An Open Model of Organization for Diverse Knowledge Systems

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Abstract

There are currently numerous knowledge systems that are marginalized by the pervasive scientific knowledge system. There is a need to develop an alternative model of knowledge organization that can fulfil the needs of multiple knowledge systems. In this paper, we compare the scientific knowledge system with indigenous knowledge systems and propose a set of principles for a model of knowledge organization that encompasses diverse knowledge systems. We also explore how the emerging digital environment offers tools for the development of knowledge organization for multiple knowledge systems. We conclude with a proposed research agenda.

Keywords: Digital environment, Knowledge organization, Scientific model.

Resumen

Existen en la actualidad numerosos Métodos de Conocimiento marginados debido al dominio del Método Científico. Hay una necesidad de generar modelos alternativos para el desarrollo del conocimiento, que permitan la interacción de múltiples métodos de conocimiento. En este trabajo comparamos el método científico con métodos de conocimientos indígenas, donde detectamos una serie de principios que debe cumplir un método de conocimiento, para que permita la interacción de diversos métodos de conocimiento. También exploramos cómo el entorno digital ofrece posibilidades para el desarrollo de la organización del conocimiento de múltiples métodos de conocimiento, y finalmente trazamos un plan de investigación.

Palabras clave: Entorno digital, Método científico, Organización del conocimiento.

1   Introduction

A study conducted from 2002 to 2005 identified the need for a model of knowledge organization that encompasses multiple knowledge systems (Birdsall et al., 2005; Shearer and Birdsall, 2006). Currently there are some knowledge systems that are marginalized by the pervasive science-based knowledge system. To illustrate this marginalization we examine Indigenous knowledge systems whose diversity provides examples of the issues raised by the more general diversity of knowledge systems and their implications for knowledge organization. A comparison of the scientific and Indigenous knowledge systems generates a host of issues regarding the inability of science-based knowledge organization to meet the needs of multiple knowledge systems. We argue that adhering only to a scientifically based worldview of knowledge organization is obsolete. We propose a set of principles for an open model of knowledge organization to encompass diverse knowledge systems. We explore how the emerging digital environment offers alternative principles and tools for the development of modes of knowledge organization for multiple knowledge systems. We conclude with a proposed research agenda.

2   Knowledge Systems

There is no widely accepted definition of knowledge systems. For our purposes, knowledge systems are the social constructs arising out of diverse ways of knowing. Knowledge systems consist of the values, norms, content, institutions, technology, and audiences of particular communities of knowing. Thus, knowledge systems address such issues as what constitutes authentic knowledge, what form it should take, how it should be distributed, who should have access to it, how access should be provided, how it should be preserved, and who is responsible for developing the required methodologies and technologies sustaining the knowledge system.

The prevailing knowledge system in Western societies is the scientific knowledge system. This system attempts to provide an all-encompassing or universal representation of reality through an experimental testing methodology ideally devoid of personal or cultural influences. The power of a scientific theory depends on the breadth of its explanatory and predictive powers and its ability to withstand alternative hypotheses. The scientific knowledge system is characterized by hypotheses, laws, and theories that are revised or discarded when successfully challenged by new experimental evidence. It consists of hierarchies of disciplines (hard vs. soft sciences, natural sciences vs. social sciences vs. arts), of institutions (such as research, comprehensive, undergraduate universities), of researchers (such as Nobel and other prize winners), and so forth. The scientific knowledge system is considered a superior method of knowing because of its process of systematic, rational experimentation that can be universally applied and replicated. It either incorporates new knowledge striving to attain the status of science, such as knowledge organization itself (Dahlberg, 2006), or it relegates other ways of knowing as less "objective" and therefore less valid.

There are numerous other knowledge systems aside from the scientific knowledge system. Indigenous knowledge systems, for example, are in many ways directly opposed to the scientific knowledge system. They resist universal definition, classification, and hierarchy. Indigenous knowledge systems embody an ecological view associated with local geographic sites. They perceive a world in constant flux within which all things are interconnected. The body of knowledge of a people is organic and is embedded in the experiences and teachings

of the specific community rather than in any particular institution, such as a library (Battiste 2002, p. 2). The elders of the community serve as the community memory, passing on knowledge through oral stories and other symbolic traditions, rituals and communal ceremonies. This knowledge is constantly being revised. It belongs to the entire community rather than specific individuals. It might be shared outside the community but it can never be given away. Furthermore, portions or all of the body of knowledge may be considered sacred and not to be shared (Batisste and Hendrson, 2000, p. 45-52).

3   Knowledge Organization

The traditional organizational model for knowledge is based on the scientific knowledge system. In this organizational model, knowledge is classified according to standardized taxonomies. It is based on a value system embodying openness including an institutional structure of knowledge organization developed for the distribution and preservation of knowledge. The model arises out of the universal values of the science knowledge system. It values universal access to knowledge by all. The universality of the science knowledge system is manifested in the principle of making scientific knowledge universally available through publication. An objective of publication is to be able to assign attribution and accountability of research results to individual researchers. As well, publication through peer review processes builds up an archival record of scientific experiments for testing and replication. And like science, high priority is given to the standardization and consistent use of terminology and naming, subject headings being an obvious example. Within the knowledge organizational structure there exist hierarchies of institutions, occupations, and clienteles. It also rewards individual with intellectual property rights and other rewards.

In our study, we identified the need for research to create a model of knowledge organization that is more inclusive of diverse knowledge systems. (Birdsall et. al,. 2005, p. 102) As part of the study, a panel of Canadian researchers representing a wide range of disciplines observed, "research and creativity take many forms, from theatrical productions to visual arts, from the study of primates to architecture, from investigation by Aboriginal communities to the visualization of microbes. New methods of producing, preserving and accessing this research must take these points of origin into account." (Birdsall et al., 2005, p. 101). Especially the constraints of the current text-based system, of books and journal articles (which may contain a few images and graphs), can create a large "translation distance" between the original expression of knowledge and the expression of the knowledge artifact. If knowledge dissemination strategies are to be effective and useful to users, they must evolve logically from and be based upon multiple forms and varieties of knowledge content. (Birdsall et al., 2005, p. 102).

Other knowledge systems are not always well served by the way in which knowledge is currently organized. Like science itself, the current mode of knowledge organization tends to incorporate knowledge either into one body of universal knowledge organization or shift it to the margins. However, there is a growing body of research that challenges the concepts of accession, control, ownership, and authorship currently held by the science based mode of knowledge organization (Anderson, 2005, p. 4). The panel of Canadian researchers contributing to our research study emphasized that:

> The more (that) research is located within an indigenous knowledge system, the less likely it will be accepted as 'legitimate' academic research and therefore the less likely

it will meet the criteria that are used to define the boundaries of acceptability for dissemination. Related issues around who and how such criteria are determined also impact heavily on dissemination of knowledge based on indigenous epistemologies.

While the panel's observation makes specific reference to Indigenous knowledge systems, it applies to other systems as well. There are knowledge systems that relate to language, culture, ethnicity, the creative arts, and so forth. For example, our study revealed that the full range of the arts—whether it be the theatre, visual arts, music, or dance—share many of the issues of other non-textual cultures such as those of Indigenous peoples.

The diversity of knowledge systems requires diverse modes of knowledge organization. Where science based knowledge organization strives to link commonalities, we must be prepared to confront differences. We must resist the tendency to force concrete differences into abstract universal principles and structures of knowledge organization. Thus, it is expected that a number of models of research and practice in knowledge organization will emerge, based on the needs and types of diverse knowledge systems. Clifford Lynch, director of the Coalition for Networked Information (CNI) and one of the most prominent leaders in the development of information networks, calls for a change in the research priorities for knowledge organization in academia. According to Lynch, digital library research has largely been based on an analogy with traditional libraries: "we must be careful not to overly-emphasize the parts of this knowledge ecosystem that are familiar, that we are comfortable with intellectually, socially and economically, to the exclusion of the new, the unfamiliar, the disturbing, the confusing" (Lynch, 2003). Lynch is acknowledging that the knowledge ecosystem is comprised of many distinct ecologies that we cannot ignore. He goes on to assert that we should focus our attention on the human and social purposes of the communities which libraries are serving.

We propose a more open model of knowledge organization that embodies the following principles:

- It recognizes the diversity of ways of knowing and knowledge systems,
- It embraces the central, collaborative role of members of specific communities of knowing in the formulation of values, methodologies, and institutions to meet the needs of their knowledge system,
- It advocates the reform of legal and institutional structures that will encompass differing knowledge systems,
- It exploits technological opportunities to meet the needs of diverse knowledge systems,
- It is flexible, open-ended, and dynamic,
- It fosters interdisciplinary collaborative research and practice involving both the knowledge organization community and the multiple communities of knowing.

In summary, an open model of knowledge organization must be decentralized, distributed, local, organic, flexible, and collaborative. To achieve these objectives the values and methodologies relating to access, technology, intellectual freedom, intellectual property, privacy, and so forth will need to be re-examined in collaboration with the communities constituting the many diverse ways of knowing.

4   Technological developments

Digital technologies are already profoundly reshaping the practice, documentation and communication knowledge. Of particular importance are the technological developments that are increasingly being driven by the collaborative and user orientated values embodied in the principles of knowledge organization enunciated above. A report issued by the Commission on Cyberinfrastructure for the Humanities & Social Sciences predicts "intensive collaboration among scholars as well as cooperation with librarians, curators, and archivists, the involvement of experts in the sciences, law, business, and entertainment, and active participation from and endorsement by the general public." (American Council of Learned Societies' Commission on Cyberinfrastructure for Humanities and Social Sciences 2006, p. 15). The social functionalities facilitated by the web, such as online collaboration and social networking, foreshadow the paradigm shifting changes to come in knowledge organization. A recent example of this is the "We Are Smarter Than Me" project at the MIT Collective Intelligence Laboratory, which has launched the first wiki project to publish a book. The book will be written hundreds if not thousands of authors using wiki technology (MIT Collective Intelligence Laboratory, 2006).

Tom Story of OCLC describes the Web as moving "from simply being sites and search engines to a shared network space that drives work, research, education, entertainment and social activities—essentially everything people do" (Story, 2006). Development of Web 2.0, the next generation of the web, embraces a highly collaborative vision of the web; it encourages user generated content; it shares software and content; its applications and data are modular, flexible, and transparent; it is concerned with communication and with building community; it is a dynamic state of "perpetual beta". Discussions around Web 2.0 are not the only efforts in this direction. Important research is going on to create socio-technical environments that empower users, promote user/practitioner collaboration, create flexible and open technological environments, and foster evolutionary development of systems that accommodate tradition along with new opportunities (Fischer, 2006).

Yet, these digital technologies also pose challenges for certain types of knowledge organization, particularly indigenous knowledge. The Canadian research panel pointed out in our study the importance of "the ethical underpinnings of data collection and interpretation processes" in research on diverse knowledge systems. The panel emphasized that research "must reflect a respect for the values and beliefs of those who have and live that knowledge, and dissemination strategies must be built upon such respect and be guided by criteria of authenticity set within those knowledge systems". (Birdsall et.al, p. 103)

5   A Research Agenda for Knowledge Organization

The next step will be to incorporate new values, capabilities and artifacts into the formal aspects of knowledge organization. Our study identified the need for inter-disciplinary research to develop a more open model of knowledge organization involving investigations that draw on a variety of disciplines, including library and information studies, computer science, law, public policy, communication studies, economics, linguistics, sociology, and psychology, among others. The research would contribute to the development, implementation and assessment of new modes for the organization of knowledge, taking into account the point of origin of this knowledge.

Possible research topics include:

- Identification of the differences and commonalities amongst diverse knowledge systems;
- User needs assessments of different communities to develop new models of knowledge dissemination based on their unique needs;
- Research to ensure the interoperability of diverse models of knowledge dissemination;
- Development of diverse modes of researcher and community collaboration;
- Development of institutional and technological structures for the long term preservation of diverse forms of knowledge;
- Assessment of the appropriate legal regime for protecting the intellectual property of individuals and communities;
- Creation of new methodologies and technologies to enhance access, rights management, preservation, and authentication;
- Develop an understanding of how the interface and potential integration of knowledge systems might be achieved.

It is also expected that a number of research methodologies will emerge, because the needs and types of knowledge differ greatly according to discipline. As our panel of researchers stressed, research must be guided by ethical priorities that recognize the unique features of each community of knowing. One example is 'participatory action research' in which the "key element lies not in methods but in the attitudes of researchers, which in turn, determine how, by and for whom research is conceptualized". (Cornwall and Jewkes, 1995, p. 1667). In regards to indigenous communities, researchers must be sensitive to the unique characteristics of the community of knowing; use appropriate methodologies of data gathering that respect individual and group norms; insure the authenticity of data and other research materials; address the language and jargon of the knowledge system under investigation; develop inclusive participatory and decision making processes; and achieve agreement on a collaborative work plan, budget, and project administrative structure; seek informed consent from the appropriate authorities or group representatives; conclude agreement on the ownership of results.

6 Conclusion

Knowledge production takes place in complex cultural, linguistic and regional contexts. There is a need for research to develop new methods of producing, preserving and accessing this knowledge taking into account its diverse points of origin. The evolution of digital technologies and the values driving its development offer both opportunities and challenges for the creation of new models of knowledge organization. While there are philosophical and theoretical implications of an open model of knowledge organization, the research we have identified here falls into the category of applied research. Our focus is on serving the needs of multiple communities of knowing through interdisciplinary, collaborative research on the development of methods and technologies for representing diverse organizations of knowledge.

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