Within the last few years, electronic resources have become a prominent, if not the most dominant, means of discovery and research for users of all types of libraries. Although much of the electronic content for which libraries provide access is in the form of electronic journals, there is a growing proliferation of databases and indexes that lead users directly to full-text content, both serial and monographic. The variety of electronic resources and means of accessing them has led to discussions regarding cataloging and online resource management. Workflow and concomitant staffing issues have also become prevalent in the literature as libraries adjust to the realities of acquiring and processing these non-print materials. This essay focuses on the “conventional” cataloging of electronic resources, i.e., the use of the Anglo-American Cataloguing Rules (AACR) and Machine Readable Cataloging (MARC). However, this treatment will also include a brief discussion of the overlap of traditional cataloging concepts with metadata.

Most of the literature on the cataloging of electronic resources falls into the following categories: issues and procedures directly related to bibliographic control; management and access issues; workflow and staffing; the relationship between cataloging and metadata; and the context of the online environment and how it may affect cataloging in the future. These topics will be treated respectively under the headings Bibliographic Control, Management and Access, Workflow and Staffing, Cataloging and Metadata, and The Online Environment. The essay will conclude with a short summary with suggestions for future research.

Bibliographic Control

Electronic resources have challenged the principles and practices of cataloging over the last several years. The complex nature of cataloging and the changes necessitated by electronic resources have led to the need for guides to explain the rules in what may be perceived as more “practical” terms. Black (2006) provided an overview of serials that places electronic resources in the context of library operations from acquisitions through cataloging, as well as the even broader environment of scholarly communication and research. On a considerably more detailed level, Curtis (2005), Hsieh-Yee (2006), and Mitchell and Surratt (2005) treated the cataloging of electronic resources down to the MARC-field level with step-by-step instructions and examples of complete bibliographic records to illustrate different types of electronic resources.

As noted in Surratt’s essay (2006) covering developments in 2002-2004, a number of changes in AACR and MARC were proposed, adopted, and published. The ramifications of implementation were being fully explored and discussed in 2005 and 2006, especially with regard to the “separate or single” record option, aggregator-neutral records, and integrating resources.

The “separate or single” record option was set up by CONSER (Cooperative Online Serials, an arm of the Program for Cooperative Cataloging, or PCC) to address both technical services and public services concerns. While it may be ideal in terms of description of the format (print or online) and provenance (which provider) of a given title, it is also very time-consuming to create separate records. Separate records also tend to confuse users who do not expect to see more than one hit for the same title and who generally do not make distinctions about format if the content is the same. Curtis (2005), Leathem (2005), and Long (2006) described the criteria for considering the pros and cons of single records vs. separate records. Curran (2006) further considered the “separate or single” question from the electronic perspective with a discussion of aggregator-neutral records in which only electronic format is described, but without regard to provider. Mitchell and Surratt (2005) and Hsieh-Yee (2006) gave detailed instruction on the suitability of single or separate records and how to create an aggregator-neutral record.

“Integrating resources” as a term was adopted along with the terms “continuing resources” and “finite resources” in 2002. In 2005 there was still some confusion about the distinctions among the three terms,
but it was recognized that “integrating resources” aptly describes the constantly updating nature of resources such as updating looseleafs (print) and updating databases and websites (electronic) (Miller, 2005; Reynolds, 2005). Miller (2005), Mitchell and Surratt (2005), and Hsieh-Yee (2006) provided thorough reviews of the concept of integrating resources as it specifically pertains to its treatment in AACR and its use in MARC. In January 2005, the PCC updated its BIBCO (Monographic Bibliographic Record Program of the PCC) Participants’ Manual and CONSER Cataloging Manual to completely cover its use as a new format; in July 2006, OCLC implemented the BLvl “i” for the format.

Management and Access

The ultimate goal of cataloging is to provide timely access to resources that the library owns or otherwise has received rights to access. Many libraries find it to be an impossible task to provide hundreds, if not thousands, of static bibliographic records for the titles available through aggregator databases in addition to those titles licensed in smaller packages or even individually. The situation is compounded by the changeable nature of electronic resources themselves, as well as the constant shifting of contents in the aggregators.

One solution has been to purchase MARC records from vendors such as NetLibrary and Serials Solutions. The quantity of records provided by such services and the effects of the quality of the records prompted the PCC to establish Functional Requirements for Electronic Vendor Records (FREVR) in 2005 and subsequently publish a MARC record guide in 2006. Also in 2006, Sanchez et al. discussed “cleanup” of one vendor’s records to match local standards for loading into the catalog.

In response to the increasing pressure facing libraries to catalog more electronic titles, in many cases without more staff, CONSER developed guidelines for an “access level” record for serials (2006). The purpose of the access level record is to quickly and cost effectively provide access points by reducing the amount of description required in the record. It will be fully implemented as the CONSER standard record.

On a broader scale, the issue of cataloging these titles at all was put succinctly by Skekel (2005, p. 65): “To MARC, or not to MARC, the question keeps coming.” And indeed it does and has been for some time. Shorten (2006) reported on a survey of ARL library practices from 2003 in which access via the catalog was preferred, but which in some cases was not provided, while in many others catalog access was created in conjunction with separate (non-catalog) lists. Similar strategies were also reported by Cuddy and Bahr (2006) with regard to health sciences libraries; Ferguson, Collins and Grogg (2006) described similar issues at Mississippi State University Libraries, as did Jasper and Sheble (2005) for Wayne State University Library System. Banush, Kurth and Pajerek (2005) reported a mixed approach used at Cornell University Library in which brief title-access MARC records for titles held in aggregators were created for loading into the catalog and for subsequently generating a separate title list using selected MARC fields from those records.

Consortia, in which member libraries share a centralized catalog in addition to having their own local catalogs, face unique problems with the cataloging of electronic resources. Naun and Braxton (2005) documented the “lessons learned” by the Illinois Library Computer Systems Organization when the consortium moved to a new integrated library system. Among the challenges dealt with were differing local practices and preferences, what could be done in MARC to reflect holdings of multiple libraries in the centralized catalog, and limitations of the online displays using the MARC data.

Workflow and Staffing

The question of whether to catalog electronic resources at all does not stem just from issues of how to give users best access to available titles, although that is arguably the primary reason. There is also the factor of maintenance: URLs for electronic resources are notoriously unstable and bibliographic records for them consequently require frequent updating. Add this problem to the sheer quantity of titles that are newly acquired from different sources—the workflow and demands on staff time become critical issues.
Ho (2005) discussed a solution for the reporting and correction of errors, as well as collecting suggestions for improving access to electronic resources, with the help of public services in the Texas A & M University Libraries. Graves and Arthur (2006) presented the results of a workflow analysis of the serials unit of the Old Dominion University Libraries. The increased number of electronic titles coupled with the decreased number of print titles received led to a reallocation of duties and reporting line for two positions and the complete reformulation of the electronic resources cataloger into the head of a new department. Grenici (2006) discussed the impact of electronic journals in the University of Oregon Libraries, especially the decision that electronic journals always receive top priority over print materials in the cataloging workflow; the load is mitigated somewhat by copy cataloging and using aggregator-neutral standards for original cataloging.

As workflows have shifted to emphasize electronic materials, expectations of catalogers have changed as well. Hill (2005) discussed characteristics and background that are expected by employers when hiring new catalogers, as well as continuing education for experienced catalogers. Hall-Ellis (2006) also examined training and continuing education with respect to cataloging electronic resources, as exemplified by entry-level cataloger job announcements over a five-year period. New catalogers increasingly were expected to be familiar with several metadata schemas.

**Cataloging and Metadata**

The recognition that metadata and cataloging are related is reflected in Metadata: A Cataloger’s Primer (2005). Smiraglia’s introduction to the collection of articles and Howarth’s article explicitly stated the relationship, albeit in somewhat theoretical terms, while Coleman’s article more practically related Dublin Core to the catalog. Similarly, Intner, Lazinger, and Weihs (2006) discussed various metadata schema and further placed the process of cataloging into terms of “creating library metadata” with AACR. Boydston and Leysen (2006) noted that in all digitization projects “each resource requires a description of its content, one that places the resource into a context that then can be used for searching in a database”; i.e., it needs to be cataloged. Boydston and Leysen further posited that “[m]etadata creation is a natural extension of the catalogers’ existing skills, abilities, and knowledge” (p. 4).

**The Online Environment**

The explosive growth of the online environment has led to discussions about the place of libraries in general and the library catalog and cataloging in particular. These issues of context and relevance in today's information landscape form the content of several reports, articles, and white papers, such as University of California (2005), Calhoun (2006), Indiana University Libraries (2006), and Marcum (2006). All of these called into question the sustainability of current cataloging practices in the context of the Internet. While these reports are controversial in a variety of aspects, it cannot be denied that the impetus driving the calls for change is the ubiquity of electronic resources and users’ preferences for using them over print materials and for accessing them by means other than libraries’ catalogs.

The need to accommodate users’ preferences for electronic resources and to consider new models for providing access, while at the same time continuing to provide information about non-electronic materials, has led to calls for revising AACR and MARC. Delsey (2005) discussed the issues to consider in such a revision, including the way materials are categorized, the concept of “edition,” and FRBR (Functional Requirements for Bibliographic Records). Resource Description and Access is meant to be a revision of AACR with the aim of being “designed for the digital world” and is being designed to adhere to the principles of FRBR and FRAR (Functional Requirements for Authority Records) regardless of metadata schema.

**Issues for Future Research**
This essay has presented a representative sampling of the issues that faced libraries in 2005 and 2006 with regard to the cataloging of electronic resources. These issues are by no means settled, and much work and research remain to be done as libraries seek to give their users the best possible access to electronic resources.

**Bibliographic Control**

The new format code for integrating resources forces the consideration of what some may see as more theoretical than practical. However, it is broadly recognized that many online resources, especially websites and databases, update regularly but not in the conventionally serial pattern. There will likely be some fallout in the implementation of the new code and a need for refinements in training and its use. Likewise, ramifications from other developments with MARC, such as the new CONSER standard record, will require documentation as they are implemented.

Digitization projects, such as one described in Copeland et al. (2006), will become more common. Various approaches will be developed to handle access to the materials created in these projects. The choice to catalog and provide access using MARC is just one choice of many. These efforts and their successes (or even lack thereof) should be documented. Likewise, unique born-digital resources, such as blogs, are being recognized as valuable resources. Moeller and Rupp (2005) described a project to catalog blogs using MARC. Similar challenges for other born-digital materials will continue, especially as electronic resources become more interactive and involve more multimedia aspects, as these resources will blur boundaries between formats.

**Management and Access**

Vendor-supplied cataloging will continue to be a valuable service. FREVR and the PCC MARC guide essentially established a quality standard for content, but rely on vendors' willingness to implement. The service could be especially useful in a consortial environment such as that described in Naun and Braxton (2005). Interoperability between vendors' delivery systems and local and consortial integrated library systems (ILSs) will also continue to be issues that will require documentation (also noted in Naun and Braxton (2005)).

Electronic resource management systems (ERMS) are becoming more popular as alternatives or complements to established acquisitions and cataloging modules of ILSs. Generally ERMS have not been treated together with cataloging in the literature (and thus were not covered in this essay), but as libraries continue to develop and refine their approaches to electronic resources it is likely that there will be a convergence of their functions.

**Workflow and Staffing**

Workflows thus far have been greatly affected by developments such as those documented in this essay. As more developments occur, such as with the imminent implementation of the new access level CONSER standard record, further acceptance of vendor-supplied records, refinements in ERMS, etc., workflows and the staffing to handle them will need to be adjusted and documented.

**Cataloging and Metadata**

MARC is one of several metadata schemas, and the one upon which current ILSs are built for displaying the catalog. As electronic resources proliferate and the metadata needs correspondingly increase, it is likely that ILSs will be developed that can accommodate other metadata schemas besides MARC. Institutional repositories, archives, and digital collections will still require processing that can be identified as "cataloging," but their digital content may not necessarily be textual or in formats that are readily handled by MARC. Continued recognition of the similarities of the process, in spite of the different
schemas, will be needed for the necessary encoding of “data about data” that makes for easier and more efficient discovery and access of electronic resources by all users.

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