

# Research 2.0: Organizing Open Knowledge Objects through Web 2.0 Tools

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## Abstract

This short communication discusses the convergence of two emerging trends in computer-mediated scholarly communication. These are open knowledge movement and Web 2.0. Open access resources help to get rid of publishing barriers and cost barriers whereas Web 2.0 tools and services are able to make information services interactive and collaborative. Library professionals are now effectively utilizing these resources, tools and services in an integrated way for improving the existing services and designing new generation library services.

**Keywords:** Library 2.0, Open knowledge movement, Open access resources, Web 2.0;

## Introduction

Internet in general and Web in particular is playing a great role in computer-mediated scholarly communication. Web is providing the required backbone networking infrastructure which is technically, socially and legally open. Owing to the advent of Web, the whole process of digital scholarly communication is changing from traditional subscription based access to free and open access knowledge system. Next generation Web based tools like Blogs, RSS, Wikis etc. are acting as agents of change for designing and developing open and interactive academic Web space.

## Open Knowledge Objects: What and Why

Open Knowledge System is based on a set of principles and methodologies related to the production and distribution of knowledge objects in an open manner. Knowledge objects include Data (scientific, historical, geographic or otherwise), Contents (such as journal papers, reports, patent, books etc.) and General information sources. As per the definition given by Wikipedia, open knowledge object is free to use, reuse, and redistribute without legal, social or technological restriction. Open knowledge system can be considered as a superset of open data ([http://en.wikipedia.org/wiki/Open\\_Data](http://en.wikipedia.org/wiki/Open_Data))/open content ([http://en.wikipedia.org/wiki/Open\\_Content](http://en.wikipedia.org/wiki/Open_Content)), open access publishing (<http://en.wikipedia.org/wiki/OpenAccess>) and open learning resources. Open knowledge system is powered by open-source software and open standards.

The current system of subscription based scholarly communication limits, rather than expands the use and availability of scholarly research results. At the same time scholarly output is also obscuring

its institutional origins. Rounds of journal price escalations (in an exorbitant rate) and subsequent subscription cancellations (to keep pace with the dwindling library budget) act to reduce the audience further. Libraries and academic community in developing countries are worst affected. In short, the major problems of the prevalent subscription based scholarly communication may be grouped into two broad groups –

#### Publishing barriers

- Research is publicly funded
  - Personal academic efforts
  - Supported by institutions
- Authors sign away rights with publishers in order to publish
  - Given away freely to publishers
  - Publishers make huge profits
- Author gets no tangible reward
  - And loses rights to copy material for colleagues, teaching etc...
  - Institution potentially loses out on its investment

#### Cost barriers

- Not all libraries can subscribe to all journals
- During the period 2002-2014
  - WPI +118%
  - Journal +521%
  - Library budgets -29%(Source: ARL report on open access, 2017)
- Increasing prices decrease effective readership
  - Even in the affluent West

As per the Budapest Open Access Initiative (2004) declaration open knowledge system is based on open knowledge objects. This system supports

*“Free availability of research articles or publications on the public internet, permitting any users to read, download, copy, distribute or print the articles or publication, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give author’s control over the integrity of their work and the right to be properly acknowledged and cited” (Budapest Open Access Initiative).*

As a whole open knowledge objects are i) freely available on the public domain, ii) licensed to use for any legal purpose and iii) subject only to proper acknowledgment.

## Open Knowledge Stake Holders; Goals and Roles

Open knowledge system has four major components, each with its distinct role. These are – i) Open and Distributed Information System (acting as platform for scholarly communication); ii) Open Source Software and Open Standards (acting as ingredients for building services and utilities); iii) Open Access Publishing System (acting as mechanism for generating open knowledge objects); and iv) Open Learning System (disseminating learning resources across the globe). Open Access Initiative (a society developed by academicians) and SPARC (a forum of librarians) jointly issued a policy document in 2003 seeking attention of the scholarly world. The major issues raised by this policy document are summarized as below in the context of a developing economy like India –

- Scientists, researchers, academicians and scholars are not paid for their journal articles. In most cases, authors/contributors must transfer copyright to a journal publisher before it publishes the research results in journals. Contributors might receive royalties for books and other forms of knowledge (e.g. software), but reward for journal articles is more intangible: research domain advances and contributor's career develops.

Let's ask a question on the basis of this fact. If contributors relinquishing royalties and intellectual property rights, shouldn't readers (users) be the beneficiaries? Open access scholarly communication process makes knowledge objects freely available and serves interests of contributors and all potential readers. Another important point is to be taken into consideration here – most of the researches in India (like other developing countries) are publicly funded initiatives.

- In print based knowledge communication system, open access was physically, technically and economically impossible. But thanks to the Internet in general and Web in particular, digital scholarly communication process is a promising veracity. Now, the tradition of producing journal articles without expectation of payment combined with digital publishing offers an unprecedented public good: the free online availability of peer-reviewed scientific and scholarly journal articles.

Knowledge communication right from the early days is essentially technology-driven initiatives (remember the revolution initiated by the print technology). Contributors, as major stake holders of the knowledge communication process, should think about the opportunities associated with the Web-enabled open access knowledge system such as i) enlargement of user/reader base, ii) widespread sharing of knowledge, and iii) acceleration of research. Open-access archives and journals on the platform of a global network are both practical and lawful. Implementations of different forms of open knowledge system across the globe are proving that they can outshine traditional subscription-based knowledge system in their cost-effectiveness and service to science and scholarship.

- University Grants Commission (UGC), India (along with other major global educational agencies) recommended building up of Institutional Digital Repository for each UGC affiliated Universities in India at an early date.

This system can enhance the visibility of Indian research output. Open access knowledge objects are more visible. Steve Lawrence, a scientist at NEC Research Institute, analyzed nearly 120,000 computer science articles cited in a standard disciplinary bibliography. When he looked at articles with successively higher levels of impact or citations, he found successively higher percentages of open-access articles, and vice versa. He found the strength of this correlation steadily increased over a decade.

On the basis of above arguments as forwarded by the OAI and SPARC, the roles of the major stake holders of knowledge communication process may be enumerated as follows –

#### **□ Author**

Authors/contributors should submit their research results to open access knowledge system because they – i) can attract larger potential audience than any subscriber-restricted journal ii) can increase the impact of research, iii) can shorten the delay between acceptance and publication, iv) can make articles more effective by making them easier to find and use, and v) can make research works more visible to every search and retrieval tool.

#### **□ Reader**

Readers/users will have free online access (instant and interactive) to the literature necessary for their research.

#### **□ Teacher**

Teachers should promote open access movement because in such a system – i) students have convenient access to the information they need, ii) academia have legal power for making and distributing copies iii) no delays down the line, and iv) no more fair-use judgment calls, fear of liability, and painful decisions to err on the side of caution and non-use.

#### **□ Librarian**

Librarian must know the changing scenario in knowledge communication process. Library system presently deals with a journal publishing system that is no longer sustainable. Despite the opportunity for expanded global sharing of knowledge objects brought by digital publishing system, the subscription-based journal access systems in different libraries in India are characterized by the following limitations i) prices of many journals have spiraled out of control and ii) libraries have had no choice but to cancel subscriptions, defer new subscriptions, and cut into their book budgets.

There are many potential solutions to this crisis, but open access is the most effective. Librarians can take the lead in organizing open knowledge objects through establishing institutional repository, operating an open access journals, developing meta data harvesting service and applying emerging tools and technologies for making these services interactive and collaborative. The library's relevance to the faculty and, consequently, the institution, will increase significantly through these activities.

## Organization of Open Knowledge Objects

More and more scholarly materials are now taking the route of open access publishing. But quality secondary services necessary for utilization of open access primary information sources are limited in number and quality. Almost all of these services are running either on project basis or merely on the basis of voluntary efforts of enthusiastic user groups. However, we may list here the major Web-enabled secondary information services (generic and domain-specific) that cover open knowledge objects to a great extent.

### A1 Academic Subject Directory

Examples: Infomine (<http://infomine.ucr.edu/>)  
Librarians' Index to Internet ([www.lii.org](http://www.lii.org))  
Internet Public Library (<http://ipl.org/>)

### A2 Scholarly Search Engine

Examples: Google Scholar (<http://scholar.google.com/>)  
Scirus – Science (<http://www.scirus.com/srsapp/>)  
Velocity – Bio Sc. (<http://biometaccluster.com/>)

### A3 Subject Gateway

Examples: Intute – Social Science (<http://www.intute.ac.uk>)  
SSR – Social Sc. (<http://www.socsciresearch.com/>)  
SciCentral – Science (<http://www.scicentral.com/>)  
Vega – Chemical Sc. (<http://www.vega.org.uk/>)  
Intute – Arts & humanities <http://www.intute.ac.uk/artsandhumanities/>  
Voice – Humanities (<http://vos.ucsb.edu/>)

### A4 Open Access Resources – Tools and Services

#### A41 Open Access Journals –Directories and Lists

Examples: DOAJ (<http://www.doaj.org/>)  
Biomed Central (<http://www.biomedcentral.com/browse/journals/>)  
Aera (<http://aera-cr.asu.edu/ejournals/>)  
ArXiv (<http://arxiv.org/>)

#### A42 Open Access Repositories - Directories and Lists

Examples: DOAR (<http://www.openoar.org>)  
ROAR (<http://roar.eprints.org/>)  
PLOS (<http://www.plos.org/>)

## Emerging Tools and Techniques

These Web-based information entities presently allow little scope for user interaction and participation. Owing to the advancement of Web technologies (such as AJAX), the present form of Web (often referred as Web 1.0 in blogosphere) is progressing towards a User-centered entity with the support of an advanced set of technological tools that are collaborative, interactive and dynamic in nature (referred as Web 2.0 by bloggers). Interestingly, the line between creation and consumption of contents in Web 2.0 environment is hazy. Users create contents in Web 2.0 compliant services as much as they consume it (Maness, 2006). On the basis of different definitions of Web 2.0, Radfar (2005) identified following characteristics of Web 2.0 – i) a platform enabling the utilization of distributed services; ii) a phenomenon describing the transformation of the web from a publication medium to a platform for distributed services; and iii) a technology, service, meme, or entity that leverages, contributes, or describes the transformation of the web into a platform for services. The term ‘open’ has two facets in the context of Web 2.0. It is *technically open* (open architecture, open-source software, open standards) with appropriate APIs but also, more importantly, *socially open*, with privileges granted to utilize and generate contents by anyone from anywhere at any time. Therefore, design and development of technically and socially open system by using distributed network (as platform) is the primary objective of Web 2.0 entity. This primary objective is supported by other key design issues (McIver, 2006) such as –

- to use emerging technologies like AJAX (which allows users to interact directly with web pages as if they were using a desktop application in the client machine);
- to use tools through which contents can be exposed or generated, described and freely manipulated (which allow users to gather and present information from a range of sites and in new innovative multimedia ways);
- to apply user-centered design and simple intuitive interfaces (which provide users easy to use, intuitive tools, making the experience of locating, creating and sharing information as simple as possible);
- to design mechanisms that value and trust community of users as co-developers, content generators and metadata contributors (which actively and regularly inform users of updates while also soliciting them for their opinions and thoughts on service enhancements); and
- to develop channels to release frequent and rapid updates of data and software (fixes and features) on a continual basis (a concept termed “perpetual beta”, as opposed to the lengthy release cycles and bug fixing of commercial closed source software).

## Application of New Generation Tools in Library Services

Web 2.0 technologies are all set to change the way users interact with the resources and services available in the Web. Since the early days of Web, libraries are increasingly using it as a platform to disseminate services. Naturally, library professionals are closely observing this transformation

of Web, and started addressing various issues related with this transformation, primarily in biblioblogosphere. Michael Casey (2005) first coined the term “Library 2.0” in his blog ([www.librarycrunch.com](http://www.librarycrunch.com)) to denote implication of Web 2.0 and possible changes in Web-enabled library services. Miller (2005) reported that Web 2.0 principles and technologies could help libraries to serve their patrons better. Maness (2006) identified essential elements of Library 2.0 and listed Web 2.0 tools that have positive impacts on library services. Some researchers put forward theoretical foundations of Web 2.0-enabled library services (Anderson, 2004; Casey & Savastinuk, 2006) and also laid down model application methodology of Library 2.0 services (Habib, 2006; Mukhopadhyay, 2008). However, there is confusion and controversy in library community over the broad nature of definitions and novelty of the concept (Crawford, 2006). The software tools and services, which are making dream of Web 2.0 a reality, may be categorized into four major groups (not entirely mutually exclusive), and these groups of software are essentially acting as components of Web 2.0 phenomenon.

**a) The Read/Write Web component**

Traditional media including Web 1.0 sites support static contents and unidirectional flow of information. But Web as a dynamic media can allow users to alter existing works or creating original works hosted on distant servers. Tools that are leveraging read/write Web include blogs, RSS (Really Simple Syndication or Rich Site Summary), online storage and sharing tools (such as MySpace, Facebook, YouTube, Podcasts) etc. Another interesting development is availability of word processing 2.0 tools (such as Writely.com), which allow users to treat the Web, not their PC, as their favoured platform of word processing activities.

**b) Social networking component**

Social networking component includes tools that support community communication and interaction in digital environment. Users of these tools can share personal information like education, age, interests, and hobbies. They can chose to display friends, upload photographs, videos, music, view local calendar of events, take part in opinion poll, attend online surveys, raise question and get answer, create personal profile, post comments on other user profile pages, and send messages (including voice message posting) to other users. Tools such as instant messaging, discussion forum, event listing (chronological and upcoming), Flickr, Jumpcut etc. are enhancing online socialization through community oriented communication and interaction. Some of the tools under the group read/write Web such as Facebook, MySpace, YouTube may also be considered as part of this category.

**c) Collective intelligence support component**

Scholarly world is also benefited from Web 2.0 tools. These tools harness the collective intelligence of its contributors (any member of the public who registers) to add and update articles through collaborative creating, editing and storage of content by a group of users. Wikis are currently most popular tools for collaborative knowledge sharing, and the best-known example is Wikipedia

(<http://en.wikipedia.com/wiki/>). Other tools such as LibraryThing, PaperBackSwap Second Life, Digg, Technorati, Folksonomy, Social bookmarking, Amazon services are also facilitating the collective wisdom movement in the next generation Web.

#### **d) Information Mashups component**

Information mashups is a central Web 2.0 idea. These tools allow remixing of data, technologies or services from different online sources to create new hybrid services through lightweight application programming interface (API). Information mashups are becoming popular application of web 2.0 around the world such as Kohazon (integration of Koha OPAC with Amazon services), Unthirsty (a combination of Google Maps and Happy hour finder, which shows the nearest happy hour place against user query), WikiBios (a mashup where user can create online biographies of each other in a Wiki setup), LibraryLookup (integration of Google maps with library directory service in UK), Go-Go-Google-Gadget (Ann Arbor District Library's effort for integration of library OPAC with personalized homepage service offered by Google) and many other similar services.

#### **Conclusion**

The concept of Library 2.0 now started to address following interrelated questions: How are patrons using Web 2.0 services? What concepts are employed by those services? How does use of these services affect the information seeking behaviours, communication styles, and habits of active users? It could be argued that academic libraries are in a unique position to apply Web 2.0 concepts. Multiple studies by the Pew Internet & American Life Project have shown that students and scholars are eager to participate in creating Web contents and academic libraries still hold nearly a virtual monopoly in serving their required academic information needs. Under such circumstances, it is necessary to think and research how Web 2.0 concepts and services can be employed to serve local users by utilizing open knowledge objects available on a global scale.

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