Rahmatollah Fattahi and Mehri Parirokh
Department of Library and Information Studies, Ferdowsi University of Mashhad, Mashhad, Iran

Restructuring the Bibliographic Record for Better Organization, Management, and Representation of Knowledge in the Global Online Environment: A New Approach

Abstract: The computer technology has considerable potential for better and more efficient management of knowledge and information sources. It is possible to provide easy, integrated and straightforward access to works of knowledge appearing in different expressions, editions, and manifestations (i.e., to bibliographic families). The online environment requires that the bibliographic record, as the surrogate for works of knowledge, should be restructured to provide users with a high-quality finding, identifying and collocating bibliographic tool. Unlike the existing flat structure, the multi-level structure of the Work Record would provide catalog users with the ability to discover if a work has been published/represented in different editions and manifestations and if there is any relationship among different works in a catalog or on the Internet. A similar structure for the Author Record would provide better access to different works by an author or about an author. A new structure for the bibliographic record is suggested through an analysis and categorization of the different relationships that exist in the bibliographic universe. A prototype catalogue developed based on the new structure (available on the Internet at: http://wilma.silas.unsw.edu.au/ students/fattahi/super.html) illustrates the ability of providing multi-level, yet easy access to voluminous works and voluminous authors. Furthermore, the prototype catalog provides a clearer picture of bibliographic families and helps OPAC users decide on specific editions, manifestations, or items related to a specific work.

1. Introduction
The value of information and knowledge in research and development (R&D) has extensively been discussed in the literature. The major source of accessing information and knowledge is, to a large extent, information retrieval (IR) systems mainly library catalogs and journal article databases. However, little has been written or researched about the ways in which IR systems can facilitate R&D through providing efficient access to knowledge rather than access to raw (bibliographic) information. This paper proposes that bibliographic information can be transformed into knowledge if the structure of the record and the catalog is redesigned to enable the system to fulfill users’ expectations in finding, integrating, identifying and understanding information as well as evaluating it in a given context. Current online library catalogs are far behind such functions.

2. Major problems with the existing online retrieval systems
For the last three decades that libraries have been using computers for information storage and retrieval, both end-users and librarians have faced
fundamental problems regarding retrieval relevance (i.e., too many hits, poor results, false drops, irrelevant documents, and poor displays) (Borgman, 1986, 1996; Wiberley, Daugherty and Danowski, 1995; Carlyle, 1999). This problem has exacerbated with the overwhelming explosion of data and information particularly in large catalogs and databases in that nothing is represented to the user as knowledge.

From the viewpoint of systems’ design, little progress has been made with current OPACs in recent times and most of the existing retrieval systems fail to rank, categorize and display the information retrieved on a well and intelligible basis. One of the most valid criticisms is that the pattern for organizing and displaying information makes little sense to users’ understanding. As Carlyle (1999: 3) points out, organized displays have seldom been incorporated into online catalog designs. The relationships between and/or among works are often obscured by the listing of irrelevant records among relevant ones or by the listing of related records with no information indicating relationships among the relevant records retrieved. Thus, the added value of information that could lead to the development of knowledge is lost in existing online systems.

Little research has been carried out to challenge the issue of knowledge organization and representation in online catalogs. Fattahi (1996a), Yee and Shatford Layne (1998), Carlyle (1999) are among the few researchers interested in such an area. IR systems need considerable research to identify the requirements for their development as knowledge systems. A major challenge of research in the area of information storage and retrieval has been, and still is, how to improve retrieval in terms of knowledge organization and representation.

3. Restructuring the bibliographic record: a new approach to make the online catalog a knowledge gateway

The need for research in restructuring the bibliographic record and the catalog has been stressed by some librarians, for example by Fattahi (1996a, 1996b), Tillett (1991, 1992), and Carlyle (1998). Information can be transformed into knowledge if the structure and pattern of the bibliographic record and the catalog is redesigned to enable the system fulfill users’ expectations in finding, identifying, relating and understanding information as well as evaluating it. As a surrogate for works, the bibliographic record is considered to be the main tool for fulfilling the different functions of the catalog. The set of data elements stored on a bibliographic record indicate physical and topical description as well as the nature of the work represented. These elements are recorded on a flat structure which is less relevant to functions such as identifying, finding, relating, organizing and sorting of information.

To provide catalog users with knowledge rather than unstructured information, the bibliographic record is in need of restructuring. Following are the proposed and tested ways in which the organization and displaying of all the instances in a bibliographic family can be managed in a fashion understandable to catalog users. The following approach proposes that, instead of displaying long lists of retrieved records which are hard for the user to browse, the contents of retrieved records can be categorized and represented in one or two screens as illustrated below. The Author Record and the Work Record are new approaches that help the
online catalog organize retrievals and achieve its functions.

4. The Author Record

The Author Record is a record which contains the title of the works created by or about an author. It can have a simple arrangement of works by the author (for example, alphabetical, chronological, or according to genres) that are available in any physical or electronic formats. It may also contain works (e.g., biographies, reviews, criticisms, interpretations, bibliographies, etc.) written by others about the author. This approach is far beyond a simple listing of all items (i.e., different instances of different works by the author) retrieved in response to an author search in existing catalogs. Rather, it would help the user get knowledge of all the works by or about an author arranged in a meaningful order.

In an Author Record, as shown in Figure 1, each work by the author appears once only under its uniform title and the different editions and manifestations of a work are linked (using hypertext linkages, for example) from the uniform title to the Work Record created for collocating them. Pointing to/clicking on each work would bring up editions and manifestations of the desired category or work.

5. The Work Record

There have been some attempts (for example, by Svenonious, 1988; Wiberley, Daugherty, and Danowski, 1995; Fattahi, 1996a, 1996b; Yee and Layne, 1998; and Carlyle, 1999, 2000) to introduce new approaches to reconstruct the bibliographic record for implementing the concept of collocating, integrating and clustering the different items belonging to a bibliographic family. Svenonius (1988) proposes clustering of records representing editions of the same work in displays based on relationships among items. Fattahi (1996a, 1996b) proposes the concept of Super Records for the categorization and integration of documents related to a particular work. This concept has been implemented in the Prototype Catalogue of Super Records (http://wilma.silas.unsw.edu.au/students/rfattahi/super.html). Carlyle (1999: 2) proposes that “one strategy for improving the effectiveness of screen displays in online catalogues is to summarize the contents of sets of retrieved records in one or two screens instead of displaying long lists. This requires the categorization of items related to a particular literary work based on description of the attributes (such as physical format, audience, content description, pictorial elements, usage and language) used for grouping. Yee and Shatford Layne (1998) propose practical ways by which computer software can recognize and organize all of the records that represent one work.

Shakespeare, William, 1564-1616.
Complete works
Selections
Translations
Individual plays (by title):
All's well that ends well
As you like it
Shakespeare, William, 1564-1616.

Hamlet
This work includes the following editions/manifestations available in/through this catalogue:

Texts (editions)
Translations
Adaptations or Arrangements (by type of modification)
Changes of Genre (music performances, operas, novelization, etc.)
Versions (by physical form: print, audio-visual, electronic)
Reviews and Criticisms

Figure 2. A sample of Work Record for a classical work
Shakespeare, William, 1564-1616.

**Hamlet: Texts (editions):** (records 1-10, from 32)

6. The tragic history of Hamlet, prince of Denmark, 1603/ edited by G. B. Harrison, 1924.

Figure 3. A sample of Work Record for editions of a classical work sorted by date

In essence, with the idea of Work Records and Author Records, catalogs resemble bibliographies in terms of their collocating function and the arrangement of entries. What is new here is that with the computer’s ability to organize, reorganize and represent entries and to create dynamic links it is possible to construct catalogs demonstrating the relationships between works and their editions and manifestations in a more logical, consistent and knowledge-based way.

6. **Implementing the concepts**

The concept of Work Record can be implemented through an algorithm that automatically identifies records that refer to the same work and cluster them together. This can be done by pointing to a number of attributes (data elements in bibliographic records) such as uniform title, author, and a term (“Editions”, “Adaptations”, “Translations”, for example) for the category to which a work belongs. Therefore, elements such as uniform heading for authors and uniform title for works are necessary for the clustering of different works by an author and different manifestations of a work respectively. In her research, Carlyle (1999) proposed a practical model for automatic clustering based on types of relationships, including translation, presence of illustrations, etc. The Prototype Catalogue of Super Records constructed by this proved its value in carrying out different functions of the catalog. BOPAC (Bradford OPAC) developed by the Bradford University has implemented a relatively similar concept (http://www.comp.brad.ac.uk/research/database/bopac2.html).

Research is needed to identify the type of categories within which items related to a work can be grouped together. Also the terms illustrating the types of relationships between and/or among items should be identified, controlled and standardized based on users’ preference so that they can be used in all catalogs. Also, how retrievals can be improved using users’ feedbacks about the organization and representation of information in IR systems would be another area for research.

All such new approaches need librarians’ knowledge. Librarians select, analyze, evaluate, and organize relevant information and thus create new knowledge. In this respect and based on their wealth of experiences developed over the history of knowledge organization and representation, catalogers and indexers have a lot to offer the new environment. Librarians are knowledge workers making
the transfer of information into knowledge easier and practical.

References


