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# Medium or message? A new look at standards, structures, and schemata for managing electronic resources

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## Abstract

This article examines several library metadata standards, structures and schema relevant to the challenge of managing electronic resources. Among the standards, structures and schema to be discussed are MARC, METS, Dublin Core, EAD, XrML, and ODRL. The authors' analysis reveals that there is currently no one standard, structure or schema that adequately addresses the complexity of e-resource management. The article concludes with an outline and proposal for a new metadata schema designed to manage electronic resources.

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I do not accept the argument that a word is a word is a word no matter where it appears. There is no pure "word" that does not inhabit context inextricably. I don't think the medium is absolutely the message, but I do think that the medium conditions the message considerably (Birkerts, 1995).

Increasingly, we are learning about new metadata schemata, structures, and standards designed to address various communities and constituencies. To date, however, none exist that address the dynamic, multidimensional, and legal aspects of acquiring and managing licensed electronic resources (e-resources) over time. The first section of this paper provides an overview of some of the unique characteristics, functionality, and challenges of managing e-resources. The next section describes the type of functionality and metadata required to support a comprehensive e-resource management system. The pros and cons of several metadata schemas are then highlighted to emphasize the functional requirements to support a comprehensive e-resource management system. The penultimate section examines some of the policy issues related to managing e-resources persistently over time; for example, the impact of proprietary software, restrictive licensing agreements, and digital rights management on the requirements for metadata to support long-term access and use of e-resources. The paper concludes with an outline of a proposed new schema to support the design and implementation of systems and tools to manage e-resources effectively over the long term.

## The long-term challenges of e-resource management

Why are e-resources so difficult to manage? What functionality and metadata are required to support e-resource management over time? This section outlines ten key challenges facing effective persistent e-resource management. The list of challenges is not meant to be exhaustive, but representative of the ever-changing, multidimensional nature of the electronic medium. The first group of challenges comprises some of the unique characteristics of e-resources and digital collections:

- the instability of content;
- license-legal issues;
- multiple business models present in current e-publishing markets;

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- product performance troubleshooting; and
- technological controls.

The remaining five are common to any library, museum, or archive collection, but in the context of electronic or digital resources management, exist in an exceedingly complex legal and technological environment:

- (1) description and identification;
- (2) access and discovery;
- (3) archiving of licensed materials and collections;
- (4) digital preservation; and
- (5) perpetual access, and persistence of licensed digital collections.

Much has been written about the nature of digital content. With few exceptions, researchers, publishers, consumers and creators agree that digital content is dynamic. The *Oxford English Dictionary* defines dynamic as:

... adj. 1. Of or pertaining to force producing motion: often opposed to static (*OED Online*, 2003).

Libraries have developed policies and procedures to manage analog content, which tends to be static and fixed. For example, paper books and journals have a definite beginning, middle, and end. The tangible format requires the designation of a different edition when content is altered and republished. These analog materials are purchased and are owned in perpetuity. Library practices include the selection, acquisition, description, loan, cataloging, maintenance, preservation, and archiving of analog products. These processes and services are well established and rely on standards including MARC to formalize, automate, and share information. Few, if any analog acquisitions, regardless of size, require a legal opinion or formal legal contract signed by both parties. All are governed by a set of agreed-upon practices and rely on national and international standards to exchange static information. In the USA, federal copyright law provides for fair use, interlibrary loan, and preservation and archiving of lawfully purchased analog materials and collections. The same cannot be said of licensed digital collections where everything is negotiable.

Most commercially-produced electronic products require a license agreement or contract which regulates their use. Negotiated license agreements are binding contracts governed by state contract law that when breached include liability and remedies that are enforceable under state law. Prior to the recent growth of electronic resources, libraries did not generally risk incurring state contract law liability for the use or alleged misuse of acquired content or collections. The stakes, risks and potential liability for libraries in a

licensing environment are new and require new tools to effectively manage. This obligation is unique to the acquisition and maintenance of digital and electronic products. Negotiated license agreements are negotiated individually and control all manner of scope, use, rights, and restrictions. Licenses typically require prolonged and time-consuming negotiations to insure that basic library principles and services are met, which include “walk-in” users, remote access for authorized users, interlibrary loan, scholarly sharing rights, linking, archiving or perpetual access rights, the confidentiality of user information, continuous use downtime, and notice of click-through license. In addition, a number of very important legal and liability issues are included in license agreements for digital content, such as indemnification, termination, breach and cure period, governing law, and warranties (Yale University, 2003). These functions, as well as other acquisition and payment processes, including automatic renewals, price, price linked to print, and price linked to consortial agreements must be recorded in a meaningful way to be systematically retrieved upon demand. Moreover, most license agreements that apply to digital content require notification to end users of relevant terms or restrictions on use. Finally, it must be noted that none of the rights guaranteed under federal copyright law are guaranteed in any license agreement. To complicate matters, libraries, archives and museums increasingly find themselves on both sides of the issue, as the consumer and/or the creator of digital content. To date, there is no one schema or metadata structure that is designed solely to produce reports and to display and distribute relevant licensed library collection information.

A plethora of business models currently plagues the commercial publishing environment. There is a clear need to standardize these practices, but content providers, producers, and publishers cannot make up their minds as to what business models are preferred. In the past five years, numerous models have been proposed with varying degrees of popularity, adherence, or success for all involved. Some examples of existing business models are based on full time equivalence (FTE of students, faculty, staff), on specific populations (i.e. how many PhDs in specific disciplines), on site-specific models, individual licenses and subscriptions, or license at domain level (i.e. .edu, consortial licensing, models based on use, models based on maintaining print, etc.). While there are a number of metadata initiatives aimed at encouraging and streamlining e-commerce (a few to be addressed in this paper),

there is no one schema that provides support for the multidimensional functionality required in a comprehensive e-resource management system.

The troubleshooting of licensed, networked, Web-based products is complex and time consuming at best. A comprehensive e-resource system should have the ability to record and maintain a thorough history of problem reports that can be used to evaluate future selection decisions and license negotiations. Reports of online access problems involving licensed digital resources require a thorough comprehension of the entire lifecycle of a resource, including the parties involved in the legal agreement, license restrictions, payment details, as well as end-user concerns, such as computer technology (i.e. electronic configuration and interface), product downtime, and possible restrictions on use and access.

“Technological controls” consist of security features that are designed to automatically restrict the access and use of an online product. They are routinely used in the electronic delivery of digital motion pictures, music, and e-books. In stark contrast to copyright law, which is limited in both scope and duration, technological controls can last forever, effectively locking down digital or electronic content that would otherwise end up in the public domain in perpetuity.

Libraries of all types face significant challenges regarding the new digital publishing environment. The logarithmic growth in production of electronic books, journals, and databases has complicated and transformed the processes and workflows associated with traditional library acquisitions functions. Most integrated library systems are designed to accommodate the control, maintenance, access, and discovery of analog resources via the representation of physical entities and their relationships (e.g. books, paper serials, etc.). These systems, however, cannot adequately cope with the growing complexities and challenges involved in the evaluation, selection, acquisition, management, access, and troubleshooting of licensed digital products from a variety of third parties, as well as the ongoing access and upkeep of electronic products.

## Metadata required to support e-resource management

### Description and identification

Descriptive metadata has no doubt received the lion's share of attention as well as the intellectual and financial resources for development throughout the history of libraries, and that trend has continued during the rise of the Internet. In

order to identify something, it must be described. In the context of modeling an e-resources management system, descriptive needs fall somewhere between the complexity of the traditional role of a library catalog and a simple Dublin Core record. Such a system requires the identification of a resource, its location, its relationships to other resources, and to its supplier package. Depending on the interoperability of such a system with a traditional library catalog, much of the descriptive metadata for an e-resource record could be derived from a MARC bibliographic record, such as title information, author information, and identifiers, such as an ISSN, ISBN, or a utility generated record number (i.e. OCLC, RLIN). Among the descriptive data which is most unique to e-resource management revolves around the relationship between an individual resource and its parent supplier package. MARC can accommodate the basic relationship between a title and a larger group of items, but does not express the detailed nature of the package itself. Specifically, an e-resource system should be able to indicate if a particular library's licensed package of titles is a complete set of holdings, or a selected subset of available titles. This adds a new dimension to the traditional concept of resource description.

Additional descriptive data can also be supplied by the vendor of the resource, which can be packaged in any one of a variety of metadata flavors, including MARC, Dublin Core, and ONIX. The extensibility and flexibility of any new metadata schema must also be considered. The overall significance of the institutional requirements for e-resource management, public discovery, and other automated systems must drive the decision about how much descriptive metadata is enough: as noted by Gilliland-Swetland (2002):

... [c]arefully designed metadata results in the best information management in the short and long-term.

### Licensing

Licensing is about the control over use of electronic resources. The Association of Research Libraries (ARL) points out that a significant distinction exists between acquiring resources or collections that do not require a license with those that do. Specifically, ARL (2003) notes that the:

... [l]icenses may define the rights and privileges of the contracting parties differently than those defined by the Copyright Act of 1976. But licenses and contracts should not negate fair use and the public right to utilize copyrighted works.

In an analog environment, libraries select, acquire, catalog, and make available millions of items. The

information and metadata required to manage analog library processes, practices, and services is standardized and well established. In contrast, the acquisition of commercial electronic or digital resources requires license agreements and adherence to a variety of business models that are being used for the first time. These models govern the who, when, why, and where of the content and conditions related to the use of the electronic product. License agreements are governed by state contract law, and unlike analog purchase agreements, restrict access and use on a product-by-product basis, and on a customer-by-customer basis. In other words, unlike the acquisition of analog materials which once lawfully purchased were owned in perpetuity and were governed by national standards such as MARC, Z39.50, EAD, and federal copyright law, the acquisition of a licensed digital resource provides no guarantees. Most license agreements provide no warranty for the completeness of content of a resource, for the accuracy or integrity of a product, or for reliable access to that product over time.

Licensing is the area that is both unique and new to libraries, archives, and other non-commercial information service providers, and is the most rapidly developing area in the commercial information resources market. To effectively manage, describe, and provide access to large digital collections supplied through a layering of third parties, license agreements requires information derived from the legal agreement or contract as well as technical, administrative, and business terms. Among some of the essential licensing data elements are those that:

- describe key licensing terms or clauses and their status;
- the scope of the license;
- its duration;
- the parties involved;
- renewal notices, indemnification; and
- warranties.

Some of these key terms are:

- confidentiality of user information;
- interlibrary loan;
- scholarly sharing;
- linking;
- archiving;
- completeness of content;
- notice of click-through license agreements;
- ADA or disability compliance;
- usage statistics; and
- perpetual access and termination (including breach and cure period).

While there are a few metadata schemata designed to encourage the exchange of rights information,

they are designed to support commercial, but not library and library user needs. Similarly, there exists several rights management schemata coupled with various payment schemata, but there is not one comprehensive, integrated, standard structure or schema that provides the essential metadata useful to libraries to manage licensed electronic resources over time. The Digital Library Federation (2002) currently is sponsoring an effort by librarians in consultation with the vendor community to address these gaps in existing metadata schemata, which proposes an open source, interoperable, flexible, extendable, and workable solution to this problem.

### **Access and administration**

The access and administration data element set is necessary to support a wide range of activities and processes related to current and long term access to electronic products. This group of elements contains the business and acquisitions terms that are specific to a product as well as its technological requirements, restrictions, or responsibilities. The unique activities in the electronic environment revolve around technical requirements for access, such as the registration of URLs with campus proxy servers (which guarantees authorized user remote access to resources), and the recording of technical requirements and hardware/software compatibility. Other data elements express user restrictions and terms of access, including the number of concurrent users allowed to view a resource, the user groups that are "authorized" (those who are allowed access to a resource), time limitations on resource availability, etc. Data elements in this group that control the management of electronic resources over time record information regarding permanent URIs, IP addresses, outside linking service updating, consortial partners, business models, price discounts, contact information, technical requirements, and proprietary software. Clearly the needs of the electronic exceed the capabilities of the MARC-based ILS. The information that is required for online materials is complex and requires a high level of maintenance. Many of these items require that an action occur based on a data element value, but these particular bits of information have not even been defined within a typical library acquisitions system, nor can current ILS technology handle these complex interactions between elements and resources.

### **Digital troubleshooting**

Digital troubleshooting is another new phenomenon that requires an extensive knowledge of the nature of electronic resources, from how they are acquired and maintained within a

technological environment to the license agreement, local system details, and user needs. Digital troubleshooting is essential as it insures access, and can be used for the evaluation of licensed vendor products and services. In an analog environment, library troubleshooting consists of reports of missing or damaged library materials that could be tracked by following the trail of the physical item. In the electronic environment, the challenge is far more complex and often takes the troubleshooter on several disparate missions to track down and solve a single problem. The lack of access to an electronic resource could be traced to a litany of errors: a missed payment, the failure to register with a service provider, a faulty network, a bad computer configuration, non-compliant hardware, a third-party site that is temporarily down, or a re-directed URL. The needs of electronic maintenance exceed the limits of MARC records and the traditional interaction of ILS modules. An electronic resource management system could effectively record hardware and software requirements, contact information, and registration details, virtually offering an electronic checklist of activities that need to be taken care of (such as registration, payments, etc.) before access is turned on. Notes about downtime and server problems can be recorded in detail, and made available to both library staff and users in a timely fashion.

### **Pros and cons of existing metadata schemata, standards, and structures**

#### **Dublin Core**

With the ultimate goal of improving document retrieval from the Web, the Dublin Core Metadata Initiative (DCMI) developed a basic set of data elements for resource description. The Dublin Core element set is concerned mostly with content metadata, which can consist of the physical description of a resource, or a description that describes the intellectual aspects of a resource. The basic set of 15 elements is conceptually divided into three groupings: content, intellectual property, and instantiation. For example, the element “creator” establishes the person or body responsible for a work, and is placed in the area of “intellectual property”, while the element “description” resides in the “content” designation, as it reflects information intrinsic to the resource, a description of the resource itself. DC elements can be utilized as is, or can be further broken down to fit individual needs. The Dublin Core “qualifiers” serve two purposes. Some qualifiers are used to refine an element, thus narrowing the scope of the

element, but allowing more specificity. Other qualifiers are used to designate an encoding scheme for a controlled vocabulary, such as LCSH, or MIME types (Hillman, 2001).

The beauty of the Dublin Core lies in its simplicity; practically anyone can use the schema, with little more than a list of elements and definitions. Because it enjoys vast support from many communities throughout the world, Dublin Core has become the *de facto* standard for electronic resource description. The use of Dublin Core-compatible elements in an electronic resources management context, simply put, makes good sense. For the most part, basic elements of description that would be required in such a system can be expressed using DC. There is no dispute about the meaning or usefulness of “creator”, “language”, “publisher”, or “title” for the description of a digital product. The complexities of the relationships that arise, however, in the acquisition and maintenance of digital products from the library perspective may require the expression of equally complex relationships that cannot be presented in such a clear-cut manner. For example, the qualified DC element “RelationisPartOf” can adequately communicate a parent-child relationship between aggregator/supplier packages and their individual titles in a basic way, but the particulars of a publisher’s package cannot always be expressed by a DC element. Often, libraries acquire selected titles from a vendor’s bundle of resources. It is important for an electronic resources management system to be able to note if the library’s holdings of that package are complete or not. This information is useful when considering new purchases or withdrawal of material. It also plays an important role in access and troubleshooting. For example, if a patron who is familiar with a library’s electronic collection expects a certain title from *ScienceDirect* to be available, a reference librarian could easily be able to determine if a library’s holdings of that package are intentionally incomplete, or if the denial of access is due to a completely different problem.

The Dublin Core element set was never meant to address the specific needs of electronic resource management. Detailed descriptions of access restrictions, acquisition information, and licensing cannot be properly expressed through the “rights” element alone. Since the Dublin Core is a descriptive metadata standard, it would benefit any system to define descriptive elements that are compatible with DC. Such a strategy offers systems the ability to share and transfer information across metadata schemata, and is precisely the strategy that the DCMI encourages. From a library perspective, should public

discovery also be incorporated into an e-resource management system, adherence to the DC standard would ensure better retrieval of resources by all library users.

## ONIX

The ONIX (Online Information eXchange) for books standard has emanated from a collaboration of members of the book industry trade, in order to share commercial book trade data in electronic form among all sectors of the industry. In essence, the ONIX standard was developed to promote the online book-selling industry. Better and more detailed book information can be transferred via the ONIX XML DTD, and its use also promotes a standardization of metadata across the book publishing trade. EDItEUR oversees its development, along with the Book Industry Communication, based in London, and the Book Industry Study Group in New York (EDItEUR, 2002). The ONIX element set is highly complex, and is structured around three record types: the serial item record, the serial title record, and the subscription package record.

The ONIX data element set is focused on the description of a work as a commercial product, with the goal of transmitting a rich description of an item to vendors and wholesalers. In addition, the ONIX for serials record structure is able to transmit pertinent serials information, such as check-in, title change information, and package information (Jones, 2002). Much of this information would be useful for the acquisition and access of electronic resources in the library setting, which has recently been addressed (Dawson, 2003). A logical mapping to components of this element set could be used for the transmission and sharing of library information with the vendor community, and vice versa. In *The Exchange of Serials Subscription Information*, Jones (2002) makes the point that information kept by the vendor community is:

... often unsatisfactory for accomplishing the tasks that libraries and others would like to achieve.

Accordingly, the commercially designed ONIX DTD does not currently address the licensing detail critical to the library acquisition model, such as archiving rights, confidentiality of user information, use restrictions, etc.

In order for the library to effectively participate in the development and implementation of the ONIX standard, it is important that library concerns, especially those regarding the access and licensing of materials, be addressed by the vendor community. The inclusion of data elements not

present in the ONIX schema, such as the details of a license signed by both parties, or the terms of a purchase agreement, could save the library a great deal of staff time and effort. This information, packaged along with item, subscription and holdings information into the XML-based ONIX record and transmitted to a library management system, would automate what can often be a painstakingly laborious effort by library staff.

## Metadata encoding and transmission standard (METS)

METS is an XML-based structural framework which stores the metadata for a digital object. METS conforms to the Open Archival Information System (OAIS) model for the long term preservation and sharing of information. The structural framework which characterizes METS was conceptualized during the Library of Congress' Making of America II project. Today, the development and growth of METS is accomplished with the additional support and sponsorship of the Digital Library Federation.

A METS document allows for the effective storage, packaging, and transmission of digitized objects. METS provides the structural containers for administrative and descriptive metadata, and can include or reference any metadata served up in XML. Metadata can also be "wrapped" around the object itself. The METS data registry is responsible for this compatibility, and currently endorses Dublin Core, MARC, MODS, and MIX (Metadata for Still Images) schemata.

At this stage, the use of METS alone would not adequately address the dynamic nature of licensed electronic documents acquired for use by a library, although its use is appropriate when a library creates and stores its own digital content. In a library setting, the metadata associated with a purchased or acquired resource usually resides elsewhere, in a separate database or within an ILS. Because of its ability to accommodate various XML metadata records, an e-resources management system could conceivably accept certain bundles of METS metadata and in turn share metadata encoded in an XML format with a METS-based repository. Of course, any sort of exchange of this nature would encourage the use of a standardized or METS-endorsed XML schema.

## Metadata schemata and policy

This section will highlight three key policy issues related to the development and implementation of an e-resource metadata schema, and the management, control, and use of digital information: the development and deployment of

digital rights management software and systems, restrictive licensing arrangements, and proprietary standards. All three illustrate the inherent tension between standardization and customization, between access and security, and between ownership and control. Margaret Jane Radin, Professor of Law and Stanford University, describes this tension as follows:

... [r]oughly speaking, customization involves individualization, production of a unique item, or attention to a particularized person or application, whereas standardization involves non-individualization or mass production of a class of identical items, without attention to a particular person or application (Radin, 2001, p. 101).

Radin calls for more study and analysis of the policy implications of the merging and interaction of technical and legal standards. Radin (2001, p. 130) cites digital rights management, contracts of adhesion, and click-through contracts as examples of where technological and legal standards have blended to become a powerful factor affecting "user autonomy and choice" as well as:

... push the have and have not further apart, because it seems predictable that the haves will check the boxes to pay more money, and the have nots will not.

Digital rights management (DRM) is a critical information policy issue, because it can limit access and use by technological and legal means well beyond that allowed under existing federal copyright law. In addition, digital rights management systems, software and tools create serious barriers to long-term preservation of digital content. Radin (2001, p. 116) defines digital rights management as a technological solution:

... that limits distribution and use of some piece of digitized content.

In response to the concern over additional technological and legal means to control use, access, and description of digital content through digital rights management, members of the library community are taking a look at DRM from a different perspective. For example, efforts such as Federated Digital Rights Management are taking another look at ways to express and protect user's rights, fair use rights, and creator's rights involved with the open publishing model. Much like the Digital Library Federation's Electronic Resource Management Initiative (DLF ERMI), this group is reevaluating metadata sets and considering the fashioning of a schema that best reflects the interests of the library and its users as lender and the educational institution as potential content creator. The federated group is integrating this model with an authentication system, known as Shibboleth. In both cases, the emphasis in rights

expression no longer favors the traditional business models, but semantically conveys these rights from the specialized view of the library.

### Rights languages

eXtensible rights Markup Language (XrML), currently in its version 2.0 release, is an example of a proprietary standard. XrML is an XML-based, commercially-designed schema whose purpose is to standardize the expression and implementation of all aspects of digital content rights. Its parent corporation, ContentGuard, is currently working alongside MPEG and the development of the MPEG-21 Rights Expression Language to develop standards for the moving pictures and audio industries, promoting the integration of content management with rights management. XrML can work across systems, and is not format-specific. It can be manipulated to handle all levels of complexity required for a particular institution, and can be used alongside other metadata schemata, such as ONIX and RDF (ContentGuard, 2003). XrML enjoys the support of major commercial enterprises, but has been criticized for its favoritism toward the commercial industry in regard to the expression of rights.

The XrML data element set contains many of the basic licensing terms and descriptive element identifiers that would be used in a library management system. ContentGuard has created an extensive set of case scenarios that demonstrate various licenses that could be issued in different business models (ContentGuard, 2001). These examples are limited to the use of a resource, which illustrates the product's bias toward insuring the rights of the content provider. While the library is concerned with content creator and provider rights, the rights of the library as lending institution, as well as the details of the business license, the purchase, the implementation and assurance of access to digital content are also key to the functioning of an efficient library system. Until there is an indication that large, commercial rights management companies will accommodate the needs of a not-for-profit content lender, the library community will continue to lobby companies like ContentGuard, but will also investigate alternative, local solutions to the problems involved with managing digital rights from a dedicated, not-for-profit perspective.

Developed as alternatives to proprietary solutions and schema for digital rights expression, the Open Digital Rights Language (ODRL) Initiative, along with the support of the World Wide Web Consortium (W3C), is striving to standardize the semantics for the expression of rights over digital assets. ODRL is XML-based, and is freely downloadable, in keeping with the

spirit of open source software. The ODRL Initiative promotes its tool as flexible and interoperable, able to work alongside any DRM system. The core data elements provide a very basic terminology for usage, transfer, asset management, and reuse permissions, as well as defining all forms of usage constraints, whether they result from the physical limitations of the object, or are negotiated terms in the license. ODRL also includes terms for the financial obligations associated with a digital asset, and basic descriptive terms used to locate and identify the resource. These elements are extensible, and can be added to using any of six “substitution groups” (Ianella, 2002).

The specifications of ODRL are broad enough to apply to all digital content, from mobile phone use, to videos, to e-books. A library that purchases digital content could use many of the ODRL data elements, and refine them to accommodate more specific needs regarding licensing details. The usefulness of ODRL might break down when trying to address the rights the library has negotiated on behalf of its users. In a large library system, there is often cause to identify and record various user groups within that library community, each group possessing different access rights to a specific electronic resource. Moreover, in a system specifically designed to deal with library requirements, some data elements contain trigger dates for other system functions, such as renewal of licenses, payments, or report generation. It seems that the ODRL element set would need to be extended in some creative ways to take care of a library’s licensing tracking needs.

When developing metadata sets, such as one for digital rights management, developing standards such as ODRL must be considered. It is relatively easy to develop metadata element sets which are compatible, and can be mapped to such a schema. In the case of a large research library, complex DRM elements could be reverted back to a basic ODRL element, if such information needed to be transmitted from one institution to another who uses the ODRL schema.

<indec> is another example of a project primarily funded by the European Commission and by an international representation of rights owners to develop a metadata framework to support e-commerce (<indec>, 2000). <indec> focuses on “practical interoperability of digital content identification systems and related rights within the multimedia e-commerce” (<indec>, 2000). Developed by rights owners and mega-industry creators such as the Recording Industry of America (RIAA), the Federation of European Publishers (FEP), and the British Broadcasting Company (BBC), the schema

emphasizes the “foundation for online commercial transactions” rather than the non-commercial information access and use issues that are the concern and mission of most US libraries and archives. While some of the data elements and definitions from <indec> could be used by libraries related to components of an effective e-resource management system, it was not designed to fully represent or reflect non-commercial use issues or concerns.

The <indec> data elements and definitions were designed to focus on commercial products and producers, and therefore definitions of what is a “publisher”, “creator” and “user” may differ greatly, particularly from a commercial context to a non-commercial one, thus making automated use and data transfer and metadata challenging and subject to extensive human intervention and data cleanup.

## A proposed e-resource metadata schema

As of this writing, several projects are underway to address the challenges involved with the access, control, and maintenance of information required for the evaluation, selection, acquisition, licensing, and cataloging of digital products. Their solutions have required the design and development of stand-alone databases, or the alteration of existing systems and software to meet the new business models, relationships, and workflows required to support digital acquisitions. Librarians at several institutions are participating and promoting the development of such tools by developing a set of best practices for the design and implementation of such a system. In addition to system design, the DLF ERMI (2003) is developing functional specifications, an extensive set of data elements, and an XML schema to allow the transfer of information between systems. The DLF ERMI Steering Committee along with a group of librarian and vendor reactor panels have developed a draft set of data elements, definitions as well as a functional specification, an entity relationship diagram, and draft XML schema related to the design of an effective e-resource management system. Extensive details of the project and design documents are available at both the DLF Web site and e-resource management Web hub.

DLF ERMI has developed a set of draft functional requirements for an effective electronic resources management system, and corresponding metadata set designed to support an integrated environment in which management and access are both supported, without maintaining duplicate systems. The DLF ERMI defines an electronic

resource management system as one that is designed to support the management and workflows necessary to efficiently select, evaluate, acquire, maintain, catalog, and provide informed access to electronic resources in accordance with license, business terms, and user needs. Seamless interaction and efficient sharing of data among a diverse set of tools and functions, including traditional MARC-based online catalogs, web portals, federated searching tools, local resolution services, local authentication and access management systems, traditional library management functions, and the unique management and service requirements of electronic resources should be supported by such a system. It should provide for global updating, flexible addition of new fields, the ability to suppress fields from public view, and a single point-of-maintenance for each data element. In addition, the system should support the ability to store, access, search, and obtain reports of the information contained in the system over time (DLF ERMI, 2003).

## Conclusion

In light of the absence of existing metadata schema to effectively manage e-resources persistently over time, there is a growing, almost desperate need for libraries to track the persistence and accessibility of their electronic resource assets. Several tools and metadata schemas have been developed to transfer bits of information between vendors and libraries, between library catalogs and users, and from vendor to vendor. Although many of these metadata schemas and standards overlap, none have been constructed specifically for the purpose of managing electronic resources long term, persistently over the continuum of time in a library collection. Collaborative efforts, such as the DLF electronic resource management initiative and the NISO/EDItEUR joint working party for the exchange of serials subscription information (Florida Centre for Library Automation, n.d.), are pooling the knowledge gained by librarians and vendors in the field to craft new ways to store, exchange, and update metadata for electronic resources from a library service point-of-view.

## References

Association of Research Libraries (ARL) (2003), *Intellectual Property: An Association of Research Libraries Statement*

- of Principles*, ARL, Washington, DC, available at: [www.arl.org/scomm/copyright/principles.html](http://www.arl.org/scomm/copyright/principles.html)
- Birkerts, S. (1995), "Page versus pixel", *FCED*, June.
- ContentGuard (2001), *eXtensible Rights Markup Language (XrML). Example Use Cases*, 20 November, ContentGuard, Bethesda, MD, available at: [www.xrml.org/spec/2001/11/ExampleUseCases.htm](http://www.xrml.org/spec/2001/11/ExampleUseCases.htm)
- ContentGuard (2003), *XrML: eXtensible Rights Markup Language*, home page, ContentGuard, Bethesda, MD, available at: [www.xrml.org/](http://www.xrml.org/)
- Dawson, L. (2003), "How will you shape the future?", PowerPoint presentation at the American Library Association Midwinter Conference, Philadelphia, PA, January.
- Digital Library Federation (2002), "Digital Library Federation electronic management initiative", available at [www.diglib.org/standards/dlf-erm02.htm](http://www.diglib.org/standards/dlf-erm02.htm)
- Digital Library Federation Electronic Resource Management Initiative (DLFERMI) (2003a), "A Web hub for developing administrative metadata for electronic resource management", available at: [www.library.cornell.edu/cts/elicensestudy/home.html](http://www.library.cornell.edu/cts/elicensestudy/home.html)
- Digital Library Federation Electronic Resource Management Initiative (DLFERMI) (2003b), "Functional requirements for an electronic resource management system", unpublished.
- EDITEUR (2002), "EDITEUR home page", available at: [www.editeur.org/](http://www.editeur.org/)
- Florida Centre for Library Automation (n.d.), "NISO/EDItEUR joint working party for the exchange of serials subscription information", available at: [www.fcla.edu/~Epcaplan/jwp/](http://www.fcla.edu/~Epcaplan/jwp/)
- Gilliland-Swetland, A.J. (2000), "Setting the stage", in *Introduction to Metadata: Pathways to Digital Information*, Getty Information Institute, Los Angeles, CA, available at: [www.getty.edu/research/institute/standards/intrometadata/](http://www.getty.edu/research/institute/standards/intrometadata/)
- Hillman, D. (2001), *Using Dublin Core*, DCMI, available at: <http://dublincore.org/documents/usageguide/>
- Iannella, R. (2002), *Open Digital Rights Language (ODRL) Version 1.1*, WWW Consortium, Cambridge, MA, available at: [www.w3.org/TR/odrl/](http://www.w3.org/TR/odrl/)
- <indec> (2000), "Interoperability of data in e-commerce systems", in *Putting Metadata to Rights: Summary Final Report*, European Commission INFO 2000 Programme, June, available at: [www.indec.org/pdf/SummaryReport.pdf](http://www.indec.org/pdf/SummaryReport.pdf)
- Jones, E. (2002), *The Exchange of Serials Subscription Information*, National Information Standards Organization, Bethesda, MD.
- OED Online (2003), Oxford University Press, Oxford, available at: <http://dictionary.oed.com>
- Radin, M.J. (2001), "Online standardization and the integration of text and machine", *Fordham Law Review*, Vol. 70, available at: [www.law.stanford.edu/faculty/radin/RadinFordham.pdf](http://www.law.stanford.edu/faculty/radin/RadinFordham.pdf)
- Yale University (2003), "LibLicense: licensing digital information: a tool for librarians", available at: [www.library.yale.edu/~license/index.shtml](http://www.library.yale.edu/~license/index.shtml)