the capability to interpret ePub3 standards is iBooks. There are many projects in existence, notably Readium by IDPF, that are intended to bring this functionality to devices outside the iOS system, but they are not available as of July 2013. It is possible that app developers can read the tea leaves and see the implementation of HTML5 as a category killer for eReading apps. As the eBook ecosystem becomes more developed and digital textbooks proliferate, it is likely that several options will develop for this purpose. Production tools for eBooks like PressBooks, described later in this chapter, have the ability to develop content that can be imported into InDesign for enhancement. It is likely that book producers in academia will be able to make excellent use of InDesign for these purposes in the future. It should be noted that functionality to create ePub3 files using InDesign is a new addition to CS6. Prior to the 2012 edition this feature was not supported.

iAuthor

iBooks Author is a free tool for creating iBooks that was released by Apple in January 2012. It represents the first step towards

implementing the ePub3 standard in eBook production. While not allowing for the production of books in the open ePub3 format, it makes it simple to create an iBook file. As explained earlier in this chapter, the iBooks format is nearly identical to the ePub3 format with the inclusion of some proprietary Apple code. The creation of iAuthor by Apple indicates that open eBook creation tools are both possible and probable.

Like many Apple programs, it is alarmingly easy to use. It is simple to add multimedia content to text in eBooks via widgets. In addition, these widgets also provide creators with the ability to insert quizzes, discussion questions, and other interactive features into iBooks. Authors are also able to import graphs, video, interactive image galleries, Keynote presentations, annotated pictures, HTML widgets, and 3D images. HTML widgets are simply a means for inserting common elements of the Mac OSX dashboard into books. Because the iBook file format only works with an Apple application on Apple products, these programs are accepted, recognized, and rendered. The 3D picture feature is quite striking and will surely be valuable in the sciences. There is the possibility for such a feature to have profound impacts on teaching and learning in fields such as architecture or history (through maps). Clearly, Apple has introduced a tool that allows authors to enhance textbooks in exciting ways. While iAuthor is easy to use to create highly interactive eBooks, it is very restrictive regarding file format acceptance. Users are allowed to import Keynote presentations into iBooks, but not the much more common PowerPoint format or the open-presentation formats provided by Google, Zoho, or OpenOffice. Text creation needs to be done in iAuthor, as it only provides the faculty to cut and paste in MS Word, Apple Pages, or rich text formats. There is no interoperability with other common eReading formats. Users cannot even import valid HTML code or CSS. These qualities make both the program and

format suboptimal. Adobe CS6 InDesign incorporates the functionality to create ePub3 standard–compliant files. While this package is expensive, it provides many features. This may be a more inclusive tool to work with for those seeking to create interactive eBooks.

iBooks will work perfectly with `.ibooks` files, it will also render ePub3 files flawlessly. It would be wise for educators to make ePub3 eContent utilizable by as many devices as possible. As has been pointed out, there are no current apps aside from iBooks with the ability to render ePub3 files. This should only be problematic in the short term. As will be discussed in the section on eReading apps in Chapter 8, there are several projects under development that will provide this functionality. It is highly likely that access issues regarding the ePub3 format will soon be remedied. Also, while there is a cost benefit associated with iAuthor as opposed to Adobe InDesign, as the market for rich eBook creation matures other solutions are bound to appear. As Ron Martinez discusses in his chapter in McGuire and O'Leary's (2011) *Book: A Futurist's Manifesto*, computer technology has tended to diffuse and improve as time passes. Just look at blogging platforms such as WordPress for an example of the amazing ease with which previously complex development tasks on a computer, such as creating a website, are being simplified so that technology presents less of an inclusion hurdle as the web matures. Martinez explains the development process relating to computers as the law of surprise and demand.[2] PressBooks represents an excellent example of this conception as directly related to eBooks.

PressBooks

PressBooks is an open-source WordPress plug-in designed to enable self-publishing. The project, founded by book futurist

Hugh McGuire, seeks to create a platform where content can be created using HTML. This content, once compiled on the web, can then be exported for a number of uses. The recently published *Book: A Futurist's Manifesto* is the initial product of the project. Production of the work was an interactive process, inviting user comments and suggestions. It served to model how the interface could operate. The entire undertaking highlighted the ways in which the concept of a book is completely changing in the digital milieu. In addition, the work was released in three installments, allowing for content adaption and contributions to be shaped by the formative process of the book.

The site housing *Book: A Futurist's Manifesto* makes efforts to be as interactive as possible. Readers are able to post comments and questions and direct them to authors and the reading community. There are also widgets that allow users to post comments relating to specific sections of text on Twitter or Facebook and email the authors directly. This is an excellent example of an API in action. It is not hard to see how this could be implemented in online textbooks or other course materials to
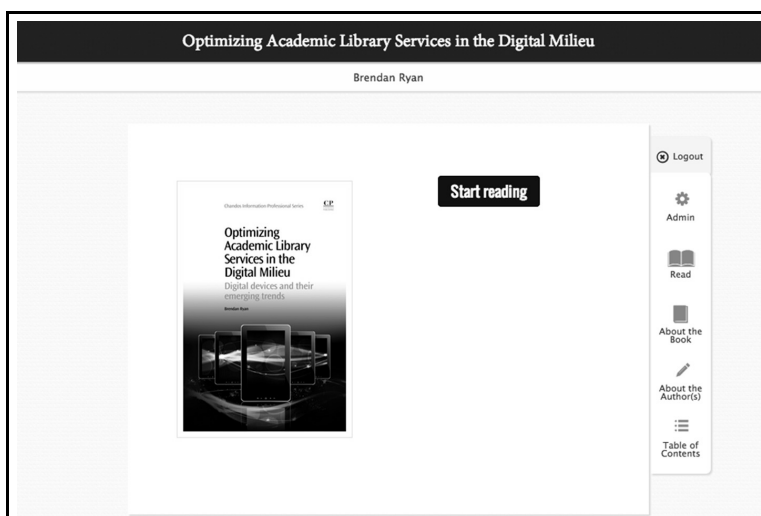
allow for the possibility of remote asynchronous discussion. In looking at the book, it is indistinguishable from a standard well-formatted blog. It renders very well on iOS and Android devices using the Safari or Chrome browser.

The production interface is very easy to use and allows for different user roles and a good deal of privacy in the process. Authors can set up a free account and begin to construct an eBook using PressBooks. The site provides a WYSIWYG editor and free content hosting on servers. This work has been adapted and used with the platform. Content can be posted behind a wall and password-protected with varying degrees of privilege afforded to different user roles. The only software required is that of a contemporary browser. Armed with this and an Internet connection, an entire book can be constructed and

hosted on the server. The interface functions in much the same way as a WordPress blog with a few minor changes related to eBook composition and construction. Authors can add structure, formatting, and content.

A tool like PressBooks is ideal for creating web-based books composed of text and static images with the HTML5 standard diffusing and making local storage of webpages possible. It could be used in conjunction with InDesign or other programs to add interactive functionality to books. PressBooks does have some functionality for images and media while also allowing for export to Adobe InDesign via XML. Content can be exported in InDesign Copy Markup Language (ICML). Using this tool, authors can import basic XML and content to a powerful tool for adding multimedia files and other aspects that are supported by the ePub3 format. It provides the basic framework that allows an author to make a fully functional book with the features present in ePub3 by importing content to Adobe InDesign. This allows authors to create content in web-based HTML and then export it to the necessary container. It simplifies the creation process, allowing creators to concern themselves solely with the content and context they want to provide.

PressBooks provides an ePub or PDF file of a book as its end product. Both formats can be converted into an eBook for Kindle in either AZW or MOBI format. If authors seek to make books created with PressBooks available to Kindle readers they can create an AZW eBook with the Kindle publishing platform provided by Amazon for free. In addition, Calibre Library is an open-source program that can assist authors in converting books to the MOBI format. This provides them with the option to create Kindle books that are DRM free. In addition, the web version of the book can also remain available. The value proposition present in the use of PressBooks is remarkable for higher education. Not only is it an

easy tool to use, the end result is easily made available in the highest number of possible formats for a digital book. The open nature of the project also provides many opportunities for use, collaboration, and customization of the interface. Hugh McGuire is an active member of the publishing community and is approachable regarding user concerns.[3]

Notes

1. Why HTML5 rocks (n.d.). Available from: *http://www.html5rocks.com/en/why* [accessed 16 November 2012].
2. The chapter "App, meet book" by Ron Martinez in *Book: A Futurist's Manifesto* (McGuire and O'Leary, 2011) does an excellent job of laying the groundwork for understanding the way in which an app and an eBook can be merged.
3. Much of the information in this section is culled from a conversation with Hugh McGuire on 27 July 2012.

Touchscreen devices and apps

Abstract: What is the difference between a tablet and a smartphone? The differences between Android, iOS, and Windows 8 mobile devices are discussed on a surface level. The various apps available and their applicability in higher education are discussed. The ways academic libraries might approach social networking are investigated.

Key words: apps, touchscreen, tablet, mobile, smartphone, eBooks, eReaders, social networking, PDF, annotation, cloud, iOS, Android, Windows 8, XO-3, OLPC, Linux, iPad.

Introduction

The two categories of touchscreen devices that are addressed in this chapter are smartphones and tablets. The reason behind grouping them simply as touchscreen devices is twofold. First, both smartphones and tablets run the same operating systems and have access to the same app markets. The line between tablet and smartphone is increasingly nebulous as smaller tablets like the Asus Google Nexus 7 and larger smartphones like the Samsung Galaxy Note compete. Additionally, many tablets have 3G or 4G capabilities allowing them to connect to the Internet by means of cellular data. It could be said the difference lies in smartphones being able to be used as telephones while tablets are not, yet this is a false dichotomy.

Plenty of options, such as Google Voice in conjunction with the voice over Internet protocol (VOIP), exist that provide tablet users with calling capabilities. These devices can also be referred to as mobile, yet they have differing degrees of aptitude than mobile capabilities so it is simplest to just refer to them as touchscreen. For these purposes, it is best to address an entire category of devices as touchscreen. A further wrinkle was added to the issue with the introduction of touchscreen desktop CPUs running on Microsoft Windows 8, and this is indicative of just how fluid the computing market is at this time. Because Windows 8 is at the cutting edge of development, it would be best to restrict the discussion of touchscreen devices to tablets and smartphones.

Tablets and personal devices dedicated to eReading (PRD) are having the most immediate impact upon higher education. When the iPad was introduced in 2010, the tremendous impact it would have was not known. The iPad represented a radically different device from PRD products available up until that time. The Kindle, Sony eReader, among many others had been available since the early 2000s, and were generating interest and gaining a foothold in academia, yet it was the introduction of the iPhone in 2007 and the iPad in 2010 that presented tremendous opportunities to enrich and enhance education through emerging technologies. The functionality of these devices with rich media and robust applications make them fundamentally different from PRDs.

Basic eReaders retail for between $50 and $125 and are functionally excellent for reading novels and other formats that are solely comprised of text. The performance and screen quality related to representing text on a page is actually better than using an eReader app on a smartphone or tablet. Text is rendered as clearly readable regardless of lighting conditions. These devices function exceptionally well in natural light. This is simply not the case with tablets or

smartphones. Often text is illegible due to glare and other factors outside. The tradeoff required to gain all of the multimedia and color features present in tablets is a screen that often reflects light. The genius of the Kindle and other readers lies in eInk's ability to remain legible irrespective of lighting conditions.

The basic functions of touchscreen devices revolve around browser-based applications. These programs require relatively little memory or processing power when compared with traditional desktop programs. The computer functions very differently in the digital milieu than the computers of the 1980s and 1990s. There is no single occurrence that signaled this change, but the functionality and capabilities that have been enabled by the Internet lie at the root of it. Computers prior to global networks of information exchange functioned locally. This means that all the data and programs needed to be present in the computer or network of computers being used in order to function. Complex sets of data and huge databases of journal articles, so central to scholarly pursuits presently, were not available prior to the Internet. There were certain exceptions, such as the database of a large research entity housed at said institution, yet the present diffusion of information was inconceivable in the years prior to the widespread introduction of the Internet. Just as the Internet has changed the flows of knowledge, so it has fundamentally changed computer operations. All data and functionality to run programs no longer need to be stored locally. There are instances where local storage is advantageous, but for the vast majority of computer uses wireless access suffices. The digital milieu is an age of immense technological change and understanding it as such will help librarians to meet patron needs. The supercomputers of the 1950s, with their immense size and limited capabilities, and the localized PCs of the 1980s and 1990s will act as vestiges of a past era.

Touchscreen devices are having such an immense impact upon the computer industry that operating systems are being redesigned with mobile devices in mind. Android is not even a desktop OS, yet its strength in the mobile market has helped make Google one of the three major players in shaping the computer industry along with Apple and Microsoft. While each of these corporations goes about the process differently, the computing world is moving to a state where their operating systems for the desktop and mobile device are one and the same. The recent introduction of MacOS X Mountain Lion by Apple represents a blurring of the boundaries between that operating system and iOS. It is thought that such a delineation will cease to exist shortly. In the fall of 2012 Microsoft introduced an entirely new operating system dubbed Windows 8. This operating system is optimized to work with touchscreen devices and introduces touchscreen monitors to desktops and laptops. Google operates a system of computing composed of Android in conjunction with the Chrome browser and OS. The entire OS project is built around the browser and all storage and applications occur in the cloud.

Apple has a central place in relation to touchscreen devices. After introduction of the iPad in 2010, the computing industry changed markedly. The iPad represented a category killer, as the entire class of personal laptops known as netbooks has essentially been rendered obsolete. The iPad has a huge hold on the tablet market, yet PRDs such as the basic Kindle and Nook still remain viable products. The continued health of those formats and devices is related to price point, ease of use, and function in various lighting situations.

Apple played a pioneering role in bringing touchscreen tools to prominence and in light of this the marketplace presents many options at the time of writing (2013). Notably, devices running the Android OS have a larger market share of smartphones. Microsoft is making a huge play in the

touchscreen market with the Windows 8 OS, introduced in October 2012. Other players exist or are developing mobile OS projects, and the situation is extremely fluid. The separate introductions of both these devices unleashed a torrent of ingenuity that is only in its formative stages.

iOS

Apple introduced the first mobile touchscreen device, the iPhone, in 2007. Three years later they introduced the iPad and greatly expanded the power and scope of mobile devices. These two devices form the core of the iOS system and the associated fallout has reshaped the computer industry, and in turn education. Prior to these two devices, personal reading devices like the Kindle or Sony Reader existed but did not have the rich interactive experience ushered in by iOS. While the development and capabilities of these two devices are groundbreaking, the mobile computing universe has been greatly enhanced by other developers as well, notably Google, Blackberry, Samsung, and Amazon. Apple iOS was a clarion call that directed the computer world towards the immense possibilities and capabilities not imagined in that sector previously.

The approach Apple takes to operations is fundamentally different from that of all of its competitors. It produces the hardware and most of the software that run its computers. Although not all software is developed and designed by Apple, it does build the operating system. Any third-party software or applications developed must meet the standards of Apple prior to introduction. This enables Apple to maintain tight control over several aspects of its products. It does not have any difficulty with platform fragmentation because all iOS devices run the latest iteration (presently iOS 6.1). All

iPhones and iPads are upgraded to the latest version. In addition, Apple produces a limited number of devices without variation. There are no iPhones with sliding keyboards or differing dimensions. The iPhone and iPad are introduced as the latest version, be it the 3GS or 4. In limiting consumer options regarding hardware, Apple is simplifying the software design process and the result is that software and hardware are able to function optimally in conjunction.

Apple iOS is a completely controlled system. Unlike the Mac OS, which has existed in numerous versions on a multitude of devices over the past few decades, iOS has existed for a limited time on a fairly small number of devices. Apple has made a conscious and vigorous attempt to maintain complete control of the system. Apart from undertaking the act of jailbreaking (discussed in Chapter 6), users with iOS devices are confined to the Mac App Store. The vast majority of iOS users will not take this step, and as a result Apple will determine its user experience. This certainly has benefits in comparison with other methods of distributing mobile software, as mentioned in the Android section (Chapter 8). The user experience is smooth and apps in the store tend to be of high quality.

The course Apple seems to be following regarding software development is a movement towards one universal operating system for both desktop and mobile. With the introduction of MacOS X Mountain Lion in July of 2012 Apple moved the desktop operating system even closer to iOS. Programs are now available in the Mac App Store and the interface relies heavily on well-developed touchpad and gesture-based controls. The iPad marked the first device to introduce gesture-based controls in full to a computer operating system. Prior to the iPad, Mac laptops had a track pad that allowed for a limited amount of control based on the method of interaction, like two-finger scrolling. The iPad has dozens of gestures, ranging from a pinch-to-zoom effect to a four finger gesture that switches

back to the home screen. Many of these gestures have been incorporated into Mountain Lion and there is the ability to use a launcher to control the computer in much the same way as an iPad. Apple's approach to developing for the desktop places the focus on gesture using a touchpad at present, whereas Microsoft has attempted to eradicate the distinction between touchscreen and desktop with the introduction of Windows 8. It seems likely that Apple will take this approach as well moving forward, yet development has not always been predictable in the past.

Android

Google owns the Android OS. It is available free to app developers and hardware manufacturers. It began as a software development project by Android, Inc. funded in part by Google and became a central feature of Google in 2005 when Google took over further development of the project and made it freely available. It is helpful to view Android as one of three components, along with the Chrome browser and Chrome OS that represent an entire computing system under Google. This triumvirate occupies the same role in Google that Windows 8 represents for Microsoft and the combination of MacOS X and iOS do for Apple. Google provides these products for free and makes immense profits from the advertising revenue they are able to generate through savvy Internet operations.

Android OS is a variation of the Linux OS, meaning that it takes its basic structure and coding from the GNU/Linux project. Finnish programmer Linus Torvalds initially conceived Linux as a communal development of a computer operating system. Initially released in October 1991, the project has been under constant development by a huge community of

users since then. The basic format of Linux is similar to Unix, which Apple has always used to build its OS. There are a huge number of Linux variations for desktop operating systems, ranging from Ubuntu to Mint. Many of the large database programs commonly used are Linux based, including Red Hat. Browsers are often created with and based on open-source principles, notably Mozilla Firefox and Google Chrome. In addition, Linux servers based on the Apache program are the most popular in the world. Much of the Internet is built or facilitated by open-source products. This is an exceedingly basic overview of the Linux project. The important aspect in relation to Android is that Linux is a robust and popular operating system with a huge community of heavily invested users, ensuring continued development and refinement.

Presently, Android and Apple iOS are the most widely adopted and powerful mobile operating systems. Because Android is not a project under tight control from Google, like iOS is by Apple or Windows 8 is by Microsoft, the character of services, products, and apps differs greatly. It has been both a huge benefit and detriment to development. Android applications can work as well or better (in some cases) than iOS counterparts, but inconsistent quality is a hindrance. The Mac App Store is highly regulated and controlled by Apple so all iOS applications must pass muster, whereas there are numerous different app markets for Android devices. The lack of curation on Google's part in relation to app development and release has led to a remarkably vast, if somewhat inconsistent, system of apps available. This allows for more variation in apps, yet it also provides an economic disincentive for potential app developers. Piracy and unauthorized copying are possible in this environment, and many app developers will not develop for this market fearing a lack of economic remuneration due to this.

Countless manufacturers and developers are working on Android projects and this has led to a great deal of platform fragmentation. This phrase refers to the high degree of variation in versions of the OS and devices that are running on it. While an app or website may work well with one device running Android v3.x (Honeycomb), the same may not be true when it is rendered on a device using Android v2.2.x (Froyo). Updates to the operating system are not universally supported and often happen at different times depending on hardware manufacturer and service provider. Hardware manufacturers also often put "skins", proprietary user interfaces with specialized apps, on products, causing further diversity in devices and versions of Android. Overall, it is a very different user experience with Android than with iOS. Some devices running the Android OS are highly restricted regarding app options by hardware manufacturers.

Nook/Kindle/Kobo

Barnes & Noble, Amazon, Kobo, and others have introduced tablets that run on the Android OS. They maintain control by determining which app markets the devices can access and download material from. Kindle and Nook tablets are only able to purchase apps from Amazon's and Barnes & Noble's app stores, respectively. Jailbreaking devices can subvert these prohibitions, a practice that was recently allowed under 2012 DMCA rulemaking exceptions.

Kindle devices are tightly controlled by Amazon and present barriers to the access of many library resources. Because Amazon is heavily invested in the AZW file format, apps for Kindle that support reading the ePub format are not available through the Amazon App Market. This could present a problem if the ePub format is to be the accepted format for digital textbooks. As pointed out in Chapter 8, ePub3 standards

present highly interactive and innovative content that should provide enhanced support for nonfiction material. The AZW format available on Kindle devices does not support the ePub format. Introduction of the new Kindle 8 format accommodates many features present in ePub3, but textbook publishers would still need to create an edition adaptable to the AZW format. As already pointed out, conversion of ePubs to the AZW format is relatively simple, yet it remains to be seen how the multimedia features present in ePub3 will translate. The Android system is full of apps that offer ePub support and Apple offers the iBooks app, which will accept books published with the ePub3 standard. Additionally, there are a number of other eReading apps available through the Mac App Store having the effect of positioning iOS devices well in the digital milieu to meet students' needs. Even the Nook and Kobo tablets will work with the ePub format. This is something to bear in mind when working with and advising students on devices in the digital milieu.

Low-cost tablets

There are numerous projects seeking to make affordable durable touchscreen devices for the classroom. While many of these products are focusing on developing for large K-12 school systems, it is probable that the output will affect academia as well. There are several low-cost tablet projects being pursued by a diverse array of actors ranging from the Pakistani government to the Intel Corporation. The XO-3 project by the nonprofit organization One Laptop Per Child (OLPC) is of particular interest to educators.

The OLPC project coordinated by Nicholas Negroponte, an architect and head of the MIT Media Lab, has ambitiously sought to do exactly what the name implies, provide laptops to children throughout the world. It has been fairly successful

to date and interestingly it has directed recent efforts to producing low-cost tablets. In January of 2012 OLPC introduced the XO-3, an eight inch tablet with a rudimentary Linux operating system. The tablet is not intended to compete with high-priced tablets with rich multimedia capabilities, but rather is tailored to the educational market throughout the world. The XO-3 was designed with low power consumption, extreme durability, and reparability as priorities. It is waterproof and capable of both solar and hand crank power generation. The XO-3 is not available for individual purchase and is only sold in large lots to governments and school districts worldwide. It sells for the remarkably low price of $135. The limited availability of the XO-3 is not as relevant to this topic as the mere existence of such a device. It points to the likelihood that touchscreen devices will in the future become so inexpensive that cost presents only a minor barrier to access. It underscores the importance of gaining familiarity with digital textbooks and the various formats of eContent.

Windows 8

Microsoft introduced Windows 8 in October 2012. Windows 8 represents an innovative new operating system based around touchscreens and is a huge departure for Microsoft. Rather than develop separate operating systems for the desktop and mobile environment, Microsoft made a foray into touchscreen devices by combining all consumer computer products under the Windows 8 OS. Microsoft had not released a tablet until the introduction of Windows 8 and their absence from this marketplace had been curious. There had been a Windows-based smartphone for a few years, but there was not a tablet. Taking a cue from the operations of Apple, Microsoft manufactured its Windows tablets, likely with the assistance

of another hardware producer under contract and direction. The tablets come with two different versions of the operating system, Windows 8 RT and Windows 8 Pro. Interestingly, Microsoft has attempted to create a tablet that can fully replace the laptop by incorporating a keyboard cover in the product. Windows tablets are designed to work as standalone tabletsor in conjunction with the keyboard. The iPad is able to be paired with a Bluetooth keyboard, yet this is an additional purchase and is not a part of the whole. The keyboard combined with Windows tablets also serves as a cover and is fitted precisely. In addition, Windows tablets have what is referred to as a kickstand, allowing the tablet screen to perch as a laptop screen would in combination with the keyboard. The Pro version of the device is designed to be as powerful as a laptop. Microsoft intends it to compete directly with the lightweight SSD-based laptops referred to as ultrabooks. This has not been Apple's intention to this point, with the MacBook Air representing their ultrabook offering and the iPad being a different product entirely.

Microsoft's app market is currently very limited when compared with the Mac App Store and widespread availability of Android apps – the newness of the operating system being the main cause. As developers have the opportunity to interact with Windows 8 it is likely that diversity of selection will increase greatly. Microsoft and Apple still represent the predominant operating systems presently, with Microsoft providing the OS for the vast majority of enterprises.

Apps

Advanced touchscreen devices and operating systems are focused on apps. Basic eReaders using eInk do not have the functionality to operate apps yet provide an excellent reading

experience in varying light. Most popular apps are now available across platforms, with some exceptions. The three most applicable classes of application in academia are cloud storage, PDF reading, and eReading. In addition, apps facilitating social networking and productivity are extremely useful and can provide valuable enhancements in higher education.

A virtue often cited in reference to apps in the digital milieu is platform agnosticism. This refers to an application's interoperability across operating systems. The ability to be utilizable across platforms is an enormous advantage for software. Because there are so many different platforms and devices the consistency of behavior and functioning in apps allows workflows to proceed uninterrupted. Many of the web standards developed by the W3C and the ePub standards developed by the IDPF have allowed the web and eBooks to flourish. The regular behavior of applications regardless of device removes an obstacle from the path of scholars in attempting to make use of technology to aid in research. Most of the apps discussed in this section are available across platforms. When apps are subject to platform restrictions, alternatives that have cross-platform viability will clearly be explored. Because Windows 8 was introduced so recently, the existence of apps on this system is not taken into consideration. If an app is available on Android and Apple systems it is assumed that it will eventually become available for Windows devices in the digital milieu. Developers would be courting economic disaster by ignoring such a huge part of the computer market at this time.

PDF reading

Reading PDFs from journal databases is currently one of the primary uses of library material in academia. These database

articles are extremely accessible in most cases because DRM is not attached to the files. Library patrons are able to download PDF files and access them locally. The better apps for PDF reading allow users to sync files in the cloud. This allows for the annotating and copying of text with a touchscreen device and saving the file with markup upon completion. It is an unbelievably powerful research tool. Since cloud storage of 5 GB or more is generally free, scholars are able to remotely access large amounts of content with only a wireless connection. In addition, it is standard for institutions to offer students some cloud storage as a part of enrollment. This allows for the ready access of personal libraries at all times. Articles can be pulled from academic databases, such as ProQuest, JSTOR, EbscoHOST, or another content management system, such as an institutional repository or the Internet, and placed in a cloud server. It allows students and researchers the portability of a vast number of personally selected documents available to read, annotate, and highlight without needing to carry physical copies or a storage device like a USB drive. Gone are the days when it was necessary to carry around piles of photocopies and journal articles or do research onsite in a research facility or library. The options available for reading PDFs range in quality, yet there are some programs that stand out for academic use.

Adobe Acrobat Reader is available as an application on all platforms. PDF was developed by Adobe and released as an open format in 2008. The app allows users to annotate and save PDFs in the cloud. In addition, Adobe has recently added the feature of incorporating cloud storage provided by them at *acrobat.com* This is simple to use. Once a client establishes a free Adobe account, PDFs can be uploaded to the cloud storage space. The files will then be accessible on any mobile device with proper authentication. Free storage up to 5 GB is provided. Should a user need more, there are a number of fee plans to increase the storage space available. This application combined

with free cloud storage may be the most advantageous for a number of reasons. The foremost reason Adobe Reader may be the best application for reading and annotating PDFs is that it allows users to be platform agnostic. It will work on all operating systems, both mobile and desktop. This allows users easy access to the same material using any combination of devices. Integration with the *acrobat.com* cloud further simplifies use of the app. In addition, most computers in college libraries are equipped with Adobe Reader. At Rhode Island College all public desktop computers come equipped with this program. It is ubiquitous and comes preinstalled in many Windows OS packages. The reading format of Adobe Reader is unique and pleasant. Rather than flip pages as in an eBook, PDFs are viewable as scrolling content, like a webpage.

The app ezPDF Reader represents an option for those seeking to use a combination of Android and iOS devices. It has syncing capabilities, yet it is not as handy to use as GoodReader or Adobe Reader. There are number of drawbacks related to ezPDF in that it is not a free application, there is no desktop version of the application, and the syncing capabilities are not as seamless as other options. It often becomes confusing for users to determine which copy of a file they are working with. Some users may prefer the interface to that of Adobe Reader, yet the differences are fairly arbitrary. It does not provide the advanced functionality present in the iOS program GoodReader. If scholars seek to use solely iOS devices, the GoodReader option described below represents a better program.

GoodReader by Good.iWare represents the consummate PDF reader available for iOS. Users can sync their account with a Dropbox, Box, Google Drive, or other cloud storage option. It allows a reader to annotate and highlight PDFs and then sync those documents into a remote storage folder. The busy work involved in managing versions of files is erased with

GoodReader because like a desktop version of most cloud storage servers, the folder of files is synced locally and in the cloud in real time. This is incredibly handy for researchers, because it allows them to highlight and explore PDF articles and then sync them remotely. Scholars do not need to worry about uploading the correct version of an annotated file as the syncing process between GoodReader and the cloud is taken care of behind the scenes. The application has such tremendously handy features such as allowing users to resize pages across an entire document for readability and a simple syncing procedure. It is the best digital application for annotating and working with a large collection of PDFs. GoodReader is not a free app and is only available on iOS devices. Despite its extraordinary functionality, the limited applicability due to platform constraints makes GoodReader inadvisable without caveats.

Most eReaders are capable of viewing PDFs. eReader options will be discussed in the "eReading" section (p. 126), leaving us free to address issues about soft-use measures and PDFs. Kindle can view and work with PDFs, yet it requires users to convert files to be viewed. This additional step can be complex and at times cost a minimal fee ($\sim$\$0.10). It adds an additional wrinkle to the process, and it is best to advise patrons to view PDFs using other means to simplify the process. Apple iBooks can view PDFs, yet users are not allowed to highlight or annotate content. This is curious because the iBooks app has an excellent user interface that allows ePubs and iBooks to be annotated.

Cloud storage

Cloud storage providers are plentiful in the digital milieu. Numerous free options exist and many academic institutions

provide students, faculty, and staff with server space for storage. Most mobile devices have a limited storage capacity that is often occupied by the apps and software used to run programs on a device. Additionally, the ubiquity of multiple device use in the digital milieu makes cloud storage convenient. It allows users to access documents at any computing device, be it a smartphone, tablet, library loaner laptop, or public computer in a lab. It is advisable for all people working in higher education to have and use a cloud storage system. This technology is rapidly making the use of USB drives obsolete. Librarians should be able to assist scholars in setting up accounts or using institutional accounts with the various digital tools employed in scholarship. Most cloud services provide a free amount of storage, generally 5 GB depending on provider, and operate across platforms. An option usually exists to purchase additional storage space. A small amount of storage space is generally required for text-based resources. Music, video, and images tend to be storage space intensive. For instance, this entire book was composed using resources stored in the cloud. It takes up less than 2 GB with dozens of journal articles, eBooks, and other support materials. The allotment of 5 GB should be sufficient for most students. Providers such as Google Drive, Dropbox, Ubuntu One, Sugar Sync, and numerous others are available for scholars to use. Institutional storage folders are useful yet it is often preferable to have a commercial storage space. Depending on the technological aptitude of the user and the level of support provided by institutional information technology services, it can often be difficult and byzantine to get these storage spaces to work with tools such as PDF annotators, eReaders, and other apps provided by the market in the digital milieu. Providers like Google and Dropbox have a great deal invested in ensuring that their services work seamlessly with other digital tools. The APIs they introduce to allow for seamless

functionality are optimized. A chief selling point for their business is the quality of this service. The inclination on their part to resolve problems is far greater than that of an institutional office.

eReading

Various eReading programs are available in the digital milieu. Most of these applications provide similar functionality with minor differences. There are programs such as Kindle, Nook, and iBooks tied to different content sellers. eReader apps tied to content stores, such as iBooks, Kindle, Kobo, and Nook, are available as free software. The major difference is that iBooks is only available in iOS. There are situations where scholars will not be afforded a choice regarding which eReading app to use, especially regarding library loans. However, putting this to one side, much regarding apps revolves around personal preference at a certain point, but there are factors to keep in mind to guide users to the most appropriate choices at this time in academia.

When reading material on a tablet or smartphone, users will often encounter difficulty in reading the text. The nature of full color screens presents issues with glare. Although device screens are improving rapidly and this issue may be alleviated soon, it is helpful to advise library patrons on settings that can optimize the reading experience. Generally, text will read better across all devices in low or high-light situations when a few simple rules are followed. Absolute black and white should be avoided. For daytime reading, users would be well served to change the font color to dark gray and the background to a light gray or cream color. Outside, brightness should be decreased a bit, to perhaps 75 percent. Indoors it is best to decrease brightness considerably down to only 30 or 40 percent. In the evening it is generally easier to read if colors are inverted. Fonts should be set to a light gray while background colors are a dark gray. It also helps

if brightness is decreased considerably. Again, these are only general recommendations. Users should experiment with settings to determine which ones provide the best personal reading experience.

Kindle is available across platforms to users seeking to gain consistent eReading experience. Kindle is the most popular program for readers in general and provides a huge marketplace for text-based books. It also syncs bookmarks across devices and provides cloud storage of any titles purchased from Amazon. There is one huge drawback to using the Kindle interface in academia. It does not render ePub files. The ePub format can be considered the default format for eBooks at this point, just as the MP3 file has become the default format for audio in the digital milieu. ePub provides all of the same functionality as the AZW format with numerous added benefits. While there has been an attempt to move the Kindle format forward on this front with Kindle 8, it does not provide the features specified in the ePub3 standard. In academia, where a great deal of material used is nonfiction, this is a severe shortcoming. As discussed in the "ePub3" section in Chapter 6, the features inherent in that format and iBooks 2.0 will provide tremendous enhancements to textbooks and other nonfiction works. The failure to accommodate these changes and work outside the Amazon system renders the Kindle program of limited functionality in academia.

Amazon also maintains a high degree of control on format relating to distribution. Unlike the AZW format, the ePub format can be distributed through any webpage. While books can be distributed in the MOBI format to work with the Kindle interface without Amazon's involvement, the format has been marginalized at this point. It does not have a large community of developers and future development of the format is in the hands of the Amazon Corporation. Its use is not

widespread enough for academia to place much stock in. While the Kindle program will render PDFs it does not provide the functionality to annotate them, making it of limited importance in comparison with other programs in this regard.

Presently iBooks provides the highest degree of functionality in eReader apps. While it does not explicitly accommodate the ePub3 standards, for all intents and purposes iBooks is the only app that will render ePub3 files. The iBooks 2.0 format is basically just an ePub3 file with proprietary tags. Many similarities exist between iBooks and Kindle. Like Kindle, iBooks is unable to annotate PDFs. It also provides free cloud storage for books purchased in the associated iBookstore. Reading material is in sync across devices through the cloud, even for material not purchased from Apple. iCloud will sync notes and bookmarks between devices for material not purchased from Apple, yet it will only remotely store entire works in the cloud if they are purchased from the iBookstore. Users will have to manually import works not purchased from Apple through email, wired transfer, or other means. The syncing of all material is of huge benefit to users, yet can be frustrating for scholarship at times. Librarians should be hesitant to inform patrons of this feature because, anecdotally, it is often inconsistent unless content is purchased from Apple.

The iBooks app has a major feature that sets it apart from Kindle: it will accept ePub files. This is definitely a huge benefit, yet there are drawbacks. While iBooks does work with ePubs, it does not save the notes in a file in ePub format. It seems that any notes taken in iBooks only exist in the book in iBooks format or a DRM-restricted version of the ePub created by the app. The process is complicated, but users cannot retrieve the notes taken in iBooks on an ePub file and view them through another eReading application. Regardless of the methods employed, this feature needs to be understood when helping scholars

use iBooks. It will not present a hindrance to users who are certain that iBooks and iOS devices are the means they will use to view content, yet when users seek to work across platforms this hassle can be averted by enlisting the use of other programs for eReading. In addition, ePub books purchased from the iBookstore can only be read using iBooks. Apple does not provide users with a functionality that allows users to view file contents on iOS devices outside of iTunes. There are numerous free scripts and programs, available by doing a simple Google search, that provide users with the ability to do so and this can be helpful for many purposes.

There are several eReading apps available in the Android system. Moon+ Reader and Aldiko Reader are two of the more popular and well-functioning applications. Moon+ and Aldiko both offer a broad range of visual settings that allow readers to adjust contrast, brightness, and color depending on environment and preference. Additionally, Moon+ provides functionality to sync with a user's Dropbox. This is extremely handy if a user is accessing content on multiple devices. It also simplifies the process of using annotated and bookmarked text on the desktop. Aldiko does allow users to export annotated ePubs, yet it is not as simple a process as with Moon+. Both options are able to read and annotate PDFs, yet the simple syncing process present in Moon+ makes it a compelling choice for this purpose. In addition, it has many features that allow readers to tailor PDFs for readability.

Unfortunately, there is not a really great open eReader that functions across platforms. The options that do function on iOS, Android, and other systems tend to fall into two categories, library-specific programs and market options. The apps associated with vendors, such as eBrary, Overdrive, or Bluefire Reader, are often of limited functionality. These programs are rife with soft-use measures that prevent annotating, printing, syncing with cloud service, and other

functions that are important regarding scholarly use. Market options, such as Nook, Google Play Books, and Kobo, provide an excellent reading experience and some functionality, yet this is only available with the purchase of content. There is not presently a serviceable cross-platform option for ePubs that meets the needs of scholarly work. There are browser-based options, such as Ibis Reader, yet these require wireless access at this point. This situation will change in the coming years as eReading becomes so much more common socially and academically.

The IDPF introduced an application dubbed Readium in March 2013 offering full functionality with books in the ePub3 standard. It was only available as a Google Chrome browser extension in the fall of 2012, and the intention at that time was to make the app available on all devices. Readium provides support for the ePub3 standard. There also exists the possibility that touchscreen browsers like Safari and Google Chrome, with WebKit 3 capabilities, could function as device readers. This would necessitate additional syncing aptitude to enable note-taking and offline viewing, yet the browsers would provide the functionality to render ePub3 files.

Productivity

Productivity apps are excellent tools to use when organizing research while switching between multiple devices. There are a number of productivity, do-it-yourself (DIY), and instructional apps available to users. The selection varies according to operating system but tools such as SnapGuide incorporate step-by-step instructions on topics that can be supplemented with audiovisual materials. Presently, SnapGuide is only available for the iPhone on iOS but conceivably this project or something like it could provide valuable instruction in

utilizing databases remotely or other library-related tasks. Other apps, like iFixit or Instructables, provide instruction on technology and other DIY projects. They provide a wellspring of ideas and instruction for librarians who increasingly need to perform technical maintenance services. Both apps provide valuable browser sites with huge user communities. Of particular note are apps such as Evernote that enable users to sync notes in the cloud that are accessible from any computer with Internet access.

Evernote is one of the most popular productivity apps. Recently, Evernote 5.0 was released. This version adds to the cross-platform capabilities Evernote is known for by being designed according to HTML5 standards. Evernote allows users to sign up for a free account and use their notes when Internet access is possible. There is a subscription-based plan that provides users with access to notes while offline and grants them a substantial amount of additional storage. The current storage allotment for the free service is rather large and should be sufficient for most users depending on how they make use of Evernote. There is the functionality to add pictures, media, and audio notes along with saving webpages and creating standard text-based notes. When considering storage needs, it is best to consider what types of files you will need to store. Text and webpages take up comparatively little space. If a user's primary interaction with Evernote revolves around creating text notes it is likely that they will have no problems with the free space provided. Rich media files such as audio or video clips and pictures take up substantially more space than text. This is a function of how material is stored in a computer. To illustrate this point simply we can look at the color red. The word "red" takes up a small number of bytes because only three letters need to be represented. For a computer to show the color red a digital string in binary code has to be constructed. There are any number of variations the string has to account

for, like opacity and shade. All of this information must be represented by 1s and 0s in a specific order, so the representation of the color requires substantially more bytes to do so than simply representing three letters. A file containing a picture has a varying number of colors that must all be accounted for by digits, making photo files large. The same general rule follows for any media files like video or audio clips. Evaluating storage needs in the cloud through a service such as Evernote or a cloud server will be an increasingly important task in the digital milieu as more computing happens remotely. Librarians will provide a valuable service to the academic community by providing support relevant to these resources.

Social networking

Social networking has become a major part of life in the digital milieu. In the past two years it has had a profound influence on politics, revolution, and nearly all phenomena happening now. It is difficult for librarians to assess exactly how to proceed in reference to the various social networks. Rather than address the features of particular networks like Pinterest, Facebook, or Twitter it will be important for librarians to take the long view and nimbly deal with the changing landscape. Two issues relating to social networks are of chief concern in higher education, the line between public and institutional (read educational) life in social networks and the unstable outlook regarding the efficacy of particular networks. If librarians take these two issues into consideration when establishing the institutional relationship with social networks they will be well served.

In the mid-2000s, a text on social networks in education probably would have focused on MySpace or Friendster.

This idea seems laughable now, but it only serves to illustrate the fickle nature of this area. As Jacobson (2011, p. 88) points out in the conclusion of her thorough analysis of social networks "librarians should not get too attached to Facebook, as there is always the new tool or social networking site people are using." Librarians would do best to expect change, establish social networking protocols, and invest in making social networking an excellent tool for library and education services. The only thing about social networks that can safely be said at this point is that they probably will have a sustained influence on life in the 21st century.

The balance between determining what is and is not appropriate for library involvement with social networks is a difficult one. This concern was put best in an article about research in the digital sphere by younger people when it pointed out that there is a "big difference between 'being where our users are' and 'being useful to our users where they are'" (Rowlands et al, 2008, p. 298). On one hand, libraries do not want to create a brand identity that is so sterile and pedestrian that students will not acknowledge them in social networks. The risk is that a library presence will be disregarded and cut out of a huge part of current society and a potentially valuable tool for integration with the community. Not only can social networks allow libraries to present themselves to the campus, they can be used as a pedagogical tool as exemplified by social reading sites and the use of Twitter for discussion and interaction between cohorts and professors. At the same time libraries do not want to take untoward or inappropriate actions that would lead to castigation, dismissal, or worse consequences. The aforementioned Jacobson article includes many best practices regarding maximizing return on activity in social networks for libraries. Certain characteristics lead to successful social networking presence, notably consistent activity. In addition,

libraries that involve themselves in the community by hosting events, lectures, exhibitions, and workshops benefit the most from announcements on social networks. Jacobson (2011, p. 87) points out that perhaps it is best to use Facebook primarily to market library events. In referencing previous research, she notes that Chu and Meulemans (2008) found that students are more amenable to communicating with organizations than with faculty using social networks. This indicates that libraries may serve a valuable role in providing academic services such as research instruction and course support in lieu of instructors. Partnerships with faculty regarding the use of social networks could increase their effectiveness for faculty while lightening the load for librarian use. It remains to be seen in a particular situation, but these findings may be beneficial moving forward regarding other networking opportunities.

Conclusion

Support for the use of apps will be important in assisting patrons with access to material and course interactions. Librarians should see these programs as a vital area where support is needed and not just as frivolous activity. Although there are many uses for apps that are certainly not academic, students of the digital milieu will need to utilize these resources to be engaged. To draw an analogy, students have had to learn to use database systems with the aid of librarians and in the coming years they may need to learn the various ins and outs of different apps, either to read content or be involved in class discussions.

Part 3
Vibrancy

Libraries in the digital milieu will need to prove their worth to academic institutions in order to get funded. Public funding for academia is in short supply, and many departments are competing for a share of the ever decreasing pie. As digital content becomes more prevalent the need for a warehouse of print resources is not apparent. Academic administrators will need to be provided with justification for the continued funding of libraries. In the future, it is highly likely that the vast majority of scholarly content will be digital in nature. Brian Mathews, the Associate Dean for Learning & Outreach at Virginia Tech, published a provident white paper entitled "Think like a startup" in 2012 that made clear the challenges facing libraries. This paper is forthright and identifies many potential instances where other groups would perform library services. For instance, what if special collections and archives work moved towards museums causing libraries to lose the entire archiving department or residence halls and student unions became learning commons areas. There are a number of situations in which libraries could be replaced by other groups, and the idea is not to identify all of the potential vulnerabilities libraries face in the digital milieu but rather to identify fields of opportunity where libraries can flourish and prove essential in the academic setting.

Publishing and access are areas where the relation of students and faculty to content is fundamentally changing in the digital milieu. These are also areas that are fundamentally important to the function of academia and have traditionally been the provenance of libraries. It would be prudent for librarians to develop skills and resources that will allow the library to change in relation to these in the digital context.

Publishing support

Abstract: Digital textbooks are amazing educational tools. What resources can librarians enlist to help make them? What are the rights considerations associated with them? The projects developed by Creative Commons, OER Commons, and Rice University in conjunction with many others, such as OpenStax and Connexions, provide educators with the means to make high-quality free digital textbooks. Librarians can play a vital role in relation to digital textbooks in academia.

Key words: OER Commons, OpenStax, Connexions, Flat World Knowledge, PressBooks, open educational resources, academic publishing, digital commons, aggregation, digital textbooks.

Economic landscape

The publishing industry is changing fundamentally in the digital milieu as entirely new means of producing and distributing content are arising. The costs of book production are no longer tied up in the physical production of an item. Although server space, technological expertise, and other costs associated with eContent exist, they are minor compared with the costs of the print book economy. The market for digital works is very fluid as it remains to be seen precisely how they are to be monetized, controlled, and distributed. Academia presents a particular situation relating

to these issues because much of what academic libraries purchase is subscription based. The relation of article content to subscriptions has been well established as it has had the necessary time to mature, but eBooks are a novel and relatively recent development. Issues regarding ownership are still being sorted out for libraries and individuals.

In the second chapter of *Wired Shut: Copyright and the Shape of Digital Culture*, Gillespie (2007) provides an explanation of the market for creative works in the digital age. He points out that the publishing industry is an economy of scale, meaning that the overwhelming majority of the costs of production exist prior to reproduction. To illustrate this he compares the cost of sneakers with the cost of a film. Each individual pair of sneakers comes attached with a cost associated with the materials and labor that went into constructing them. They must include an initial consideration in the price of covering those costs. In comparison a film has significant costs associated with production, in the form of actors, materials, crew, and so forth, which only exists initially. The economic cost of producing DVD copies is negligible in comparison and does not accurately reflect cost in the same way the market price of a material good like a sneaker would. As Gillespie notes "markets that exhibit an economy of scale tend to privilege large and well-established corporations" (p. 27). While some materials that a library collects may necessitate the huge sums of capital involved in making a film, many materials, such as eBooks, journal articles, and the associated support materials such as data, are not capital intensive. In addition, much of the capital necessary for the creation of these works is provided by other sources such as academic institutions and research grants. A significant way that libraries can enhance academia in the digital milieu is by facilitating the production and dissemination of this content. In the same way, they would be creating value for

their particular institutions by closing the production circle of intellectual products and limiting it to academia. Digital commons are a growing segment of academic libraries and there is no necessary reason their output has to be solely of the archival variety.[1]

The introduction of digital textbooks in education represents a disruption in the publishing marketplace. Apple's iBooks 2.0 launch in January of 2012 and the resulting alarum in education altered the understanding of what was possible for textbooks. While Apple presented an initial and highly polished introduction to the interactive textbook, their iBooks are not atypical. The new ePub3 standards are nearly identical to iBooks and promise to introduce these textbook functionalities throughout the marketplace.

Librarians must integrate themselves into the new marketplace of ideas and continue to provide vital services to the academic community. This will not mean repudiating traditional librarianship, but rather an update on services. As the ARL document on best practices relating to copyright and digital materials shows (ARL, n.d.), central features of librarianship such as preservation and attribution are integral to limiting institution-wide liability relating to rights. Also, just as librarians have provided an organizational framework for printed intellectual materials they can assist scholarship in the digital milieu by enhancing the metadata associated with content.

The challenge of providing patron access to works will be presented in two forms, relating to platforms and rights issues. Often, these two forms will be intimately tied together. Rather than establish copyrights via legal means, content vendors will implant rights control methods into works. This will often render access via certain devices difficult or even impossible. Librarians will play a vital role in ensuring intellectual freedom

regarding digital content by disseminating knowledge about rights and workarounds that will enable scholars to practice them. As was discussed in Part 1 of this book ("Rights"), many soft-use measures that limit user agency with content can be evaded by perfectly legitimate methods. The chapters comprising Part 2 ("Format") coupled with rights issues will assist librarians in providing the appropriate support to guarantee access in the digital milieu.

Aggregation

Aggregation refers to the act of collecting, cataloging, and making materials available. It is a term used widely in business in reference to media conglomerates or Internet companies. For example, a cable company is an aggregator. They collect content such as films and television programs and derive profits from making them available as a package. Interestingly, cable companies tend to make far greater profits than content creators like television or movie studios. This same principle applies in the context of the publishing industry. The profits for Amazon or Barnes & Noble dwarf those of even the largest publishing concerns. It is in this sphere that libraries operate.

Content producers benefit from the presence of many aggregators because they are then able to negotiate with a myriad of potential buyers to set more favorable terms. There has been much consternation in the publishing industry, and in the economy in general, concerning the lack of viable distribution options for producers. If the only outlets for distribution are Amazon, Barnes & Noble, and other big box stores then publishing entities will be at the mercy of their demands. The presence of more competitive aggregators grants publishing companies more leverage when negotiating terms.

This is vital to their economic health, allowing them to support authors producing content. Libraries in general present a huge market for all print material. Academic libraries hold a special position in the market because research facilities and academic libraries (often the same institution or a part of the same department) represent a huge portion of the limited market for journal databases, university presses, and other scholarly publishers. This places academic libraries in a relatively strong position in relation to publishers in the academic field. In addition, the textbook industry derives its profits from education, and a high percentage of their books are sold at higher education institutions. Should libraries become influential in higher education in reference to course texts they would gain even more prestige in the education market. With the academic textbook arena in tremendous flux due to digital textbooks, there is certainly a need for skilled professionals to direct academic relations to digital course materials in the present environment. The section "DIY publishing support" will focus on the tools for creating digital textbooks will provide an overview of the present possibilities of this medium.

Libraries can present their value to an institution by being a powerful presence in aggregating content. In order to create value the library should leverage this presence in a number of ways. Presently, the publishing industry is attempting to deal with the rise of digital content and eBooks in many ways. Libraries can also support learning with digital devices and emerging trends by providing the resources and training opportunities that allow faculty to meet community needs. In addition they can act as facilitators of access to content, notably digital textbooks. Patrons are overwhelmed when presented with new tools to use solely to access materials. Using print books is so different from using digital text. It is difficult to imagine not being able to access and use a print book but that

is because students have been educated in their use throughout their lives. Digital texts are a new phenomenon for all, and people will need somebody to navigate this novelty. Traditionally a librarian's job has been to provide users with content, yet the digital milieu is teeming with resources. Often, the primary difficulty students encounter relates to accessing that content. The strength that libraries possess in aggregating content can be leveraged to create a stronger scholarly community at institutions of higher learning and provide a safeguard to intellectual freedoms.

Douglas County Library

The market for eBooks is unsettled, especially regarding libraries. There has been dispute over the relation between libraries and purchased content. The publishing industry has attempted to direct sales towards subscription plans. At the moment, none of the big-five publishers[2] will sell ownership of titles to libraries for loan. This is problematic and does not allow libraries to make use of digital material in the same way as print material. Innovative ideas relating to ownership at the Douglas County Library in Colorado serve to inform one approach to published content and ownership at libraries in the future. This could be especially relevant should the self-publishing of eBooks continue to flourish[3] and the academic library become a major locus of scholarly publishing.

The Douglas County Library (DCL) in Colorado has a novel approach to eBook collections and circulation. Rather than leasing the opportunity to provide content the library has purchased actual copies of the eBook. This is done by maintaining a server holding the material and imprinting digital rights management (DRM) within the books to loan

them. This is an innovative approach that seems to place the DCL at the forefront of integrating public library services in the digital milieu. In explaining library operations regarding eContent loans, Director Jamie LaRue wrote an informative letter about the program (LaRue, n.d.). His comments about library purchasing and publishers are very interesting. In the letter he points out that the largest publishers will not sell eBooks to libraries. Rather than accepting the terms the six largest publishers have dictated regarding eBook use, he has decided it is best to deal with publishing groups who will meet library needs. Addressing this problem by taking a route other than the one dictated by the market is a possibility enabled by the logistics of eContent publishing. Possibilities, strategies, and tools regarding library publishing have been explored in Chapter 7 ("Creating eBooks") and will be further discussed in the coming pages regarding digital textbooks and academic publishing.[4]

The DCL has also introduced the concept of a "Digital Branch" in approaching patron services.[5] The library as a public space where the community comes together is vital and can serve a strong function in academia but at the same time libraries have to meet patrons where they are and adapt to the ubiquity of digital content. The DCL is attempting to raise patron awareness of digital resources and eBooks while highlighting the wonderful services the library provides. The present digital reality affords people previously unthought-of possibilities, many of which are offered at the library. The DCL is taking a refreshing and innovative approach to the problems and possibilities present in digital content. The approach the DCL is taking to eBooks is occurring at the same time as the possibilities for nontraditional publishing are growing. The relationship between libraries and this publishing effort can nurture the field and be mutually beneficial in the future.

Nontraditional publishing

The publishing world is in flux right now. Even the format of content is very fluid. There has been a tremendous growth in nontraditional publishing (NTP) in recent years that has only been accelerated by the establishment of the market for electronic texts and the increasing availability of tools to utilize this format.

Nontraditional publishing (NTP) can be best defined by establishing what traditional publishing is. Anything that is not traditional publishing would then be ascribed to the NTP category. Traditionally, the relationship between author and publisher is related directly to market operations. The author supplied the finished product to a publishing enterprise and was compensated fiscally for it. Depending upon the terms of the publishing contract, the author was granted other financial remuneration in the form of advances, royalties, or copyrights.

NTP results from the new forms of production and distribution enabled by technology. The publishing structure presently established was refined in the context of physical books and the attendant copyright regime. Physical books prior to the digital age existed in a very different context. Production was centered around material goods (paper, cloth, glues, etc.) and hard copies. Content was not represented as a fluid and dynamic array of 0s and 1s as it is in digital files, but rather in static immutable blocks of text that required a physical facsimile. The material presented by a book had an innate value. The cost of books was padded by a number of related costs, such as shipping, inventory, and goods that eventually had to be sold at a lower profit margin or even loss. This is still the case today when talking about paper books, but is radically different with eContent. There are costs related to the distribution of eContent, but they are not the same as those in traditional publishing. Risk is mediated when

publishing eContent in the digital form and on demand. There is not the inevitable loss related to unpredictable variations in the supply and demand of material goods.

DIY publishing support

Academic libraries can provide a variety of support to publishing in higher education. They can assist pedagogy as creators and consumers. As was discussed, the aggregating power present in academic libraries can prove very beneficial to higher education when negotiating intellectual freedom issues and purchasing matters with publishers. They can leverage this power to economic advantage as well as in programming for the institution. Academic libraries provide the forum and logistical support to bring authors to present or speak at colleges and universities as a part of the deal when purchasing content. On the productive side, academic libraries can play an instrumental role in creating and facilitating the use of open education resources (OERs), digital works, and digital textbooks to support pedagogy.

Public textbook programs

Several initiatives are underway that seek to supply textbooks as a part of education. When contemplated in the abstract, it seems strange to think that such a large part of education, course texts, have been relegated to the market. This certainly served a purpose when course materials required large amounts of capital due to the cost of goods involved in production. As Gillespie pointed out, creative works in the digital milieu operate on an economy of scale. The initial costs of production are indirectly paid by academic institutions in the form of faculty wages, facility costs, and other collateral costs

required to support academia along with research grants that facilitate much intellectual exploration and data gathering. If the market to produce textbooks is an economy of scale where the production costs are already being footed by academic institutions, it clearly makes sense that the resulting textbooks be distributed freely using the new methods enabled by digital technology. This is an exciting possibility and several states, among them Ohio, California,[6] and Florida,[7] are already exploring ways to make free textbooks a reality.

Research Director for the eText Ohio Project Steve Acker provides an overview of the factors and actors involved in digital textbooks in academia in a chapter of *The No Shelf Required Guide to eBook Purchasing* (Acker, n.d.). Particularly helpful is his examination of a program in which the University System of Ohio (USO) evaluated potential avenues to pursue and instituted a pilot program in conjunction with Flat World Knowledge (FWK) to gauge the impact open textbooks would have on students. Prior to examining that program, he addresses the various considerations in adopting digital text and distributing them as a part of tuition to students.

In order to mitigate the rising costs of higher education one area to address is textbooks. Textbook publishers hope to address the problem by selling universal access to learning materials on a subscription basis. This would benefit students by bringing down the cost of textbooks while publishers would potentially recoup the lost revenue from sales of the books by expanding the market to include the roughly 15 percent of students who do not buy textbooks now, presumably due to financial considerations (Acker, 2011, p. 42). An example of publisher attempts to sell universal access is the CourseSmart database, which offers content from several publishers, including Cengage and Wiley, at less than half the cost of print.

Since the mid-1980s textbooks and a standard canon had

become the more conventional approach to teaching in higher education. This was due, in part, to the radically changed hiring practices in the United States where the bulk of positions went to adjunct faculty. These educators did not have the necessary time, job security, or agency to direct adoption of course materials and the curriculum advisory committees tended to favor textbooks from large publishers for sizable undergraduate classes. In light of this situation, much of higher education became dependent on large publishers for textbooks and course materials.

Aside from relying on the major publishers for course texts, there is the option of compiling course packets from other educational material. If it is determined that copyrighted content is necessary then financial terms can be agreed on through the Copyright Clearance Center or other avenues. The Copyright Clearance Center is a not-for-profit corporation, which acts as a broker between rights holders and parties interested in using copyrighted works. A website is provided at *http://copyright.com* that allow users to determine the copyright associated with a particular work. A license can then be purchased on a per use basis or through an annual institutional license to particular works. Interested parties can search for print materials by ISBN, ISSN, or title. If you have this information you can narrow your search. It provides valuable resources for faculty seeking selection of a copyrighted work for course packets or eReserves. Academic librarians can provide a valuable service to their organizations in helping to provide legal access to copyrighted works using the Copyright Clearance Center.

An option that does not result in licensing costs lies in utilizing the tremendous array of available OER. The abundance of repositories for accessing OER arising in the digital milieu make this approach sustainable provided there is sufficient faculty capacity to engage in the task. Faculty can

either use a market-based approach and enlist the help of entities such as Flat World Knowledge or work with freely available options such as Connexions and OER Commons. The advantage in the latter approach lies in the total elimination of financial outlays on the part of students in procuring digital textbooks. There is an initial challenge presented to faculty in that there are no employees to help direct their efforts. At the same time, there is a growing user community and it is likely that the community can provide the necessary support to educators engaging with these tools. Google has built an extremely successful business model where a community of users through forums and discussion boards provide most of the resources and solutions regarding problems associated with their services.

Acker recommends that librarians become directly involved in the textbook provider vetting process. The skills librarians have practiced and refined in assisting patrons to evaluate resources can be enlisted in evaluating potential solutions. They can in this way identify quality materials. In addition, the organizational faculties librarians have developed can further enhance the implementation of a digital textbook program by indexing selected materials and directing them towards optimal courses. Libraries could also develop patron-driven acquisition programs that would assist schools in directing funding appropriately. There would be fewer sunk costs if digital textbooks were adopted and institutions refined their methods for determining purchases. As opposed to having print copies of books sitting on shelves unused, digital textbooks can be purchased or licensed only when they are needed. The instantaneous delivery of items eliminates many of the logistical problems associated with purchasing the print books. Another approach to tailoring eBook purchasing to institutional needs exists in Columbia University Librarian James Neal's conception of a National Digital Library. In

this scenario, an immense digital repository of specialized resources would exist and be made available on some basis to all libraries. This would eliminate the need for academic libraries to attempt to create an expansive collection, freeing up funds for textbook purchases. Not only would this allow for the collection of textbooks by libraries, it would also enable them to tailor collection development to meet specific institutional needs.

In order to meet competing needs while addressing a very fluid situation, the USO formed the Ohio Digital Bookshelf (ODB) project in 2008.[8] The ODB evaluated the matter and decided to pursue a bifurcated strategy in relation to digital textbooks. The determination was made to institute a buyers' co-op and begin a pilot program with Flat World Knowledge textbooks. The former effort involved a survey of faculty in the most popular course in the USO system, Introduction to Psychology. Professors were polled and data were collected regarding books purchased. After analysis, the group identified 24 popular texts and negotiated with publishers to purchase licenses to digital versions of the text. The discounts were significant, sometimes up to 70 percent (Acker 2011, p. 47), and students were guaranteed to have current editions of the text. The lower price students paid in leasing fees more than negated any potential recoupment of expenses in resale of texts. The co-op showed that skillfully approaching publishers in negotiations regarding textbooks can benefit students financially, but it requires a situation in which detailed analysis can be conducted to determine need. The extent to which this would be generalizable across a broad spectrum of course offerings is questionable.

In the spring of 2012 the USO purchased 1000 seat licenses to FWK course content to be used at the University of Akron and other community colleges in the system. The pilot aimed to distribute digital textbooks as well as assess their efficacy in

relation to student life. Of the 1000 licenses, students actively used 987. In the fall of 2012 the University System of Ohio will seek to expand the program.

Textbook creation

Digital textbook creation with open educational resources (OERs) is a new development in the digital milieu. Previously librarians assisted faculty to create course packets composed of photocopies of different selections. Much of the support provided by librarians in this process revolved around copyright. Fortunately, there will not need to be that same degree of support around copyright with digital textbooks thanks to some extraordinary tools that enable their creation. The field of OERs has grown at an astounding rate in the Internet age. There are numerous repositories of content available that can be adapted by instructors for particular pedagogical needs. Two of the most well-developed projects are OER Commons and Connexions. These provide a wealth of resources to educators.

OpenStax is connected with Connexions and has many of the same people directly involved. It seeks to create high-quality textbooks available for free in digital form. These textbooks can be remixed and content on Connexions can be added to them by interested parties or drawn from the vast repository. Connexions is a powerful tool for creating and adapting textbooks from OERs. Flat World Knowledge is another textbook creation initiative. Unlike OpenStax and Connexions, which are based at Rice University and supported by philanthropic foundations, FWK is a for-profit company that helps faculty to develop texts. High-quality textbooks written by scholars can be adapted and supplemented for use. FWK textbooks are not free, but are

available for very reasonable prices and represent a great way for faculty to create excellent digital textbooks for courses. It is unclear how copyright comes into play when seeking to use OERs in an FWK textbook, but they present excellent support and assistance to authors and faculty so any questions could be resolved.

Flat World Knowledge

Flat World Knowledge (FWK) is a for-profit company that facilitates the use of OERs in the creation of course textbooks and supplementary materials. The OERs present for use with FWK's interface is supplied by other academics. The company enlists authors to create textbooks for courses. In order to build a catalog, FWK has authors submit proposals. They evaluate the proposal by gauging the qualifications and area expertise of the submitting party and after vetting ask the potential author for a sample section. This sample is then sent out to instructors in the subject matter for evaluation. If the peer response is positive and validates the scholarly content, a book contract will then be arranged. This model allows FWK to maintain a nimble catalog and meet instructor needs. The content and books are then made freely available for faculty to customize and edit so that they may use them in their courses.[9]

FWK seeks to build a business based on inexpensively accessible and editable textbooks. The FWK business model relies on the Gillette model of profit. In the case of the toiletries company, profits are generated through the sale of razor blades after giving the razor away. Most notably Google and Red Hat Linux have employed this model in the tech industry, to tremendous benefit. The intention is to provide free online editing abilities to faculty so that they will adopt texts for use in courses. Once professors adopt FWK material for courses, their students are able to access text online for the reasonable

price of \$19.95 or purchase digital copies of the book in combination with supplementary course materials to be accessed at their convenience for \$34.95 (Why Flat World is moving from free to fair, 2012). FWK edits submitted work and encourages authors to create supplementary pedagogical materials such as flash cards, study guides, and PowerPoint presentations. The appeal to authors is both economic and practical. The authors receive a 20 percent royalty on books and materials published through FWK. This represents a better rate than is commonly offered in the print publishing world. In addition, these academics are provided the opportunity to produce and disseminate course textbooks that blend with their individual teaching priorities and needs.

Apart from the authors, there are huge benefits to instructors who adopt FWK products for use in the classroom. Once the books have been listed in the FWK catalog they are adaptable for particular courses. There is no cost to an instructor associated with the act of selecting a book for a course and modifying it. All content is hosted on FWK servers and can be edited in the browser. FWK has just introduced a new way to customize textbooks called MIYO (Make It Your Own). Instructors are able to add, reorder, remove, and modify textbook material with ease through the website. The interface is remarkably simple to use, not unlike the experience of editing a basic blog hosted by WordPress.

FWK books are all published under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 license (CC BY-NC-SA 3.0) (Flat World Knowledge – Creative Commons, 2010). This license allows for the sharing and remixing of a work by persons adapting it for their own uses. When a user makes a notation in a book or adds text and elucidation to a section it is clearly marked with that user's identity as a section that has been edited. The edits a particular individual makes can be saved as is. The instructor can then make them available to students in her/his class. Remixed and added content on FWK is available to anyone who visits the site. It can be adapted for specific purposes. Instructors are able to modify and incorporate content that has been added by other instructors after the textbook has been released. In this way, course materials are continuously improved on and refined for different purposes.

Individual instructors are able to personalize, enhance, and tailor FWK texts to their particular pedagogical needs. The freedom this provides to instructors is of profound benefit. Rather than rely on a textbook publisher to direct lessons or the focus of class, instructors can improve upon what works successfully in a book while eliminating areas of a text that are

not as useful. If an instructor seeks to cover topics in a different order the table of contents can be amended. Material that will not be useful to a course can be removed or abbreviated. Exercises, links, and multimedia can be added to enrich material. Anything particular about course conditions can be incorporated into the text. For example, a civics course could contain text that investigates particular aspects of present elections, applying them to course material. The content of books can be expanded upon and updated by instructors. Rather than have textbooks that may be dated instructors can update certain sections of the text to represent present conditions. Books do not expire after their initial use ends. They remain available on FWK servers for instructors to use again. Textbooks are living entities at FWK. They are constantly being adopted, updated, and refined by other faculty authors.

OER Commons

OER Commons is an open educational resources repository being developed by Creative Commons. Like their resources for determining license needs, Creative Commons makes the effort to simplify the adoption of OER by making licensing terms easily understandable so that educators can focus on pedagogy rather than legal minutiae. All resources are classified broadly as No Strings Attached, Remix and Share, Share Only, or Read the Fine Print. As discussed on p. 153, the CC REL is an amazing tool that contributes to a clear legal identity and searching mechanism for OER resources.

Educators are able to limit their search for material based on a number of factors including rights issues. OER Commons actively partners with academic providers to provide as complete a collection as possible. Items from the OpenStax project are listed and available on OER Commons. In

addition, there are over 100 partners providing content including the Berkman Center for Internet & Society at Harvard University, the Encyclopedia of Earth, University of Cape Town OpenContent, and the Public Library of Science (PLoS) (About | OER Commons, n.d.). This is clearly a vast and complete collection. Many of the popular MOOCs (massive open online courses) are represented in the partnership list. The OER sources provided through OER Commons are not simply based in academic institutions, but also represent many public broadcasters such as KQED and WNYC. The search mechanism is optimized so that instructors can search for material by subject matter, age, and even method. There are dozens of game-based educational options to incorporate into classes. Unfortunately the distribution capabilities do not seem to be as well developed as those of FWK. Educators can create accounts and save lessons and exercises that are deemed useful but the ability to post it and make it accessible to students on the site is not there. The logistical challenges of such a task would be the responsibility of the faculty.

OpenStax/Connexions

Faculty at Rice University is developing OpenStax with support from several major philanthropic organizations. The goal of the project is to develop high-quality peer-reviewed textbooks for use in higher education that are freely available. It is a continuation of Connexions, a project begun in 1999 to increase OER availability in the digital milieu. Many of the principle participants in Connexions, including the founder Richard Baraniuk, are involved in OpenStax. As of July 2013 there were five books available and eight more in the development stage. The books are available on the web and in standards-compliant PDF and ePub versions for free. In addition, they can be printed on demand for a fee that covers
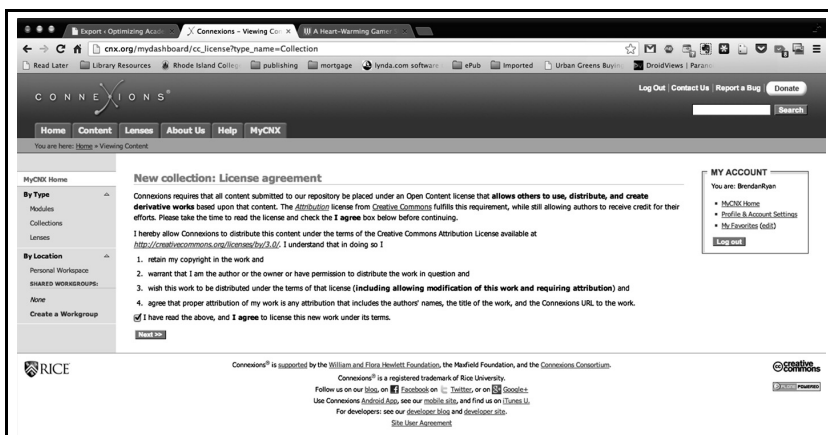
the cost of printing. Students get a professional looking and high-quality textbook for a fraction of the price.

OpenStax is not just a warehouse store for free textbooks. These textbooks are able to be modified using Connexions in order to better meet the needs of a course. All textbooks issued by OpenStax can be adapted and customized in Connexions. While it does not provide the functionality to edit sections, Connexions allows instructors to rearrange and eliminate parts of a book. In addition, they are able to create modules, which can be placed inside books. The huge library of OER content housed on Connexions can also be imported into any book. This provides the user with an enormous catalog to draw material from. In order for an instructor to insert her/his module into a book, it must be published under an "open content license that allows others to use, distribute, and create derivative works based upon that content" (Connexions – Legal, n.d.). While users cannot edit the contents of a module they can place modules before or after completed modules that can address issues they would like to see dealt with in the text. Creating a module in Connexions is not as simple as using MIYO with FWK. Users are able to import MS Word or other types of text documents. They can

also use a LaTeX editor to import MathML material. Connexions provides templates for Word and LaTeX. Once documents are imported they can be edited in a WYSIWYG editor or as XML.

The role of an academic library

There are challenges associated with producing and distributing digital textbooks in higher education. Fortunately a number of tools allow educators to produce textbooks that will be both better for teaching and far less expensive than traditional textbooks from the big-five publishers. The features provided by FWK and Connexions are similar with a few differences. If either avenue is taken it is clear that there is a place for librarians to provide support and expertise to enhance education. Certainly some form of training, skill sharing, or

workshops would be necessary in order to support faculty in the creation process. Problems in this area could come from two places, rights issues and actual use of the production software. Librarians would do well to familiarize themselves with the rights issues associated with using, citing, amending, or working with content. In addition, there will likely be some problems on the student side where librarians will have to enable access. General knowledge throughout the library regarding these tools would be a great asset. A librarian with a focus on digital textbooks will also likely be necessary depending on the size of the institution and the attendant digital textbook program. Librarians can utilize the tools present in the digital milieu, like SnapGuide, or a series of LibGuides to provide a reference resource for faculty creating books.

The other pronounced area of need regarding digital textbooks in the academy lies in providing access. With FWK it is a bit simpler because course content will be hosted on their servers, yet books created with Connexions or other means will present a challenge. Perhaps the skills that have been refined in the library while providing course reserves in print and digital form can be transferred to distributing digital textbooks. Librarians will be confronted with a huge store of files that need to be accessed freely. An indeterminate number of copies of texts need to be produced. This will involve all sorts of issues to be sorted out. Is some kind of authentication needed to procure a free resource? This may be far more trouble than it is worth. Is there some technical mechanism that will create an unlimited number of copies from a host file that can easily interact with the full spectrum of platforms and computers? These and other questions anticipate a future revolving around digital content in academia. There will also be students who need the book in print form. Libraries would do well to accommodate this through a print-on-demand station.[10]

It may serve libraries well to familiarize themselves with these issues now. That way, when institutions are ready to take the plunge into self-produced digital textbooks librarians can provide expertise in this subject matter. It seems likely that in the near future textbooks will be delivered in digital form and remaining ahead of the curve will allow libraries to take a prominent seat at the table when that time comes.

Promoting digital textbooks moving forward

There are two parties that must be placated for digital textbook adoption to be successful, the student body and the community. Matkin (2009) provides an interesting assessment of the state of digital textbooks and potential strategies in implementation moving forward in *Open Learning: What Do Open Textbooks Tell Us about the Revolution in Education?* In considering options for adoption in California he provides a reasoning behind a potentially successful strategy in higher education there. The analysis is directed towards implementation of large-scale programs by state and local governments and many of the ideas are valuable for librarians in higher education to be acquainted with. For academic textbook programs to be successful they will need a good deal of support from campus institutions, and the library represents a natural setting to direct intellectual activity campus wide. Matkin focuses on K-12 settings as well as post-secondary education and the influence of community response to the program.

Matkin identifies several barriers present to adoption. Distribution can present a problem in any program, yet the faculties and equipment developed in digital commons can be enlisted in this effort. Another matter that may present

serious obstacles relates to a lack of quality standards. Assisting faculty in developing and finding quality OER can easily solve this problem. Additionally, the material present through repositories like Connexions and OER Commons is already of high quality and is subject to peer review through use combined with the assessment and feedback tools provided by the projects. The red tape Matkin cites as an obstacle can be eliminated by enlisting OER resources and DRM-free materials, a viable option as tools continue to mature. Administrators will need to be upfront about the cost associated with digital textbooks, but librarians can make clear that if they are provided with the proper support to familiarize themselves with the undertaking the benefits to the institution will be immense.

Weisberg (2011) conducted a research project to assess student attitudes and behavior related to the introduction of digital textbooks at the Sawyer Business School of Suffolk University in Boston. The study is informative because it began in 2009. Mitchell reports that students have grown more accustomed to and amenable to digital textbooks over the two initial years of the study. He chalks this up to improvements in device functioning and proliferation. In 2009 the iPad had not been introduced and the idea of a tablet computer was purely conceptual. When contrasted with the leading devices present in 2009, the Kindle and Sony eReader, the improvements are marked.

Weisberg identified four factors that drive students' acceptance of digital textbooks:

1. The cost benefit in comparison with traditional print textbooks.

2. A desirability factor and the ability to provide media content.

3. They provide greater convenience and portability.

4. Search and discoverability features enhance usability.

(Weisberg, 2011, p. 194)

Academic publishing

In the digital milieu, the value of libraries to academia can be presented by the digital resources it houses and disseminates. In many ways, digital commons initiatives are presenting libraries with the opportunity to be akin to university publishers. Digital content exists in an economy of scale. If the costs of production are offset by other factors in academic publishing there is little reason that the work cannot be disseminated through digital commons at academic libraries. The production of digital copies is not capital intensive and the text-based character of much academic publishing material is of small file size. This means that digital copies could be housed and distributed through a library's digital commons server. Academic publishers will still be necessary to produce the print copies of material, yet much of the information can flow freely.

The idea of an entity that produces educational content and a library do not need to be mutually exclusive. There is no reason libraries should not actively engage in fostering the production and distribution of educational materials. In reality, it may be advantageous for students and faculty if the library takes an active role in these endeavors. Whereas in the past libraries had provided the physical infrastructure for print materials to exist, there is now a tremendous growth in open educational resources (OERs) that libraries provide access to. The academic library can assist faculty in curating, creating, and incorporating this material into course texts.

The concern exists that material may not be reliable if it is not vetted by peer review. There is no reason the procedures of peer review cannot be adapted to material published digitally through an academic library. The benefit to libraries in moving to an open distribution system of scholarly publishing is not solely in regards to prestige but also relates directly to economics. The cost of operating a server and paying for the associated traffic is minuscule in comparison with the cost of a subscription to EbscoHOST, ProQuest, or any other large-database vendor. Academic publishing will not be supplanted by collections housed solely in digital commons for quite some time but the process is already beginning to happen with initiatives like the Directory of Open Access Journals (DOAJ). System, procedures, repositories, and search mechanisms will need to be developed for the process to move forward, but these are faculties that are in ready supply in the library field. It will be a major task in libraries to provide structure, authorization, and access to open access content.

Notes

1. The book *Wired Shut: Copyright and the Shape of Digital Culture* by Gillespie (2007) provides a thorough analysis of economics and copyright law as they relate to intellectual freedom.
2. The top-five publishers are (1) Hachette, (2) HarperCollins, (3) Macmillan, (4) Penguin, and (5) Random House.
3. An analysis of the market for these books is given in "Non-traditional book publishing" by Bradley et al. (2011).
4. A good examination of the DCL program is given in "Colorado library ebook model gains steam" by Kelley et al. (2012).
5. The support materials and a video about services are available at *http://douglascountylibraries.org/digital-branch* It is an

excellent example of tailoring library materials to meet user needs.

6. This initiative is very recent as is the material relevant to it. Matkin (2009) on the future of public textbook programs in California provides a good background to the many considerations administrators take into account prior to institution.

7. Mardis and Everhart (2011) provide a summation of this program in "Digital textbooks in Florida: Extending the teacher-librarians' reach."

8. Neal (2011) is insightful and offers many ideas about the possibilities for libraries moving forward.

9. This information is based on a conversation with Pam Hersperger, the Director of Product Development at FWK, on 30 July 2012.

10. Geitgey (2011) wrote an informative article about the Espresso Book Machine housed at the University of Michigan Library.

Academic support with digital content

Abstract: The ways that librarians in higher education can assist students in accessing content are enumerated. Students born during the age of the Internet have different characteristics in researching. These traits are addressed and espoused in reference to creating information literacy services for millennials.

Patron desires and use of eContent

The shifting environment in twenty-first century higher education is intimidating to navigate. The support necessary so that young people can flourish in higher education is changing along with the tools of pedagogy and research present. The library is well situated to provide the skills and instruction necessary so that students can make use of those tools. In addition, the tools and material needed to learn in higher education in the digital milieu are not always readily available and obvious. Rather than finding information, as librarians have traditionally done for students, they will need to find ways to help students access information in the digital milieu.

Evolution of scholarship

Scholarship is changing along with the modes of content in the digital milieu. As the system of information gathering in society shifts it will call for libraries to adapt to patron needs. In academic libraries these needs will be more pronounced than in other library settings because most students will be young adults. This will vary greatly depending upon particulars, but at the typical institution of higher education in the United States most undergraduates will be in their late teens or early twenties. This demographic has unique qualities that will be important to be cognizant of when directing services. They will have grown up in an age in which all information was available immediately through the Internet. Younger people also tend to be early adopters of new technology, so librarians will be tasked with meeting the requirements of the latest devices. Additionally, the constant introduction to and adoption of new digital technologies throughout their lives provides the Google generation with valuable experiences to draw on and would place them at an advantage as opposed to preceding generations in working with new technologies.

The Google generation

In 2007 the British Library and the JISC (formerly known as the Joint Information Systems Committee) commissioned a report from a diverse group of scholars, many in the information sciences and library fields, which was published online as "The Google generation: The information behaviour of the researcher of the future" (JISC, 2010). The Google generation was defined as people born after 1993 with little cognizance of life prior to the web. Researchers throughout the globe from such diverse locations as Tennessee and

Tehran participated and the findings are informative. To address the new developments in academic libraries it is important to understand how students expect to learn. Academic librarians would do well to familiarize themselves with the findings when designing research services moving forward. The study aimed to determine just how research would be done in five to ten years. The researchers were curious to see if there were fundamental differences relating to information gathering present in the Google generation.

The Google generation primarily displayed information-seeking behavior that was classified as horizontal. This was characterized by several traits that revolved around skimming information and then bouncing to other sources. Navigation represented an important information-seeking use of time. Students in the Google generation generally spend an equal amount of time navigating the web of resources as they do engaging with content. This could result from several factors, yet two potential causes of this that relate to the library field could be impenetrable or obtuse information systems that make navigation difficult or a poor grasp of information literacy skills. Several other characteristics of researching behavior could extend navigation time. Students tended to skim articles briefly and spend a limited amount of time viewing eContent. Some researchers in the JISC report (Rowlands et al., 2009, p. 294) found that "60% of e-journal users view no more than three pages and a majority (up to 65%) never return." They also "squirreled" away large personal libraries on research topics for potential later use. In order to check the veracity of information sources the Google generation do not typically go to scholarly sources such as citation indexes or peer-reviewed sources, but rather trust in the brands they traditionally receive information from prior to academia (e.g., Wikipedia, Google). These findings suggest that students in the Google generation need a good background in information

literacy to make use of their prodigious facility in using search engines. Academic librarians would do well to understand the horizontal information-seeking behavior characteristic of Google generation students. A nuanced view of this behavior and the associated benefits and drawbacks will assist librarians in cultivating information literacy. There are certain strengths of the horizontal approach that can enhance student aptitude if negative qualities can be augmented and enhanced. There are several ways that this can be supported; one of which relates directly to eContent support by librarians in providing rich metadata to enable search and assist students in getting access to particular content.

Cull (2011) addressed the research present in several different fields pertaining to reading and interacting with text on screens and how it has changed with digital content. Much of the research he analyzes seems to align with Rowlands et al. (2009). Of particular interest is his reference to a Steve Jobs' quote noting that ''people don't read anymore'' (Cull, 2011). Because of this, the iPad is a more effective text delivery system in the digital milieu in that it enables horizontal information seeking. It is similar to the activity of scholars working with print in that there is a good deal of tactile and spatial involvement in both research cases (Hillesund, 2010). One of the characteristics displayed when gathering information is a nimble ability to switch between information sources such as social networks, blogs, search engines, wikis, bookmarks, and other resources present on the web. The facility offered by the digital milieu with its myriad resources is certainly a tremendous asset that educators can direct towards valuable research.

The Google generation possesses strengths that facilitate resource gathering, yet guidance is needed to improve information literacy. Companies, such as Google, have developed tools that facilitate a user's ability to gather information sought from the web, which has the largest

collection of data. A major hurdle for the Google generation in making use of library resources is that they are housed in an opaque system that is not intuitively navigable. Research libraries have huge collections of publisher content. This content is often present on the web as well, yet it is far easier to work with there because publishers are partnering with Google and other engines to link to content. Libraries need to leverage their power and prestige in order to provide these benefits to users.

Rowlands et al. (2009) found many unique behaviors when approaching academic work, yet interestingly many assumptions made about younger students were debunked. The Google generation did not exhibit better skills when using databases or search engines to conduct research. This was surprising because it is generally assumed that increased exposure to digital devices would result in more facility researching digitally. Because the Google generation is incapable of determining information needs, it has difficulty finding useful keywords or developing search strategies. It also has problems properly assessing content for applicability due to the rapid search strategies employed and the maladroit nature of content scans. The researchers attributed this finding to the primacy of developing information literacy skills to nurture skilled students. Librarians seeking to design any information literacy program would of course benefit from acquaintance with fully comprehensive research findings.

Citing eBooks

Librarians will need to provide support to students and faculty who wish to cite eBooks. Several factors relating to citation arise when dealing with digital content as a result of formatting. Certain file formats, most specifically the proprietary format

developed by Amazon for the Kindle reading program (`.mobi`), present the reader with pagination options when utilizing text. The Kindle device or app provides readers with both relative and text-based page numbers. Relative page numbers relate to the progress a reader is making in a manuscript based upon relative position, which varies according to magnification of text and positioning of the device while reading (landscape or portrait). Text-based page numbers are based upon the correlation between text and its position in the print version. This certainly makes it easy for the reader when cross-referring to an in-text citation. In contrast, the iBooks utility only provides readers with relative page numbers. This is helpful when reading because it gives a sense of your progress, but it makes it nearly impossible to cite quotes or facts by page number. If Apple considers print page numbers as a vestige of a rapidly declining form of reading that is not necessary in eBooks they would not include them.

Page numbers are a vestige of print books. It is helpful to be able to note progress when reading text, but there is no necessary reason for them to be there other than cross-referral. The utilities provided by digital devices for searching, scanning, and analyzing text enable readers to have all the tools for referencing citations without page numbers. Several vestiges of the print book are present in most popular eReading programs – programs that include a book-like interface, as is the case with iBooks.

A new form of in-text citation is needed based upon the novel formats of reading material. Unfortunately, as is the case presently with so many things relating to eContent in the digital milieu, new forms and methods are still being created. In ten years (or perhaps weeks) we will have agreed upon practices but currently we have little option but to wait until they are fleshed out. All in all it is an exciting time to be a librarian. Issues of content and attribution are the domains

that librarians should actively participate in and help shape. As noted in Part 1 ("Rights"), proper attribution is central to best practices regarding fair use.

Repositories

Peer-to-peer training and skill sharing present a valuable opportunity for members of the academic community to interact. Providing a space for this skill sharing to occur while also engaging with the academic community will provide librarians with valuable insight into what needs are not being met. If, for instance, students voice concerns with the file formats of course reserves in reference to personal devices, librarians can act as a professional intermediary between students and faculty to facilitate access.

Possessing a toolbox composed of knowledge of file formats and devices along with professional cooperation in sharing knowledge pertaining to issues in the digital milieu, librarians can enhance learning at institutions of higher education. Because there are so many variations on file format, platform, and device a professional repository composed of particular knowledge would be very advantageous moving forward.

Creating repositories with collaborative knowledge regarding emerging technologies is an excellent strategy that bears investigation. Librarians might take cues from the open-source community in developing a forum for such a knowledge archive. The ready availability of web publication tools could supply the backbone content management system for any such endeavor. This would ensure that updates and other technological support should continue for the foreseeable future. In order to ensure robustness and collaboration any repository should be open and accessible to all. If these

repositories are developed in advance of the widespread adoption of digital textbooks they would go a long way towards improving student services in the digital milieu.

Virtual space

The library will lose credibility as an institution central to scholarship if it does not actively work outside the building's walls. Mathews (2012) and Rowlands et al. (2009) both point to the need for the library to represent a virtual space in the academic environment of today. This is not to repudiate the services the library has offered in the past but rather an opportunity to expand and strengthen scholarship at the institution. Much as eContent exists in the ether, there needs to be support for this digital material where it is located, at the same time everywhere and nowhere in particular. Technologies such as AJAX and APIs allow the library to service user needs when they arise, and not only during operating hours. Rich and robust information can be created and hosted on library servers in order to support scholarship. Tools like LibGuides, YouTube, and blogs enable librarians to have a virtual presence on the Internet to address problems when exigent.

Rowlands et al. (2009) found that younger users turn their backs on the library as a physical space and hope to see it as a virtual digital environment. The need to be present with research materials is no longer necessary. Proxy database access and eBook-lending programs render the act of physically going to the library building superfluous. If students do not need to visit the library to retrieve material it is only logical that they get assistance making use of this material remotely as well.

Mathews makes the point that it is not known how libraries will most benefit students in providing remote services. The

library of the future will need to both innovate to develop different ways of serving users and devise ways to properly analyze and assess the impact of particular services. For services to be effective, what works must be apprehended. At the same time, to develop plans of action, libraries have to be connected to the needs of faculty, students, and administrators. Conceptually, these needs revolve around integration with the academic community. A virtual presence that interacts with users and meets needs while receiving and processing feedback would be ideal. Perhaps to develop these skills libraries need to look to information service providers in the market who have been successful, such as Google or Twitter. Not only have they had tremendous success economically but also as cultural fixtures. The term Google has entered the vernacular in regards to finding information. One of the vital factors in the success of Google has been the ability to collect and process immense sums of data in order to refine services. Libraries operate on a vastly different scale with other considerations, but taking a cue from the proven success of Google in virtual information services is the plausible approach to the virtual space presently. Analytics in education will be a topic of importance in the coming years. For a library to develop programs that meet student needs libraries must gain an understanding of what those needs are. In addition, in order to direct efforts at programs that are working a means of determining how to assess the relative worth of efforts is required.

Conclusion

Tim O'Reilly, founder of O'Reilly Media, delivered a presentation in July 2012 entitled "The clothesline paradox and the sharing economy" that is relevant to libraries moving forward in the digital milieu (O'Reilly, 2012). In it he emphasized the importance of institutions creating value for the community rather than solely extracting it. He was speaking in reference to open-source developments and the economy but the idea extends to libraries as well. Libraries often go unnoticed in the academic community and the services they provide create a tremendous amount of value for higher education. To ensure continued funding in the digital milieu libraries must create value for the institution. Providing support for digital textbooks will enable the quality of education at schools to improve greatly. It has the additional benefit of potentially reducing the financial strain on students. In helping faculty to create these resources and enabling students to use them librarians will be providing an essential service in the academy of the twenty-first century.

Libraries must accept and operate with the understanding that we live in a state of constant change in a vast, complex, and interdependent world, which is incomprehensible. While this is a daunting task, it frees the library to accept uncertainty. Higher education, and the library in particular, are subject to

the broad changes in society. They must remain nimble and adaptable to remain relevant in the academy of the future.

The principles of resilience theory, an ecological concept, can be instructive in dealing with these challenges. In an essay published on the blog *In the Library with the Lead Pipe* Karen Munro, a librarian at the University of Oregon, discusses the implications of resilience theory for libraries (Munro, 2011). In the essay she points to six survival strategies for academic libraries to enlist the lessons of resilience theory. Of particular note are her advocacy of amassing social capital in libraries and innovating to develop new competencies. Libraries can build social capital in the digital milieu by using their clout as aggregators to benefit academia. They can negotiate better terms regarding the pricing of content and advocate for intellectual freedom for faculty and students concerning DRM. In order for these efforts to be recognized and valued by institutions libraries will need to make it known that their efforts have had tangible benefits. This can be made clear to the student body by facilitating access to course materials for free. In addition, providing the support and assistance faculty need to make use of these tools will imbue value to the institution. Innovation is something that is enabled by the digital tools of the twenty-first century. The ability to publish and distribute academic resources at minimal costs is a faculty that librarians should take advantage of. The freedom that exists in the present moment will not exist indefinitely. Modes of practice and distribution will be formed surrounding eContent and librarians should engage in this process now to ensure the interests of the academy are represented.

Critical information studies (CIS) seeks to protect fair use in practice. This is an important function for librarians to perform in the digital milieu, as so many issues have not been legislated on yet. Siva Vaidhyanathan points to four key liberties that CIS

seeks to investigate in the ''Afterword'' to the May 2006 issue of *Cultural Studies* :

1. The liberty to adapt, reuse, and remix cultural works.

2. Agency on the part of users to determine what the methods and tools will be used for rendering, displaying, and distributing digital material.

3. The relationship between information control and technology.

4. The ramifications of flows of information

(Vaidhyanathan, 2006, p. 293).

There are several ways that librarians can do these while also proving their worth to academic institutions. The efforts to create academic presses at libraries situated in the academy will help to foster intellectual freedom. As Ted Striphas and Kembrew McLeod find in their article ''Strategic improprieties: cultural studies, the everyday, and the politics of intellectual properties,'' Duke University Press is committed to intellectual freedom and supporting fair use for authors (Striphas and McLeod, 2006, p. 124). The fair use statute was written into the Copyright Act to provide scholars with the ability for discourse and insight regarding intellectual works and librarians can uphold this feature in the digital milieu. Librarians can also seek to guarantee access to material on different platforms by supporting student engagement with content.

The digital milieu presents librarians with challenges as well as opportunities. The means of reproduction enabled by digital technologies are unprecedented and akin to the revolution in knowledge dissemination brought about by the printing press in Europe in 1440. Librarians play a vital role in guaranteeing access to this content while also ensuring that the rights promised in the 1976 U.S. Copyright Act are protected.

Glossary

Adobe Digital Editions (ADE): A platform for collecting and managing eBook libraries developed by Adobe Systems. It is commonly used as a content management method in relation to ePubs that have some form of DRM, be it through a lending library or vendor.

Aggregation: The act of collecting, cataloging, and making materials available.

Android OS: The mobile operating system developed by the Android Corporation and under the control of Google since 2008. It is based on an open Linux kernel and is highly modifiable and customizable. Google distributes the code and maintains it free of charge.

American Civil Liberties Union (ACLU): This group is a U.S. advocacy group primarily concerned with issues related to rights gauranteed in the Constitution. Their work focuses on freedom of speech, intellectual freedom, and the separation of church and state.

Asynchronous JavaScript and XML (AJAX): A new fusion of tools present in the browser stack. Essentially, these tools

and the way in which they cooperate have been so refined that they enable instantaneous occurrences on webpages. Rather than require a computer to continuously go back to the server to get more information so that a page can function, AJAX enables actions to take place on the client-side computer. It allows for data to be constantly gathered from a server without disruption of the browsing experience for the user.

Application programming interfaces (APIs): Fundamental features of web-based content that allow software components to communicate with each other. Bridges that allow for the interoperation of apps, websites, data collections, and more.

AZW: The format in which books are distributed for the Kindle platform by Amazon. It is essentially a repackaging of the `.mobi` format. The format has varying levels of DRM and serves as a way for Amazon to prevent piracy of content.

Berkman Center for Internet & Society: A project based at Harvard University that is focused on the legal aspects of the flow of information in the digital realm. Many leading copyright authorities are involved in the center.

Calibre: An open-source software tool that helps users to manage eBook libraries. It can be used to convert files between ePub, Kindle, and PDF formats.

Cascading Style Sheets (CSS): The styling information for webpages is written in a style sheet. A separate file is often linked to from a website to provide all the styling information for the content contained in the HTML code. The styling code

can also be included along with the content of the webpage in HTML.

Client: A program or software that runs on a personal computer and utilizes data from a server. For example, Microsoft Office is a commonly used email client. Often the term is used to refer to the PC running the software.

Connexions: A project that began at Rice University that provides a wealth of open educational resources and the tools to modify them for particular purposes.

Copyright Term Extension Act (CTEA): The act was passed by Congress in 1998 to extend copyright protection for works about to enter the public domain. In practice it prevents expiring works from entering the public domain for an additional period. Congress cannot extend copyright protection indefinitely, but continued extensions for periods of time could prevent certain works from ever entering the public domain.

Copyright Clearance Center (CCC): A nonprofit corporation that acts as a broker between rights holders and parties interested in using copyrighted works. A website is provided at *http://copyright.com* that allows users to determine the copyright associated with a particular work.

Creative Commons: A nonprofit organization begun in 2001 that enables the use and sharing of works through free tools which allow creators to manage copyright law.

DAISY Digital Talking Book (DTB): The file format traditionally employed in the accessibility world to provide learning opportunities to the visually impaired.

DeCSS: Programs for decrypting the content-scrambling systems used on most DVDs that prevent copying.

Digital Millennium Copyright Act (DMCA): In 1998 the U.S. legislature passed this act to bring U.S. copyright law in line with two 1996 WIPO treaties concerning intellectual property and digital content. It is primarily concerned with preventing the circumvention of rights restriction measures.

Digital rights management (DRM): Any set of protection measures rights holders place on digital works such that commercial value is not compromised. It often inhibits functionality that does not have direct relation to market concerns.

Directory of Open Access Journals (DOAJ): A repository of published works of open-access journals.

Electronic Frontiers Foundation (EFF): A San Francisco–based nonprofit that defends digital rights. They are the primary advocacy group for intellectual freedom and open standards relating to the Internet.

Encryption: A common form of DRM that relies on altering digital information mathematically so that it is scrambled without proper authorization.

End user license agreement (EULA): Used for most software an end user license agreement includes the legal stipulations placed upon use of said software put forward by the licensor. It establishes the purchaser's right to use the software. The license may define ways in which the software can be used for sharing and creating.

ePub: The ePub file format is the primary open file format for electronic books. Nearly all eReaders and apps accept this format, regardless of the source of acquisition. It is developed and maintained by the IDPF.

European Union Copyright Directive (EUCD): The European Union passed this directive in 2001 to bring copyright law in line with two 1996 WIPO treaties concerning intellectual property and digital content. It is primarily concerned with preventing the circumvention of rights restriction measures. It mirrors the DMCA in many ways.

Flat World Knowledge (FWK): A for-profit company that facilitates the use and production of textbooks in digital and print forms.

Hard-technology DRM: Systems that control or disallow direct or subsequent use of material, such as saving, printing, or emailing despite the functionality present in the OS or browser.

HyperText Markup Language (HTML): The language the Internet is based on. Styling can be included along with content. As the web has matured, HTML has primarily become the method of conveying content for websites and works using JavaScript and CSS to deliver content.

iBooks: The proprietary eReader for iOS. Files are also issued in the `.ibooks` format. It is the first eReading application to incorporate many of the elements of ePub3. The program can be used to read ePubs, yet iBooks files are not renderable in other programs.

iOS: The operating system for Apple mobile devices including but not limited to the iPhone, iPad, and iPod. It is a highly proprietary and controlled OS.

International Digital Publishing Forum (IDPF): The IDPF is dedicated to the development of electronic publishing and standards relating to it. Members include publishers (in all formats), booksellers, authors, and software developers involved in eContent.

Jailbreaking: The act of removing the content restrictions on iOS devices. It allows users to take full control of devices and access content repositories other than the Apple App Market.

JavaScript (JS): An object-oriented scripting language that is instrumental in controlling the behavior of web-based user interfaces. It is a fundamental aspect of Internet content along with HTML and CSS. It is not a version of the Java programming language.

Kindle Direct Publishing: A tool that allows authors to directly publish in the appropriate Kindle format and sell through Amazon.

Linux: The project initially conceived of as the communal development of a computer operating system by Finnish programmer Linus Torvalds. It has been under constant development by a huge community of users since initial release in 1991. The basic format of Linux is similar to Unix, which Apple has always used to build its OS. Many of the most popular applications presently are based on Linux, including Mozilla Firefox, Google Android, and the hugely popular Apache server.

MOBI: An eBook file format first developed by MOBIpocket, a French company. Amazon purchased the MOBI format and reader in 2005. Since the acquisition Amazon has ceased supporting the software and user support for the reading platform. The MOBI format and the Amazon word (AZW) format are the same except that AZW operates with a modified DRM scheme.

NII (National Information Infrastructure): The precursor to the World Wide Web. The term is often used in place of cyberspace.

National Institute of Standards and Technology (NIST): A U.S. government agency that is part of the Department of Commerce which works to provide standards and protocols relating to science and technology.

One Laptop Per Child (OLPC): A project coordinated by Nicholas Negroponte, an architect and head of the MIT Media Lab, which has ambitiously sought to do exactly what the name implies, provide laptops to children throughout the world.

Open eBook Publication Structure (OEBPS): The part of an ePub file that contains all the content of the book.

Open educational resources (OERs): Resources, in any form, that are freely available for use in educational endeavors. They can often be modified, edited, or remixed for particular purposes.

OER Commons: A repository of open educational resources that partners with many groups such as Creative Commons and Connexions.

OpenStax: A project of Rice University and partners that is focused on developing free, high-quality, academic textbooks. It is closely related to the Connexions project and many of the same people are involved.

Open Container Format (OCF): The packaging format of an ePub file. It is comprised of three parts: the OEPBS, OPF, and a simple text file that identifies the file type.

Open Packaging Format (OPF): The component of an ePub that contains all the metadata and structural information relating to the content of the file.

Operating System (OS): The software system that is needed to communicate with the hardware device so that a computer can function.

Peer-to-peer network (P2P): A software system that allows computers to distribute and consume data without the need for a central server. It allows all computers to function as servers, thereby democratizing the means of information distribution.

PRD (personal reading device): A device dedicated solely to eReading.

Portable document format (PDF): A file format for conveying content based on the PostScript language. It is the most common file format for the text-based material distributed throughout academia. While it has excellent properties for print purposes, several factors make it suboptimal for digital reading.

Print on demand (POD): A text produced and distributed in small quantities in print form when an order is made.

Public domain: The legal status of a work where no permission or allowance is needed to make use of said work. Materials enter the public domain either if the creator waives copyrights or the copyright term has expired.

Rulemaking: The triennial review of the state of the DMCA. The Librarian of Congress is charged with assessing the provisions of the act in light of current developments and making amendments when necessary.

Server: A computer that provides data to other computers.

Soft-technology DRM: Server-side configurations of software or hardware that discourage certain uses, but you can hack the DRM through the OS or browser to perform the desired use.

Technological protection measures (TPMs): Access control measures based on technology that often also impede authorized use.

Tethering: In reference to DRM, the linking of authorized users and digital content.

User interface (UI): The means through which a user controls a software program or hardware device.

World Intellectual Property Organization (WIPO): The U.N. agency dedicated to developing international standards for the use of rights-restricted concepts to promote economic development and stimulate growth.

W3Schools: The standards-making authority for web content.

WYSIWYG: What You See Is What You Get is the term used for an editing module within a webpage or program that allows users to edit text as it will appear. It is a prominent feature of many online collaboration tools such as PressBooks, WordPress, and Connexions.

eXtensible HyperText Markup Language (**XHTML**): A markup language that allows for visual expression of information like HTML while also conforming to the more stringent standards of XML.

eXtensible Markup Language: A markup language that allows data to be conveyed. It is very similar to HTML with the major exception being that programmers are granted the capability to create their own tags allowing for a higher degree of agency in organizing information.

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