Book Title: Managing Intellectual property in Digital Libraries.

Chapter Title: Open access to knowledge and challenges in digital libraries.

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ABSTRACT

The recent developments in Information and Communication Technologies (ICTs) have profoundly impacted modern information and knowledge management dynamics. In particular, the internet and the World Wide Web (WWW) have redefined the different aspects o scholarly communication and the role of its stakeholders. Among the emerging realities from these paradigm shifts are the open access and digital library phenomena. As the world embraces these phenomena there are emerging issues and challenges, chief amongst these are the barriers imposed by the copyright acts to free access to information. This chapter gives a detailed understanding of open access as an aspect of digital libraries and further explores the existing strategies for dealing with the copyright issues. It is based on desktop study of the available literature. It concludes that the future of scholarly communication rests with open access content, which will constitute the bulk of scholarly output and a formidable pillar of digital libraries. In this recognition, different players have come up with successful interventions for dealing with the barriers posed by copyright requirements. The chapter recommends that all the players in the scholarly communication sector should fully embrace open access principles at their levels and that stakeholders should urgently relook at the challenges posed by copyright to the realization of open access.

Keywords: open access, digital libraries and copyright.

INTRODUCTION

Information and communication technologies (ICTs) have redefined all aspects of human life in a profound way. In the information and knowledge management sector, ICTs have affected the reproduction, saving, and distribution and preservation of the collective memory of humanity. Among the many ICTs, the discovery of the internet in the 1990s had far reaching implications in the management of information, it created a global digital sphere, which coupled with the hyperchange of technologies and social networks has impacted all aspects of knowledge management. Based on the internet platform, the distribution of knowledge today is a global phenomenon. This is the reality that defines the current knowledge society which is based on the global interconnection of technologies.

The rapid evolution of ICTs and their application in knowledge management has come with new paradigms in the treatment of the traditional laws governing management of knowledge resources, thus redefining

realities in the knowledge market. Casualties in this case are the intellectual property rights which have to tightened or reformed due to weaknesses opened by the new technologies and the new demands in the information and knowledge market. These laws are now viewed as being obstacles to the distributions of information and knowledge as a matter of public good in light of the global open access movement. Unesco (2015) asserts that the instantaneous reaction towards making the Law stricter regarding the availability, use, and distribution of creative works through the internet as a networked public sphere is in itself a constraint to the evolution of digital libraries and repositories. This chapter advances the understanding of open access content in connection to digital libraries and copyright laws.

BACKGROUND INFORMATION

The evolution of digital libraries has been very dramatic starting with the discovery of Memex machine in 1945 to help the world deal with the exponential growth of information – the information explosion. This discovery provided a micro-form based means of storing and retrieving information (IFLA, 1998). The eventual discovery of computers around the same time, led to the application of microforms in building large bibliographic databases that created new paradigms in information retrieval systems in the library. This may be viewed as the first major step in the evolution of digital libraries. It was immediately followed by the discovery of the internet in 1990s, a redefining phenomenon in the development of digital libraries and landmark development from the memex database technologies. The network technology and its integration with telecommunication technologies allowed organizations to connect a number of computers into local and wide area networks so as to share software applications, information storage spaces and to transport information electronically. Arising from this scenario, the world embraced libraries of digital information which was ubiquitous in nature as contrasted to traditional libraries (IRMT, 1999).

The exponential growth in literature in the 20th century, underpinned by the internet and the World Wide Web (WWW) technologies, created enormous challenges to libraries and research institutions. The burden of information explosion became catastrophic; publishing costs spiraled while distribution of scholarly communication was facing teething inefficiencies. In particular, libraries were faced with the burden of spiraling prices of journals, limited physical space for their storage and budget cuts. This scenario called for new models of scholarly communication which led to open access movement. This step stands out as an outstanding progress in the evolution of digital libraries. Currently, many of these libraries are populated with an increasing collection of open access content as compared to subscribed and licensed materials. As such, open access literature should be seen as a fundamental building block for digital libraries across the world.

UNDERSTANDING DIGITAL LIBRARIES

Graham (1995) opines that the concept digital library is very confusing in literature. One, it is used synonymously with terms such as virtual library, electronic library and libraries without walls. Two, the concept attracts different connotations in different fields: in the area of information retrieval, it is seen as a large database; for people in library science it is seen as a mere development in library automation and just as an application in the World Wide Web (WWW). Further, from the librarian's point of view, so many things are erroneously considered as digital libraries. They include collections of computer algorithms or software programs for computer scientists, commercial documents and databases maintained by different vendors and electronic documents maintained by large corporations and worse still a collection of documents in the WWW which to scholars and librarians are not credible and authoritative enough to be accepted as being academic. All these perspectives end up clouding the understanding of digital libraries.

It is generally appreciated that the understanding of traditional libraries should be adopted in defining digital libraries. Like traditional libraries, digital libraries are expected to address functional issues like collection development and management, abstracting and indexing, access and retrieval, provision of reference work, and the preservation resources. In this light, Waters (1998) looked at digital libraries as organizations that select, organize, interpret, distribute and preserve a collection of digital materials to make them available for a defined user community or communities. As such the difference comes in the context of their service provision but almost everything else remains constant theoretically, when they are compared to traditional libraries. With this at the background, IFLA (1998) underlined the defining features of digital libraries as follows:

- They are the digital face of traditional libraries with both electronic and traditional fixed media collection.
- Include digital materials that exist outside the physical and administrative bounds of any one digital library.
- They are based on all the processes and services that are associated with traditional libraries.
- Digital libraries are tailored to the needs of particular communities or constituencies, as traditional libraries.
- Success of digital libraries requires both the skills of librarians as well as those of computer scientists.

A new perspective in the understanding of digital libraries is the reality that their content may be acquired and disseminated at a fee of for free. This creates two perspectives to the content of digital libraries as being open and closed access.

OPEN ACCESS CONTENT

Open access literature is one of the fundamental pillars of modern digital libraries. In many digital libraries today, the composition of open access literature is immense and on the growth trajectory. They have opened new and formidable avenue for scholarly communication, especially for journals. The journals were

discovered in the 17th century and have since remained a leading avenue for communicating scholarly ideas. The serial crisis of the 21st century defined by among other things high cost of production and cumbersome distribution for journal heralded the evolution of open access literature as a response to the challenges (Unesco, 2015). The Open access revolution is anchored on the possibilities provided by the internet, WWW and other ICTs for the creation, distribution, sharing and storage of e-journals, for all those who had access to such technologies.

The history of open access literature is tied to both the history of digital libraries and the developments in scholarly communication. It goes back to the dawn of civilization when people learnt how to record their experiences in inscriptions and later manuscripts. The discovery of the printing press in the 15th century brought a new impetus to scholarly communication by enabling publishing of printed book form. This development was followed by the evolution of scholarly journals in the 17th century to help researchers and academicians publish and disseminate the results of their research work. Today, publishing in a peer-reviewed journal is the prime indicator of professional standing for researchers and academicians. The information explosion in the 20th century brought new challenges against the success that the world had recorded in journal publishing, calling for improved interventions. The emergence of e-journals in the 1980s and the development of WWW in 1990s helped in partly arresting these challenges. New models of scholarly communication were initiated to facilitate self-publishing where the responsibility and ownership of scholarships rests with the creators (Waters, 1998). It further provided the research community with the ability to unlock the traditional scholarly publishing system by providing new approaches. The technologies have made online publication possible and preferable for many scholars forming the foundation for open access literature.

Suber, P. (2012) argues that Open Access literature is digital, online, free of charge, and free of most copyright and licensing restrictions. The literature is usually made freely available on the public internet, thus making it possible for users to search, read, copy, download, distribute, print and use them for any other lawful purpose subject to privileges provided by copyrights for authors to control the integrity of their work and the right to be properly acknowledged and cited. According to Bethserda declaration (2003) open access refers to a situation whereby copy right holder grants to users a free access to, and a license to copy, use, distribute, transmit and display their work and their derivatives publicly in any medium for any responsible purpose but subject to proper attribution of authorship.

The global achievement in the provision of open access content has benefited mostly from the open access movement – a global phenomenon whose main focus is to address the challenges related to accessing electronic journals

including increases in subscription costs, hiking of online access fees, cancellation or reduction of subscriptions of many over-priced serials due to budgetary limits. These realities had profound negative bearings of the output of research institutions. This movement started in the 1990s, driven by different stakeholders. It has since realized many achievements.

ACHIEVEMENTS OF OPEN ACCESS MOVEMENT.

The catalogue of the milestones that the world has recorded since the dawn of open access movement cannot be fully catalogued, but the following will suffice.

1) Open access declarations:

Three major global declarations, dubbed BBB, by stakeholders in open access movement, today govern almost all the developments that the world is making in the sector. They embody the principles and philosophies used in the provision of open access content on the internet, repositories and digital libraries. They can be analyzed as follow:

a) Budapest Open Access declaration:

The declaration was made in the year 2002 in Budapest Hungary as a call on all stakeholders to help open up access to all literature and remove the barriers, especially the price barriers, so that people can enjoy the benefits of open access. Its tenets were as follows:

- Scientists and scholars should publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge.
- Peer-reviewed journal literature be made completely free and ensure unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds.
- Removing access barrier to research information is matter of public good – access and application of research information accelerate more research, enrich education and form the foundation of development in all areas.
- Open access benefits both readers and authors for it gives readers extraordinary power to find and make use of relevant literature, and that it gives authors and their works marked visibility, readership and impact.
- Open access literature primarily covers peer-reviewed journal articles, but it also includes any un-reviewed literature put online for access by other researchers.
- Two fundamental strategies necessary for open access should be pursued. They are self-archiving (scholars individually deposit their refereed journal articles in open electronic archives) based on standards prescribed under open access initiatives and the need to launch open access journals.

b) Berlin Declaration:

The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities came up in the year 2003, only one year after the Budapest declaration. The issues addressed under this declaration can be summarized as follows:

- An appreciation that internet has revolutionized the practical and economic realities in distributing scientific knowledge and a commitment to leverage it as the global scientific knowledge base and human reflection.
- It specifies open access contributions (resources) as original scientific research results, raw data and metadata, source materials, digital representations of pictorial and graphical materials and scholarly multimedia material.
- It stipulates two conditions that open access contributions must meet:
  i) The rights holders should grant users free, irrevocable, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, subject to proper attribution of authorship.
  ii) A complete version of the work/contribution in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards.
- The signatory organizations undertook a commitment to be leading advocates for open access by among other things encouraging members to publish under open access and promoting quality and merit of open access literature.

c) ***Bethesda declaration.***

The Bethesda statement came shortly after the Berlin declaration in 2003 in Maryland USA. The declaration was aimed at stimulating discussion within the biomedical research community on how to proceed, as rapidly as possible, to the widely held goal of providing open access to the primary scientific literature. It was a statement of commitment targeting funding agencies, publishers, libraries and scientists, prescribing what ought to be done to promote the rapid and efficient transition to open access publishing. The content of the declaration can be summarized as follows:

- It adopted a definition of open access based on the conditions set forth by the Berlin declaration and sought to provide the mechanism for enforcement of proper attribution for authors of copyrighted works.
- It calls on research institution and funding agencies to promote open access in their policies by encouraging their researchers to publish on open access.
- Libraries were urged to promote open access resources and to teach their users about their benefits.
- Publishers were called upon to provide open access options for publishing of scientific work and to develop tools for authors and publishers to facilitate publication.
- Scientists and professional societies were tasked to embrace principles of open access by selectively publishing in open access journals.

2) Open access repositories:

a) ***arXiv.org Repository:*** This was started in 1991 as an electronic archive and distribution server for research articles. The subject areas of the articles include mathematics, computer science, quantitative biology, quantitative finance and statistics. The repository is operated by the Cornel University library. It allows users to retrieve articles via web interface and gives registered authors tools to submit articles, update their submission and subscription to subscribe to automatic email alerts.

b) ***PubMed Central Repository*****:** PubMed Central (PMC) was launched in 2000 and has continued to grow rapidly. It was initially operated based on a policy that required voluntary deposit of all research funded by the National Institutes of Health (NIH). Later a law was put in place requiring all NIH-funded peer-reviewed research to be deposited into PubMed Central within 12 months of publication. As a result, the repository has expanded dramatically in the recent past, with over 4 million articles in the biomedical and life sciences.

3) Open access softwares:

a) ***E-prints Institutional Repository Software:*** This was one of the first IR software packages to appear and has been available for 15 years. It originated from the University of Southampton. The software is open source and provides room for modification by the user. Once installed, users may upload documents and provide the necessary metadata for the records by filling out a simple web form. Due to its special features, E-prints is currently in use in at least 300 institutions worldwide.

b) ***Open Journal Systems (OJS)***: This is open source software for the management of peer reviewed academic journals which was created by the Public Knowledge Project. Originally released in 2001, Open Journal Systems (OJS) was designed to facilitate the development of open access peer reviewed publishing by providing infrastructure for online presentation of journal articles. By mid-2015, OJS was being used by at least 8,000 journals worldwide.

c) ***Dspace software:*** It started in the year 2002 as an open source software to help institutions in building digital repositories. It is easily customizable to the needs of the organization. DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, mpegs and data sets.

4) Open access journals

a) ***Public Library of Science (PLOS) journals:*** The Public Library of Science began in 2000 with an online petition by Harold Varmus calling for all scientists to pledge that from September 2001 they would discontinue submission of papers to journals that did not make the full text of their papers available to all, free and unlicensed, either immediately or after a delay of no more than 6 months. With grants from donors, PLOS officially launched its operation on 13 October 2003 with a journal in the area of biology. By 2015, PLOS had risen to seven journal publications – biology, medicine, genetics, pathogens, tropical diseases, clinical trials and bioinformatics.

b) ***BioMed Central journals*:** This is a United Kingdom-based scientific publisher specializing in open access journal publication. In many quarters BioMed Central journal is considered the first and largest open access publisher. It is owned by Springer and has other associated companies like Chemistry Central and PhysMath. Together, they publish over 200 scientific journals online.

5) Open access directories and databases:

a) ***OAIster Database*:** This is an online combined bibliographic database of open access materials. The database started in 2002 at the University of Michigan with the aim of establishing a retrieval service for publicly available digital library resources provided by the research library community. OAIster has since grown to become one of the largest aggregations of records pointing to open access collections in the world. In 2009, OCLC took over the management of the database and has ensured continued access to open access collections aggregated in the database.

b) ***Directory of Open Access Journals (DOAJ)*:** This is a website that lists open access journals. It aims at increasing the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact. The idea of directory was conceived in 2002 and was funded by the open society institute. As at 2015, the database contained records for 10,000 journals.

c) ***OpenDOAR (Directory of Open Repositories)***: This is an authoritative directory of academic open access repositories. The directory also provides tools and support to both repository administrators and service providers in sharing best practice and improving the quality of the repository infrastructure. The underlying database has been designed from the ground up to include in-depth information on each repository that can be used for search, analysis, or underpinning services like text-mining.

6) Other initiatives:

a) ***Scholarly Publishing and Academic Resources Coalition (SPARC)*:** This is a global network of libraries working to create more open systems of scholarly communication. The aim of the venture is to ensure increased research impact and returns through faster and wider sharing of the research output. SPARK runs four programmes: open access, open education and open data. Since its inception, the coalition has attracted membership from across the globe. Its membership is based on annual fees.

b) ***World Summit on the Information Society (WSIS) Action Lines*:** This is an UN summit held variously to discus opportunities of the new ICTs and their associated challenges. Through these summits, the targets have been established for the deployment of ICTs running along other internationally agreed development goals. The summit is an important international action towards building a knowledge society - societies in which people have the capabilities not just to acquire information but also to transform it into knowledge and understanding, which empowers them to enhance their livelihoods and contribute to the social and economic development of their societies. This is precisely tandem with the open access movement.

c) ***Open access week:*** Open access week is a global annual event celebrated during the last full week of October. It is marked with different events displays, training sessions, or producing materials/resources to share information about open access activities by the library. The events provides an opportunity for academic and research institutions learn more about the potential benefits of Open Access, to share what they've learned with colleagues, and to help inspire wider participation in Open Access developments. It started formally in the year 2009 and has been celebrated all through.

d) ***Scholarly Publishers Association (OASPA)***: The association stated in the year 2008 to represent the interests of Open Access (OA) journal and book publishers globally in all scientific, technical and scholarly disciplines. It supports members through exchange of information, setting standards, advancing models, advocacy, education, and the promotion of innovation.

COPYRIGHT DILEMAS FOR OPEN ACCESS

Copyright legislation is part of the wider body of laws known as intellectual property (IP) laws which refers broadly to the creations of the human mind. They are enacted to protect the interests of innovators and creators by giving them rights over their creations. The need to protect IP dates back to the Paris Convention for the Protection of Industrial

Property (1883) and the Berne Convention for the Protection of Literary and Artistic Works (1886). These treaties are administered by the World Intellectual Property Organization (WIPO).

Copyright (at times referred to as author rights) relates to literary and artistic creations, such as books, music, paintings and sculptures, films and technology-based works (such as computer programs and electronic databases). The expression copyright refers to the act of copying an original work which, in respect of literary and artistic creations, may be done only by the author or with the author's permission. The laws are established on the fact that authors have certain specific rights in their creations that only they can exercise. According to WIO (2016), copyright protects two types of rights - economic rights that allow right owners to derive financial reward from the use of their works by others and moral rights which allow authors and creators to take certain actions to preserve and protect their link with their work. Under moral rights, the following actions on copyrighted works are prohibited and can only be authorized by authors reproduction of the work in various forms, such as printed publications or sound recordings; distribution of copies of the work; public performance of the work; broadcasting or other communication of the work to the public; translation of the work into other languages; adaptation of the work, such as turning a novel into a screenplay. Under the Berne convention, the moral rights that authors are entitled include the right to claim authorship of a work (sometimes called the right of paternity or the right of attribution) and the right to object to any distortion or modification of a work, or other derogatory action in relation to a work, which would be prejudicial to the author's honor or reputation (sometimes called the right of integrity).

For many years there was a global convergence of opinions as to the benefits of copyright. Copyright was seen as a means of helping countries in protecting their cultural property and to benefit from international trade and development. Protection of copyright and related rights is therefore a necessary precondition for participation in the system of international trade and investment. According to WIPO (2008) countries have laws to protect intellectual property for two main reasons. Firstly, to give statutory expression to the moral and economic rights of creators in their creations and the rights of the public in access to those creations and secondly, to promote, as a deliberate act of Government policy, creativity and the dissemination and application of its results and to encourage fair trading which would contribute to economic and social development. However, in the academic and research quarters, copyright has been viewed as a barrier to the free flow of information. It is within this school of thought that different exceptions have been preferred to the original copyright laws. Key among these amendments is the 'Fair Use' doctrine which allow the use of works without the right owner's permission, taking into account factors such as the nature and purpose of the use, including whether it is for commercial purposes; the nature of the work used; the amount of the work used in relation to the work as a whole; and the likely effect of the use on the potential commercial value of the work.

The realities in the information age have converged to shake the very foundation of copyright laws. These realities are testing the whole idea behind copyright laws – to promote progress of science by giving authors exclusive rights over

their work for limited duration (originally 14 years). It has always been appreciated that societies thrive when ideas and expressions are made publicly available. As a result, the popular thinking has generally been against commoditization of information that has been seen to run counter to the long standing academic principle of the free interchange of ideas. To this extent the barriers placed by economic rights of the copyright holders (authors or their licensees) are seen to be threatening ability to advance research (Hilton, 2001).

In the current scientific world, while some commercial publishers are still screwed to commodification and commercialization of their scholarly works, the research community is fast embracing alternative pathways to ensure that authors and users of scholarly literature retain some of the exclusive rights for fair use and continuation of the knowledge creation process. These alternatives are rightly in conformity with overriding principles behind copyright protection. At a time when knowledge is accepted as one of the leading resources for human prosperity the limitations to its access and use should be opposed on the basis of public good. The open access movement is anchored on this premise (Hess & Ostron, 2003).

Managing copyright for open access content.

Since the dawn of open access movement, researchers have not been very enthusiastic to embrace open access for their works. In response, universities and funders have introduced many strict open access policies to try and force them to do so and subjected librarians with the difficult task of tracking them down and deposit copies of faculty papers. As such, the transition to open access is proving a slow, unpredictable, and at times self-defeating. The initial aim of open access to make research freely available for anyone to view, adapt and reuse the research community, did not envision the barriers posed by copyright. Even the Budapest initiative left more questions than answers to this effect. To date, copyright has proved to be an immovable barrier to the realization of open access. There are generally two major alternatives to Copyright regime for protecting author's rights as well as users' freedom of use, reuse, share, distribution and modification of the original work – *creative commons licenses and copyleft* (Suber, 2012).

According to Klimpel P. (2012), the idea of commons has its roots in the study of natural resources. Traditionally it was used to refer to natural resources like forests, grazing land and water resources which people in community use collectively and has to be managed to guarantee the needs of all. Such resources must be protected with the requisite policies and decisions to guarantee their equitable use and sustainability. The idea of common resources was adopted in the field information and knowledge management, at the dawn of open access movement, by embracing the term knowledge commons. The commons are meant for the collective and individual good of all members of the society. In the case of knowledge commons, the more

they are used the more they serve the greater good of the public. For the commons to serve the general good there must be rules, decisions and behaviors meant to mange collective action on the commons. The idea of creative commons emanated from this background.

Unesco (2015) asserts that Creative Commons Licenses are public copyright licenses that enable the free distribution of an otherwise copyrighted work. It is used by an author who wants to give people the right to share, use, and build upon a work that they have created. The licenses were initially released in 2002 under the following licenses:

a) **Attribution (CC-BY):** The license allows others to copy, distribute, display, perform and remix an authors work so long as the users give credit to the authors name as requested.

b) **No derivative works (CC-ND):** This license confers the rights contained under attribution but prohibits derived works of the content. Derived works are fundamental to advancing knowledge through research, subject to open access. It allows elements such as figures from a published research article to be reused in other studies, without needing to request permission of the publisher. Similarly, article translations, image libraries, case report databases, text-mining enhancements and data visualizations are all examples of how additional value can be created by allowing derivative use. Under this license, these practices are disallowed.

c) **Share-alike (CC – SA):** These licenses allow users to create and distribute derivative works, but only if those works (derivatives) are shared under the same Share-Alike license so as to spread the continuing use of the licenses in its derivatives. This both helpful and limiting for not allowing derivatives to be mixed with other content. This makes CC-BY most preferred.

d) **Non-commercial (CC-NC)**: Works the same way as attribution licenses but applicable only where the use will not be for commercial purpose, that is, others can copy, distribute, display, perform and remix an author's work but for non-commercial purposes only.

The creative common licenses led to different types of open access. Initially when open access was being embraced, two methods were proposed for making research available over the internet – green and gold open access. But because of teething challenges to their implementation other types of open access were sought. These can be outlined as follows:

1) Gold open access:

Gold open access journals provide barrier-free access to the full-text of articles online, immediately on publication. Articles in such journals are rigorously peer-reviewed retaining the quality hallmarks of the

academic publishing process so as to guarantee quality. These journals are usually supported by the payment of an article processing charge (APC) by the author, institution or research funder of the accepted manuscript.

2) Green open access:

This is where articles published in an appropriate journal, has a supplementary copy free for all on the web (usually on the author's institutional website). This approach is about balancing between publishers' financial interests and the public good under open access. The major challenge with Green OA is it relies on the authors to voluntarily self archive their works for free access over the internet.

3) Hybrid open access:

Under this arrangement, authors can free their individual articles for anybody to read by making an optional payment to the publisher, while the rest of the journal's content remains reserved for subscribers only (Weber 2009). The common benefit enabled by payment is that the authors usually retain full copyright of the final published article and the article is labeled with a Creative Commons license, which explicitly outlines what readers can do with the article. Hybrid open access journals are becoming increasingly popular because different donors have come on board to help authors pay publishing fees.

4) Delayed open access:

These are journals which make their articles free after some period of time – known as embargo period. The embargo period varies from a few months to years. This period is generally meant to help the research recover expenses spent in the production of the article. This amount is usually marginal for online publications as compared to print.

Challenges to the use of Creative Common Licenses

Through the use of creative commons, the crusaders of open access imagined that the barriers scholarly communication, associated with copyrights especially to commercial exploitation by publishers would be cleared. Today this has not been not be realized – the publishers smartly came back and very expensively with charges like Article Processing Charges (APCs), especially for the hybrid open access. Poynder, R. (2017) argued that the Creative Commons licenses are not an alternative to traditional copyright, but rather they seperate the different rights that are automatically generated when a work comes into being so that creators can signal publicly that they are waiving some of those rights. Amongst other things, this means that many of the access problems associated with copyright do not necessarily go away when CC licenses are used. The author further argued that

Budapest intuitive, promised a better, more democratic, and more effective scholarly communication system under open access, but it failed to outline a practical strategy for achieving this, or of reducing the monopolistic power of legacy publishers. Its greatest oversight was its failure to appreciate the extent to which copyright would be a barrier to achieving its goal.

The CC – BY licenses have been criticized in many ways to the aspect of reuse of research output. Based on this weakness, there is evidence that some unscrupulous authors can take up open access content and repackage them for sale, thus profiting unfairly from the hard labor of the authors. This challenge may be based on the fact that the creative common regimes were designed to dispense with the time-consuming (and often impossible) task of tracking down the author(s) of a work in order to get permission to reuse it. As such, the licenses were made available in a machine-readable form so that CC-licensed content can be automatically identified and reused by machines, dispensing with the need for any human agency. This reality is compounded by the fact that policing compliance is nigh impossible – authors do not have incentive nor (one might assume) authority to prevent or punish any infringing activity. It is on this account that authors prefer the most restrictive CC license - CC BY-NC-ND. One responded in the survey was concerned about the reputational risk in cases where the original authors work is republished poorly or the content is diluted. This is a common problem in the case of reuse.

Generally, CC licenses have been opposed by authors on the following grounds (Nicholson and Kawooya, 2008):

- Researchers have a strong sense of ownership of their work and so expect to be adequately credited when others make use of or reuse it. It is not clear that CC licenses can assure this will happen;
- While they may be happy to see their work reused, most researchers believe they ought to have a say and some control over how, when and where this is done. At the very least, they feel they ought to be informed when reuse takes place. CC licenses do not require this;
- Policing copyright is extremely difficult (and expensive) and not something researchers are able to do effectively on their own. If they use a CC license they are more likely to have only their own resources to fall back on.

These concerns have seen a decline in the use of CC BY open access as scholars call for more restrictive provisions especially for reuse of their content. But in practice, the situation may be different since scholars are generally ignorant about copyright requirements, often they are desperate to have their works published.

Poynder, R. (2017) avers that publishers will always oppose open access regardless of the need of researchers and the interest of the public. To the legacy publishers, CC licenses threaten their revenues, and their historic control of scholarly communication and such they prefer working with traditional copyright licenses. These publishers are unwilling to give up their proprietary habits and have been noticeably tardy at reengineering their online platforms for

the new world. Even where authors agree to their works to be made open access, there is evidence that publishers would still circumvent this. This has been witnessed even in cases where authors have paid APCs. This trend has been defended by authors on the grounds that they are seeking to maintain academic records, ensure unique citations for the articles and disallowing duplication of the articles. These justifications seem to converge with some of the concerns raised by authors especially those pertaining to the duplication of their work and proper recognition. It totally negates the critical objective of open access, that is, publishers to cease appropriating intellectual property and downsize to become managers of peer review and research distribution channels alone. In other words, once a publisher has overseen their peer review, papers are set free on the open Web, to float where they will, and be used as the license attached to them specifies (Poynder, R. 2017). As such publishers are still hell-bent on promoting the idea of exclusivity of rights so as to secure the monetary interests in research publishing. Such rights even give them room to deny authors a share of any income that is collected by Copyright Licensing Agency (CLA) and Copyright Clearance Center (CCC) under the guise of subsidiary rights which would allow them to support the continuing publication of the Journal.

These trends contradict the intended role of copyright in the open access environments. Under gold open access, publishers are expected to recoup all their costs by charging a one-off OA fee for providing publishing services and leave all the rights with the author(s). But they are demanding more in terms of exclusive rights, with the clear aim of also earning rent from OA papers. It therefore seems that in ideal open access environment, publishers should charge APCs and thereafter make the articles freely available over the internet. This model would guarantee quality peer review for the articles, income to the publishers and availability of the articles to advance scholarly work. In this case, the authors will be entitled to copyright. Unfortunately, publishers are not content with this. As Poynder, R. (2017) argued, publishers want to have their cake and eat it. They expect not only to be able to levy a hefty publishing fee to make papers OA, but to also acquire exclusive rights in the hope of earning rent from them, and yet not take responsibility for preservation. Notably owning copyright by the author serves basically nothing when the publishers takes all the exclusive rights, even though the standard practice is that copyright will remain the property of the author(s), but control of the work pass to the publisher. As a result, authors have little or no say over when and how their work is published, marketed and sold, and to whom and on what basis it is sub-licensed. This raises the question over the significance of owning copyright under these circumstances, beyond the payment of royalties. But at the core of it, these negative tendencies associated with contractual publishing must never be allowed to rule open access publishing. This tendency is evident in situations where authors pay to publish their OA papers and assign exclusive rights to the publisher.

But there are also preservation and archiving risks associated with extending exclusive rights to publishers. There is a great danger that when authors cede all rights to publishers under CC licenses, creating an environment in which OA content might cease to be freely available. Cases of publishers closing shop are common in the history of publishing. On the other side, it is very risky to entrust preservation and archiving needs of OA resources with publishers. Experience shows that publishers do not have strong preservation culture for resources. In the open access environments, preservation of digital objects is easier because of the ease and extent of sharing. Unfortunately, even third party digital preservation initiatives like LOCKSS do not offer conclusive answers to the problems and have given low priority to open access journals.

These challenges are grossly undermining the smooth evolution to open access. It is unfortunate that the framers of Budapest declaration never gave them adequate thought - they gave far too little thought to the pragmatics of how open access would work (or even what it is!). They also somewhat naively failed to see how legacy publishers would be likely to respond to the threat that CC licenses pose for them (Poynder, R. 2017). In response to the assaults that open access movement encounter with publishers, it has been recommended that the green open access archiving be adopted. This would ensure that if the research community wants to ensure articles for which it has paid an OA publishing fee remain freely available it will need to do the preservation work itself. Currently this seems to mean incurring the additional costs associated with depositing and maintaining copies of all OA research papers in thousands of institutional repositories around the world.

Many researchers are today opting for green OA instead – that is, to continue publishing in subscription journals, and then selfarchive their papers (or more likely, allow librarians to self-archive them) in an open repository. This does not require paying a hefty publishing fee and papers can still be made OA. In fact, most of the papers freely available in repositories today will have been published in a subscription journal. This option has also been subjected to other stringent requirement. Publishers now insist on an embargo before a self-archived paper can be made freely available. They also invariably only allow a pre-print version of the paper to be deposited in a repository (not the publisher's version), and they usually prohibit papers from being deposited on commercial paper sharing sites (Poynder, R., 2017). Further, establishing which version of a paper can be self-archived is further complicated by the fact that there are many potential versions, and little or no agreement on how these different versions relate to and/or differ from one another.

It is this dilemma that has now forced academic institutions to opt to put all its efforts into establishing and supporting high-quality, central, collectively-funded, subject based repositories. Such repositories can do

more than just provide access and preservation services. They can also act as publishing platforms for community owned journals. This would help the research community the necessary tools and skills, to allow them to cut publishers entirely out of the loop and take back control of scholarly communication. This is in synch with the requirements under Budapest declaration that the role of copyright in open access should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. It will serve to exclude the publishers from commercializing scholarly works. But these repositories are also facing challenges the existing paper sharing sites such as ReserachGate. Authors who decide to share their work online often prefer these sites because they are far more user-friendly, and offer vastly superior functionality to anything any institutional repository is able to offer. As such researchers will spurn local solutions in their favour.

Business model for open access journals

It is clearly evident that open access has significantly complicated the scholarly communication landscape, especially in regard to copyright. Not only has copyright become more complex in the OA environment, but it is allowing publishers to continue to exercise a surprising degree of control over access to research, not just with green OA but also when researchers pay to make their work freely available by means of gold OA. Given that one of the primary justifications for open access was that it would reduce the ability of publishers to control scholarly communication (and gouge the public purse), this represents a major failure of the OA movement. Some of the popular business models that open access journal can explore so as to counter the challenges posed by publishers include (Klimpel P. 2012):

1) Article processing charges (APCs): This is an arrangement whereby the authors in open access journals are charged subsidized fees for processing and production of the journal. This model is based on the belief that authors and their institutions are direct beneficiaries of the publications in the scholarly journals. The benefits primarily accrue from the academic visibility which comes with publishing their works.

2) Advertising: Publishers may ride on the reputation of the journal to make money from web based advertising. In this case, the publisher can sell advertising space or work with advertising agencies. This works better where the journal has substantial following.

3) Sponsorships, grants and donations: Some open access journals rely on institutional or corporate sponsors to subsidies some or all of its operational expenses. The sponsorship usually comes in exchange of recognition on their websites and the publications from the journal. In some cases, the journals would

benefit from grants from philanthropic organizations to cover the cost of their publications. In some cases organization literally fundraise and use donations to raise money for their publishing activities.

4) Subsidies: In this case the organization may use part of its revenue to finance open access publishing programme. This is common with professional organizations which use membership fees to pay for the cost of their journal publications.

5) Versioning: This is where the publisher has different versions of digital information services, targeting different market segments. It may take the form of publishing a print version at a fee and using the income from the print version to finances open access publishing.

6) Use-triggered fees: This is whereby; fees are imposed on voluntary basis. Economically disadvantaged users (like those from developing countries) would freely access the journal while their counterparts from developed countries may be requested to pay for access on certain conditions.

BENEFITS OF OPEN ACCESS

The trends in open access development are pointing to a future where scholarly communication will primarily be based on open access. As pointed out earlier in this chapter, open access was founded based on the heels of serial crisis, a phenomenon that embodies the challenges that authors, publishers and libraries were facing as a result information explosion in the 1990s - high proliferation, high mortality rate, high production cost, cumbersome distribution, authors waiting long to get published, long time before listing in indexing services and increasing subscription costs (Unesco, 2015). The internet provided a perfect platform for responding to these problems fundamentally because it did away with the time and physical distance between all the players in scholarly communication at global levels. As such, the benefits of open access vary depending on the nature of stakeholders in the scholarly communication process. They can be summarized as follows:

- Ensures increased global visibility and accessibility for authors, only bounded by the reach of the internet.
- Authors also benefit from increased possibilities to get cited by other author which may be a consideration in employment or promotion for authors.
- It increased article level metrics (measure of the impact of an article based on citations or otherwise) for further research.
- Open access publishing has increased the extent of collaborations in publishing by authors, making it possible to collaborate internationally at individual or institutional levels.

- Open access publishing also enhances the work of authors by allowing for constructive feedback from readers through the Web 3.0 tools.
- Through open access, the libraries are able to easily satisfy the needs of their users in the face of limited capitation.

These benefits, looked at higher levels has helped the world to ensure improved scientific activities among scholars and researchers. It has taken scholarly communication to a new level by reengineering all its major facets - creation, transformation, evaluation (peer reviewing) dissemination and preservation of knowledge related to research undertakings. In particular, the networked digital environment has redefined the role of libraries in ensuring outreach and access to scholarly resources. We can therefore conclude that Open Access has made new ideas easy to find, formulate and disseminate.

CONCLUSION

This chapter has extended the theme of the book by looking into the connection between open access and digital libraries and by outlining how the barriers posed by intellectual property rights have been circumvented by the supporters of open access movement. In this chapter, open access literature is viewed as the primary building blocks for modern digital libraries. Most digital libraries have vast collection of open access content running alongside fees based resources. To open up copyrighted materials for open access, the world has embraced the creative commons principles for literary works and the copyleft for software. Added to the principles of fair use for the use of creative common licenses, were expected to open up more content for the benefit of research and humanity. Unfortunately, challenges to application of creative common licenses have undermined this noble dream calling for new interventions. The chapter has provided very bold treatment of the issue to promote an understanding of open access for the audience of the book. It has also opened very many windows for future research, both quantitative and qualitative, on the many issues which are treated theoretically in the chapter. Specifically, practical studies should be undertaken to monitor the implementation of different principles and models of open access by different stakeholders in the scholarly communication.

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