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**NEW PERSPECTIVES ON THE SHARED CATALOGING ENVIRONMENT
AND A MARC 21 SHOPPING LIST**

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NEW PERSPECTIVES ON THE SHARED CATALOGING ENVIRONMENT AND A MARC 21 SHOPPING LIST

ABSTRACT: The cataloging literature is surveyed to collect problems that have been identified with the MARC 21 format. The problems are sorted into 1) problems that are not the fault of MARC 21; 2) problems that perhaps are not problems at all; 3) problems connected with the current shared cataloging environment; 4) other problems with MARC 21 and vendor implementation of it. Recommendations are made to deal with the true MARC 21 problems that remain after this analysis.

A number of writers in our field have suggested recently that it is time to move our cataloging data out of the MARC 21 format and into something else, perhaps XML (1). Even quite knowledgeable MARC 21 leaders recognize that MARC 21 has a much smaller installed base than does XML and that at some time in the future we may have to plan for a migration of our data into something like XML or one of its successors in order to have access to a broader marketplace of software and hardware solutions to the problem of bibliographic control (2). In fact, the Network Development and MARC Standards Office at the Library of Congress has made it quite easy for any institution that wants to switch their MARC records to XML to do so today by providing both a full MARC 21 XML schema, and a more abbreviated 'MARC XML lite,' if you will, known as the Metadata Object Description Schema (MODS) (3). There is also evidence that the world at large is turning to the examination of the issues and problems that for the past several hundred years have occupied only librarians (4). Given this situation, perhaps it would be a good time to consider whether or not a future transition might provide the opportunity for beneficial changes to be effected in our shared cataloging environment and in our methods of tagging and coding cataloging data for the purposes of sharing it.

The purpose of this paper is to explore the various problems that the writers have associated with the MARC 21 format. There are actually four categories of problems.

In the first category are problems that are not actually the fault of MARC 21, but rather lie with the cataloging rules and practices that provide content for the MARC 21 data structure standard, such as AACR2R, LCSH, etc. Such problems will be identified but not discussed extensively, as the need for change in cataloging principles and the rules based on them is much too broad a subject to be covered here. (One exception to this approach is made for problems associated with multiple versions and FRBR, on the grounds that MARC 21, the cataloging rules, and the shared cataloging environment are so entwined in their effect on possible solutions that they can't be separated from each other.)

In the second category are problems that are not really problems at all, but rather solutions to problems that are imperfectly understood by the writers.

In the third category are problems that are due to the shared cataloging environment that MARC 21 was designed to support. Simple change in MARC 21 without also changing the context in which it operates cannot solve these problems. Here we must deal to a certain extent with possible changes in the cataloging rules.

Finally, in the fourth category there are some known problems that are either caused or partially caused by MARC 21 and that perhaps could be solved in the process of the migration of our data to some new data structure standard in the future. These latter problems I have referred to as a MARC 21 shopping list. It should be noted that it is possible that a number of these latter problems would

actually be better solved in vendor software implementation than in the MARC 21 format itself. In these cases, it is hoped that this paper will stimulate discussion in the vendor community about better ways to use existing MARC 21 data to provide better user service. Unfortunately many of the problems that are blamed on MARC 21 are actually problems that derive from the failure of vendors to support full MARC 21 capabilities. Sometimes this is due to financial considerations (development is done only when a significant number of customers will benefit from them); sometimes it is due to the vendors' lack of understanding of MARC 21, of cataloging records, of problems that arise in large complex databases of bibliographic records, and of problems the public face in accessing online public access catalogs.

The third category, problems due to the shared cataloging environment, and the fourth category, the MARC 21 shopping list, will be the focus of this paper.

Category 1, Problems That Are Not The Fault Of MARC 21

For the most part, MARC 21 is a data structure standard, not a data content standard or a data value standard, and this seems to be imperfectly understood by some writers (5). A data structure standard provides a standard for the labelling of data and, as such, for the isolation of particular kinds of data for particular purposes such as indexing or display. The data itself (or the semantic content), however, is determined by data content standards (cataloging rules such as AACR2R) and data value standards (lists of authorized headings, such as the National Name Authority File or the Library of Congress Subject Headings). Thus, some writers have identified problems as being associated with MARC 21 when they are actually associated with cataloging rules (data content standards) and authority files (data value standards). For example, Miller and Fiander note what they consider to be "overemphasis on description, especially in considering

the growing availability of fulltext." (6) Fiander discusses the need to ease the creation of analytic catalog entries and the question of abandoning the main entry. (7) A MARBI Joint Meeting with CC:DA concerning the relationship between MARC 21 and XML posted a long list of concerns that were identified as primarily cataloging problem areas, rather than MARC 21 problems per se, or problems with MARC 21 alone. (8) These cataloging problem areas were also sometimes not necessarily problems, but rather solutions imperfectly understood. As stated above, these cataloging issues will not be discussed here, as the topic is too broad to be covered in these confines. However, it is clear that there is much work to be done in educating our fellow librarians about the value of controlled vocabularies and uniform headings, and the value of the main entry as a work identifier that demonstrates relationships among all of the expressions of a work, works about it and works related to it.

Numerous writers accuse MARC 21 of being "flat," rather than "hierarchical" like XML. For this reason, it is claimed that there is an "underemphasis on relationships," as Miller puts it. (9) As John Attig has pointed out, MARC 21 has a flat structure because of the shared cataloging environment in which we are currently operating. (10) The current shared cataloging environment derives cost efficiency from the fact that each record is independent so that we can move it in and out of different systems. (11) Since the object of the bibliographic record is the manifestation, this means that there is an over-emphasis on manifestation at the expense of expression and work. (12) This is an unfortunate situation, as it means that the most difficult and labor-intensive part of cataloging, the demonstration of relationships, is the hardest part to share. However, the solution to the problem lies in changing the shared cataloging environment, not in changing the MARC 21 format. This will be discussed further below in the section on category 3 problems, those due to the shared cataloging environment.

In any case, the claim that XML is superior to MARC 21 in its degree of hierarchicality is something of a red herring. The tag and subfield structure in MARC 21 is hierarchical, though not as open to complex hierarchy as XML, and the data content housed in MARC 21 is highly hierarchical. The real problems are not with MARC 21 itself, but rather with 1) underutilization of the hierarchical data on the part of software vendors; and 2) limits on the degree of hierarchicality that can be supported in the current shared cataloging environment in which there are thousands of different catalogs, each with a different set of manifestations of expressions of works. Underutilization, the first problem, is likely to continue in any XML implementation, if system designers are not better educated in cataloging principles. As John Attig puts it: "The MARC structure supports communication of records; that communication process does not create a catalog." (13) The creation of the catalog, with all of the demonstration of relationships that implies, is up to the catalog software that indexes and displays the MARC 21 records. Limits on hierarchicality that can be supported in the current shared cataloging environment, the second problem, will also not go away in a hypothetical XML shared cataloging environment that is in every other way similar to the current environment with thousands of different subsets of records to index, display and maintain over time.

Category 2, Problems Identified That Perhaps Are Not Problems

A number of writers complain of the complexity of the MARC 21 formats. Tennant, for example, claims that "There are only two kinds of people who believe themselves able to read a MARC record without referring to a stack of manuals: a handful of our top catalogers and those on serious drugs." (14) However, these writers then go on to suggest that further complexity be added to

MARC 21; for example, they complain that the functions carried out by the people whose names are attached to bibliographic records are not adequately differentiated (thus an author is not distinguished from an editor or from a translator). The implication is that MARC 21 actually needs more complex tagging such that an editor or translator is given a different tag from an author. There are two unexamined assumptions here: 1) that catalogers will always know what function(s) were carried out by a person whose name appears in a statement of responsibility connected with a particular work or expression; and 2) that it is possible to create a complete and exhaustive list of all of the possible functions that a person could carry out in the creation of a work of any kind, whether image, sound, text or some combination of those. (There is also a failure to recognize that it is already possible in MARC 21 to designate functions performed using relator codes, but this is not widely done, mainly for economic reasons, but also because of the complexities alluded to above.)

MARC 21 is complex because it serves so many different communities, including academic libraries, public libraries, school libraries, special libraries and archives in all disciplinary areas. One institution's complexity is another institution's lack of granularity!

Writers fail to recognize that most of the complexity in MARC 21 is optional. There is no requirement that MARC 21 users use every field and subfield, and very few of them do. A local implementation will almost always be a subset of MARC, with the subset or "level of description" (to use AACR2R's term) being governed by the content standard or standards followed locally. Also, as noted above, for those who desire less complexity, the Library of Congress is providing a short version of MARC 21 XML, known as MODS. In considering the reasons for the complexity of MARC, it should also be recognized that to some extent the complexity is driven by the content standards supported by MARC 21, not by

MARC 21 itself. MARC 21 must provide a place for all of the data elements required by content standards such as AACR2R.

MARC 21 has also been criticized for redundancy (15). When the charges are examined more closely, however, it is apparent that the critics do not understand as much as they should about the reasons for the redundancy. Leazer, for example, claims that place of publication is recorded in twenty-four different fields. (16) When one examines his tables more closely, however, it becomes apparent that he has equated with 'place of publication' such various other types of data as country of original production of motion pictures (257), place of manufacture (260 \$e), and the place of publication data in linking fields that apply not to the item described in the bibliographic record in question, but to items described in other bibliographic records that are related to this item. He also fails to recognize the function of the 044 field that provides space for coding more than one place of publication when necessary (since the 008 fixed field only has room for one).

Those who charge MARC 21 with redundancy also do not seem to recognize the value of having the same piece of data in coded form, transcribed form, normalized form, and in a form suitable for subarrangement, linking and precoordination. Having the data in coded form allows the piece of data to be used in rapid batch processing of millions of records. Having the same data in transcribed form allows use of the data as evidence of variation in the naming of authors, works and subjects that is valuable in making decisions about forms of name for access points as well as as historical evidence concerning how various expressions of a work were presented to the public at the time of publication. Having the same data in standardized and normalized form facilitates the collocation of all of the works of an author, all of the expressions of a work, and all of the works on a subject. Also, having the same data in standardized form

precoordinated as parts of linking headings aids in the demonstration of relationships with other entities (as, for example, when the expressions of a work are subarranged by language using language subfields in uniform titles, one of Miller's examples of redundancy). Consider the following example of so-called "redundancy:"

Indexable field (e.g., 651 _0 \$a London (Eng.))
Descriptive field (transcribed) (e.g., 260 __ \$aLondinum ...)
Coded data for rapid batch processing (e.g., xxk)

Many would consider this type of redundancy not just useful but one of the major sources of the power of a catalog to provide superior precision, superior recall, and superior recognition value for scanning, as compared to a web search engine.

Some charge the MARC 21 format with not being flexible and extensible enough (17). Flexible would seem to imply that there is no need for two different catalogers to try to catalog in the same way. Extensible would seem to imply that changing a standard or adding to it should be easy. If we move too far in the direction of flexibility and extensibility, the resultant data may be so little standardized that library catalogs won't be able to differentiate their "look and feel" from that of Google (with the disadvantage of continuing to be much more expensive than Google, as they are now).

Fiander complains that the 1XX, 2XX, 3XX, etc. order of MARC 21 field blocks "jumbles" description and access points (18). This order precedes the MARC 21 format by hundreds of years, and is by no means obsolete in the computer era. It has the effect of ordering the description in such a way that the work is identified first (1XX and 2XX), and then the expression/manifestation (2XX to 5XX), with those fields first that are most likely to differentiate the expression/manifestation

from other expression/manifestations of the same work (such as the statement of subsidiary authorship, e.g. translator or editor, the edition statement, and the statement of extent, i.e., paging for books, playing time for moving images, etc.). Online systems that ignore this fundamental ordering of fields in the bibliographic record create very confusing displays that are difficult for users to scan through quickly.

Category 3, Problems Connected With The Current Shared Cataloging Environment

Note: Numbers in parentheses in the following two sections refer to MARC 21 discussion papers (DP) and proposals that have been made in the past to deal with these problems (19).

Two major problems have hitherto proven to be intractable in the current shared cataloging environment. One is that it has proven to be so expensive and labor-intensive to keep thousands of catalogs under authority control that in fact most of them are under rather poor authority control. The other is the problem referred to as "multiple versions" (89-9, 91-13, 2002-DP04). Even before the digital revolution came along, we have had technology to reproduce the same intellectual content onto different physical formats or to distribute the same intellectual content under different title pages. This is known as the "multiple versions" problem. Our catalogs do a very poor job of differentiating for users between the situation in which two records represent two different expressions of the same work with different intellectual content, and the situation in which two records represent the same expression of the same work with the same intellectual content and only minor variation in physical format or distribution

history of little interest to most users (two manifestations of the same expression).

Recommendation: Change the shared cataloging environment to enable solution of the multiple versions problem and to enable better and more cost-effective authority control, in order to demonstrate hierarchical and other types of relationships between records for both catalog users and library staff in the most cost effective manner.

1. Re-examine our concept of "communication" of records. Consider whether or not the shared cataloging environment could be changed in some way such that changes in headings and bibliographic records could be made once and immediately appear everywhere.

One possible model might be a master record concept for both bibliographic and authority records such that the master record is "mirrored" in some way in local systems, and any change made to the master record is immediately visible to all users of all systems everywhere. Master authority records must be globally linked to master bibliographic records so that a change in an authority record automatically changes headings in all linked bibliographic records. And editing privileges on master records must be tightly controlled, such that they are limited to those who are educated and experienced concerning the complexities of the bibliographic universe. (20)

This solution could potentially solve both of the major problems described above. It could save us millions spent on staff time to move records in and out of local catalogs and to edit local catalogs to bring them under authority control. Instead of moving records back and forth wholesale and editing the local catalog, copy cataloging staff would spend their time adding holdings symbols to records

in the master database, and catalogers would spend their time adding new manifestation records, expression records, work records and authority records for authors, corporate bodies and subjects to the master database. It could also allow catalogers efficiently to share with users information they often have about identical intellectual content contained in different manifestations represented by different bibliographic records (multiple versions).

This solution would require a major change in the business model of the utilities, however, as they probably would no longer be able to charge on the basis of record use. The utilities could consider transitioning to the kind of licensing that is practised by abstracting and indexing services. This solution would also mean a different marketplace for system vendors, one in which the software design would be limited to that required to design local systems (circulation, acquisitions, binding, etc.) and link them to master records. It would appear that the complexity of software design currently required by libraries and the inability of libraries to pay high software development costs may have already driven many vendors out of the marketplace, so perhaps such a narrowing of scope might be welcomed. The master record approach could have the advantage of leading to the one-time development of complex software for indexing and display of complex hierarchical relationships that could then be shared by all.

If such a major change in business model is impractical, another change to explore might be use of authority record numbers (rather than text strings) to link bibliographic records to authority records. This approach, if designed carefully, might allow local systems continually to refresh their authority files with much less frequent editing of bibliographic records than is currently necessary to keep catalogs under authority control. It would solve the first problem above, but not the second, that of multiple versions, as we would still

have thousands of different catalogs each demonstrating a different set of relationships among the bibliographic records contained in it.

Since the editing of catalogs to bring them under authority control and to ensure that they demonstrate relationships provides the greatest service to our users and is the most expensive part of our work, it is a shame we can't apply our experience of the cost benefits of shared creation of bibliographic records to solve the problem of how to make the editing of catalogs as efficient as possible. Solving this problem would have the potential to save us millions of dollars every year and to provide better service to our users, a win-win situation!

2. Consider defining the bibliographic record as an expression-based record to which all manifestations of that expression should be linked.

This solution is under consideration by the Joint Steering Committee for AACR, but it appears likely that it will be rejected in favor of continuing with the current practice of creating manifestation-based records, given the difficulty of creating and using expression-based records in the current shared cataloging environment.

3. If it is not practical to define the bibliographic record as an expression-based record, at least allow use of the MARC 21 holdings format to attach all different manifestations of the same expression to one expression record in audiovisual archives that have a preservation mission.

Holdings in an audiovisual archive with a preservation mission tend to be unique (not held by other institutions), and these archives do not tend to practice shared cataloging in the same way that the library world does; rarely does one institution use bibliographic records created by another. Because the process of

preservation is a process of creating reproductions, the cataloger can be certain that an item in one format is an exact copy of the intellectual content contained on another item in a different format. Without the solution recommended above, it is difficult to impossible to convey this valuable information about content identity to users. Current library standards require making a separate bibliographic record for every change in format; this could lead to the creation of fifty or more bibliographic records for one preserved title; if there are other records for different versions or expressions of the same film which actually differ in content, the situation is hopelessly confusing for the user. The appendix presents an example of an expression-based record for a film preserved at the UCLA Film and Television Archive [name incorrect in published article, corrected here] in which manifestations are described as holdings appended to the expression record.

4. *Consider other ways to create a sufficiently hierarchical data structure for the general library world.* The key requirement is the ability to define the work, expression and manifestation levels clearly, and the ability to link in order to demonstrate relationships appropriately across and between these levels.

5. *Clean up the MARC 21 format to make a cleaner distinction between coding for the carrier and coding for the content.*

One example of a problem area (there are others) is that of moving image materials. The content (work/expression) is moving image, but there is currently no code in the 008 for moving image. Instead, there are codes for two types of moving image carrier (manifestation) in the 008/33, m for motion picture film and v for videorecording. Since a video copy can readily be made from any motion picture film (and often is in an audiovisual archive with a preservation mission), the current coding of the 008 in MARC 21 effectively

precludes the creation of an expression-based record even for known reproductions of moving image materials. If the move to an expression-based record is allowed for preserving audiovisual archives, as recommended above, it will be necessary to remove carrier coding from the 008 in the bibliographic record (e.g. 008/33 code m or v) for audio and visual archival materials that are described on expression-based records with manifestations described in holdings records, and place the carrier coding in the holdings records instead. As Miller has noted, "The fixed fields also illustrate the difficulty in changing overlapping values during format integration." (21)

Current work on the AACR2R data content standard to clarify which kinds of data go into Area 3, Area 5 and Area 7 may lead to cleaner distinctions between carrier and content in the bibliographic description, which may in turn lead to demands for cleaner distinctions in MARC 21.

6. Design the best possible record relationship mechanism to enable the inclusion in holdings displays of identification information drawn from bibliographic records, such as main entry (i.e., author and title) and date.

Currently, this is a local system vendor problem rather than a problem solvable in MARC 21, but that might change if the shared cataloging environment were to change as recommended above. The solution, by the way, is *not* to store the same data in two or more places! This creates insupportable data maintenance problems in the long term.

7. Consider whether it might be possible to create identifiers such as URNs for the logical entities "work," "author" and "subject."

URN stands for uniform resource name, which is defined as "persistent identifier for information resources." URNs are being developed by a working group of

the Internet Engineering Task Force. (22) For this to work in our field, we would have to agree on common definitions for the FRBR entities, and then we would probably have to designate an agency, perhaps the Library of Congress or a consortium of national libraries, to assign URNs to those entities.

8. *Consider defining the authority record for a work heading as a work record to which all expressions of that work should be linked (DP72).* CONSER is currently working on proposals to use authority records to cluster the successive expressions of a serial work (23), and the Joint Steering Committee also has a Format Variation Working Group working on the use of work authority records, which is recommending the creation of an authority record for each expression of a work; if this follows the pattern of Bible headings whereby the expression heading always begins with the uniform title for the work, it could at least create a hierarchically related cluster of headings that represent the work. (24) The IFLA FRANAR (Functional Requirements and Numbering of Authority Records) Working Group is also studying the role of authority records within the catalog. (25)

9. *Separate work headings from transcription that identifies a particular expression or manifestation of a work.* Titles and series titles in current MARC 21 do double duty as transcribed forms and as headings. Many people are using systems that allow global updating for authority control; in other words, a heading in an authority record is linked to all occurrences of that heading in bibliographic records, and when a change to the heading is necessary, it is made once on the authority record and that change automatically generates changes in all associated bibliographic records. MARC 21 tags for transcribed titles and series, such as 245 and 440, need to be protected from simple global updating, but they need to link to authority records for the purpose of heading displays and more complex

global updating that can retain the transcribed form but substitute a different normalized form for heading display purposes. (26)

10. *Consider migrating all variant title access (currently in 246 fields in the bibliographic format) to cross references on work authority records. (27)*

11. *Change the 245 first indicator to make it unambiguous concerning whether or not the title should go into the title index.*

Currently, the meaning of first indicator 0 in the 245 field is determined by the presence or absence of a 1XX field. If a 1XX field is present, the first indicator 0 means the title should *not* be put into the title index. If a 1XX field is not present, the first indicator 0 is an indication that the 245 title is the main entry; as such it *should* be put into the title index. Figures 1 and 2 illustrate problems that arise in the sorting of moving image materials with 130 title main entries when the 245 titles cannot be suppressed from the title index based on MARC 21 indicator value of 0. Figure 1 shows an online public access catalog (OPAC) display example that does not work due to the failure to suppress titles from title indexes based on MARC 21 indicators. Note how the display of the title that is marked for suppression renders the authority record display meaningless and confusing.

Figure 2 provides an example of an OPAC display that includes titles that have been coded for suppression. Other types of titles that need to be suppressed from indexing in this way include transcribed titles that include 'sic' or interpolations to correct them, titles with varying orthographies, and generic/numeric nondistinctive music and law titles that should be superseded by a more structured uniform title in a 240 field. (28)

This may be a problem that must be solved by vendors of local systems, rather than a problem that requires a MARC 21 solution; however, a MARC 21 solution could make the local solution much easier; most local systems are accustomed to tying display to the presence or absence of indicators; the current MARC 21 requirement that the meaning of an indicator for display be linked to the presence or absence of another field is a much more cumbersome approach, logically, and it is perhaps not surprising that no local systems currently enable the accurate reading of 245 first indicators in the construction of title indexes.

12. Design the best possible record relationship mechanism to enable keyword searching of bibliographic records to include a search of cross references found in linked authority records.

This is currently a problem that must be solved by vendors of local systems, rather than a problem solvable in MARC 21; it might become a MARC 21 problem, though, if the shared cataloging environment were to be changed in the ways recommended above.

13. Determine the optimum way to record the hierarchical relationships among headings such that a single change can cascade to all relevant headings; example, a change in a main subject heading should be able to cascade to that heading with any subdivision.

This is currently a problem that must be solved by vendors of local systems, rather than a problem solvable in MARC 21. It might become a MARC 21 problem, though, if the shared cataloging environment were to be changed in the ways recommended above.

14. Determine the optimum way to record the hierarchical relationships among headings such that a user who searches on variant forms of name found in two hierarchically related authority records will have a successful search.

Example:

The following is the authority record for the FBI:

110 10 #a United States. #b Federal Bureau of Investigation
410 20 #a FBI
410 10 #a United States. #b Dept. of Justice. #b Federal Bureau of Investigation
410 20 #a Federal Bureau of Investigation (U.S.)
410 20 #a FBR
410 20 #a Federalnoe biuro rassledovani
510 10 #a United States. #b Bureau of Criminal Identification
510 10 #a United States. #b Dept. of Justice. #b Division of Investigation #w a

The following is the authority record for a Section of the FBI:

110 10 #a United States. #b Federal Bureau of Investigation. #b Uniform Crime Reports Section

Note that the *see* reference from "FBI" to "United States. Federal Bureau of Investigation" occurs only on the parent record. If a user were to search on "FBI Uniform Crime Reports Section," the search would fail unless the system were smart enough to recognize the hierarchical relationship between these two records.

This is currently a problem that must be solved by vendors of local systems, rather than a problem solvable in MARC 21; it might become a MARC 21 problem, though, if the shared cataloging environment were to be changed in the ways recommended above.

15. Consider the possibility of using a different record structure than the current one to deal with 'change of name as change of identity,' for example, change of name of a corporate body (earlier and later names), use of pseudonyms by an author, serial title changes, title changes in monographic works entered under title, and main entry changes in works that are published in sequential revised editions.

What is desirable is to allow users the choice of seeing either a) only those works done under one identity or b) all works done by one person or body under any identity. The two options also would be desirable for works with uniform titles, such as serials that have changed title. The current structure does not differentiate between a 500 for a pseudonym (same person) and a 500 for another person with the same name as a variant name for this person. The current structure simply chains together the corporate name and serial title changes. If one link is broken, the user cannot follow the chain back. It is more difficult for a user to assemble all of the works of a corporate body that has changed its name many times.

This is currently a problem that must be solved by vendors of local systems, rather than a problem solvable in MARC 21; it might become a MARC 21 problem, though, if the shared cataloging environment were to be changed in the ways recommended above.

Category 4, The Marc 21 Shopping List

The following is a discussion of other miscellaneous problems with MARC 21 and vendor implementation of it.

1. *Devise a methodology to allow for switchable preferred forms of headings* (2001-DP05). (29)

Essentially, a user of an English-language catalog should be able to define herself as a Spanish (or Chinese or Arabic, etc.) speaker, such that if a Spanish form of name is present for a particular author, work or subject sought, the Spanish (or Chinese or Arabic, etc.) form will be substituted for the English-language preferred form wherever that heading is displayed to that user, whether it be a heading display, a multiple bibliographic record display, or a single record display.

A method should be developed to enable a language of preferred heading to vary based on language of catalog, language of catalog user, or script or transliteration preference of user. It should allow suppression or highlighting of categories of cross references in the OPAC by language, script, category of heading, or rules used in formation of heading. It should be possible to designate a particular form of heading as the preferred form for more than one language, as when two different languages actually use the same name for the same person, corporate body, work, concept, and so on. When more than one form is available in a given secondary language, it should be possible to designate one as the preferred form for that language for all users that speak that language.

If we can solve this problems for users who speak different languages, we might be able to devise similar solutions for speakers of the same language who have different usage, e.g. experts who use technical language vs. laypeople who use common language for the same concept. The desire to serve both types of user creates a constant tension in data value standards such as LCSH used in both public libraries and research libraries.

This is a complex set of record design (MARC 21) problems and system design (local vendor) problems. Before the local solutions can be devised, however, the

MARC 21 records must be designed to support them. Data content standards come into play here, as well; currently AACR2R, for example, prefers the name by which an author, corporate body, or work is commonly known in the country of origin, rather than the name by which it is known in English-speaking countries. This was deemed necessary in order to share cataloging internationally. If MARC 21 record structure design can be redesigned to support multiple preferred forms as described above, the data content standard practice will be more closely aligned with its own principle, that is, the principle of using the name commonly known by users of the catalog, regardless of country of origin of the named entity.

2. Ensure better access to data currently coded in fixed fields.

Put coded information currently in 006, 007 and 008 fields in MARC 21 bibliographic and holdings records into the best possible place to allow ready access to both librarians and the public for direct searching on dates, language, country of origin and physical format categories of all kinds, e.g. GMD, SMD and all types of data coded in 007 fields, separately and in combination. This may be a local system vendor problem rather than a problem solvable in MARC 21.

3. Ensure adequate content designation to enable complex sorting of headings in online public access catalogs for those institutions that desire to do so.

The sorting of bibliographic records and headings is an oddity in the shared cataloging world--an area in which there are no standards, or, so many standards that it amounts to having none. Institutions are free to do what they like, and many would like to be able to achieve the complex sorts described below.

They would like to be able to code (or mark in some way) parenthetical qualifiers in headings that should be ignored in filing until there are two identical strings that differ only in qualifier (DP57). This is needed for subject headings in order

to help users improve both the precision and recall of their searches by being able readily to select the meaning of a particular homonym that most closely matches their need (e.g., *power* as used in the political sciences, not as used in engineering). In the case of serial uniform titles, users could see right away that more than one journal has the title for which they are looking, as well as an array of all those journals, enabling the users to easily scan the records for the right one. Figures 3 and 4 offer examples of headings with qualifiers.

Vendors of local systems could possibly resolve this sorting issue without requiring a change in MARC 21 if their sorting algorithms were made to pay attention to parentheses in normalized headings, since catalogers restrict their use of parentheses in headings to use with qualifiers only--this concept should be tested, however. If parentheses are ever used in headings for elements other than qualifiers, MARC 21 change would be required, as no system solution would be available. It appears that OCLC is confident enough to sort parenthetical qualifiers in this recommended way in OCLC authority files. To see an example, scan the corporate name "Greens" in the OCLC authority file.

Institutions would benefit from being able to ensure that the optimal way to code chronological subdivisions on subject headings always file chronologically in heading indexes. [*This is how the sentence reads in the published version, but it should read: Institutions would benefit from being able to ensure that chronological subdivisions on subject headings always file chronologically in heading indexes.*] It should be rather self-evident why this is useful for history headings. The headings are artificial constructs created by catalogers and not likely to be known in advance by users. If users are not given a chronological array, they may never find the correct period in a large file such as the one for U.S. history. Figure 5 provides examples of history headings with chronological subdivisions.

Vendors of local systems could solve this problem in part without requiring a change in MARC 21 if their sorting algorithms would pay attention to subfield codes, and would accommodate a rule that requires all \$y subfields in 6XX fields to be sorted on the first number encountered in the string, skipping over all preceding text. There may be no ideal machine-driven solution for the problem of B.C. dates, dates that are not in 4 digit form (e.g., 19th century), etc.

c.) Enable title fields (including 130, 630, 730 and 830 and 246) and subfields, corporate name fields (including 110, 111, 610, 611, 710, 711, 810 and 811), and subject and geographic heading fields (including 650 and 651) in both bibliographic and authority records to contain articles with non-filing indicators or other markings to signal that they should be displayed, but skipped over for purposes of heading arrangement. Fellini's famous film is called *La strada*, not *Strada!* (DP102, DP118, 98-16R, 2002-DP05; note, on January 30, 1999, MARBI did approve the use of control characters (98-16R) to indicate non-filing characters and has recently issued guidelines on their use. (30) While these guidelines are somewhat conservative and restrictive, this does essentially throw the ball back into the court of the content standards, which need to change to allow inclusion of articles in heading fields, as well as the court of the system designers, who need to retool their software to use the new MARC 21 control characters to achieve proper matching and sorting.)

Examples:

The episode of the television program *The Courtship of Eddie's Father* entitled *A Little Red* currently must have the article dropped to file properly:

130 0_ \$aCourtship of Eddie's father (Television program : 1969-1972). \$pLittle red.

245 04\$aThe courtship of Eddie's father. \$pA little red ...

The musical group Los Lobos has a cross reference in its authority record to add the article back to the name!

010 __ \$an91017885

110 2_ \$aLobos (Musical group)

410 2_ \$aLos Lobos (Musical group)

4. *Consider differentiating proper names from other topical subject headings.* (31)

Currently topical subject headings include many proper names, e.g. performing animals, fictitious characters, pyramids, ethnic groups, computer systems, etc.

(32) Users, including many reference librarians, are confused about which index ("subject" or "author") to use to search for a proper name. The creation of a new tag in both the 6XX and the 7XX fields for proper names other than geographic, personal or corporate names would allow systems more freedom to index all proper names, including fictitious characters, performing animals, etc., in a "name" index, or the option of indexing them in both a "name" and a "subject" index.

5. *Ensure a separately tagged note is available for expression information composed by the cataloger.* It is not uncommon for catalogers to have information about the expression of the work they are cataloging that does not fit into standard fields of the bibliographic record tailored to contain expression information, and instead must be placed in a cataloger-composed note. This is particularly common with nonbook materials such as moving images. For example, the cataloger may know that the item being cataloged is a short airline version, but the item usually does not have an edition statement that can be transcribed into a 250 field. The 562 field is currently used in a limited fashion to hold a cataloger-composed expression note, so perhaps more widespread use of the 562 field is all that is required. Separate tagging is valuable because it can ensure that this note can be placed ahead of all other notes in displays. (98-02)

6. *Enable the encoding of item barcodes such that one barcode can be shared by multiple holdings records.* In order to support the creation of analytics in library catalogs, it is necessary for systems to allow one barcode to be shared by multiple holdings records. This is currently a problem that must be solved by vendors of local systems, rather than a problem requiring a solution in MARC 21.

7. *Enable multiple bibliographic records to attach to one holding record.*

In order to support the creation of cataloging records for multiple works contained in a single physical item, the so-called bound-with problem, it is necessary for systems to allow multiple bibliographic records to attach to one holding record (DP116). This is currently a problem that must be solved by vendors of local systems, rather than a problem requiring a solution in MARC 21. Cornell has a local solution, for example. (33)

8. *Create a subfield code to separately designate the forename from the surname.* (34)

Name searching could be made more precise if the user were allowed to specify whether a particular string was a surname or a forename, for example in fill-in boxes such as those offered on the Amazon.com Web site.

This may be a problem that could be solved by vendors of local systems by using the presence of a comma in a personal name heading as an indication that what follows is the forename--rather than a problem that requires a solution in MARC 21. However, such a solution should include the ability to recognize those cases in which the entire name is a forename, as signified by MARC 21 indicators.

9. *Try to ensure that catalogers have to supply as little ISBD(International Standard Bibliographic Description) punctuation as possible* (35)

This may be impossible in current MARC 21 as there may not be enough subfields in 245 to support an alternative to ISBD punctuation. A substantial retrospective conversion of existing data would also be necessary, of course, even if it were possible to change MARC 21 to do this.

10. *Add codes for method of distribution (e.g., theatrical distribution of motion pictures, television and radio broadcasting, print publication, Internet distribution, etc.).*

It would be very useful to be able to limit moving image searches to works theatrically distributed as motion pictures, excluding works broadcast as television programs. For moving images, these codes would be needed at the work level. Now that the methods of distribution are changing so radically for materials more commonly collected by libraries than motion pictures and television programs, it might be useful to let users limit their searches to works and expressions of works available over the Internet (as opposed to print publications), or vice versa. When the same expression of the same work is distributed both as a print or other off-line publication and over the Internet, the coding would be needed at the manifestation level.

11. *Add content designation to classification number fields to allow catalogers to differentiate between classification numbers that are used as both location devices and as discipline-based subject access devices, and classification numbers that are not used as location devices but still are valuable as discipline-based subject access devices [article as published erroneously says 'divisions' here]. Examples are classification numbers assigned to materials shelved in remote storage in barcode sequence, or classification numbers assigned to electronic documents.*

Wilson has done research demonstrating that only 20 per cent of Association of Research Libraries (ARL) member institutions are applying classification numbers to electronic documents, which means that users are missing out on discipline-based subject access to these information resources. (36) Wilson does

not suggest that a reason for this negligence may be that libraries are afraid to confuse users with classification numbers, fearing that they will expect to find items they seek on the shelf at the classification number location. However, this explanation for the decision not to classify seems a distinct possibility. Content designation might allow us, however, to suppress a classification number for an electronic document in an online shelflist, but include it in an online classed catalog. It might also allow us to develop display constants in single record displays that better explain to users how the classification number is being used (whether as both location and subject access, or as subject access only and not as a location).

Summary

One reason various commentators are predicting the demise of the MARC format is that there is a fear that if we allow our bibliographic data to be "segregated" from data in the rest of the world, we will be marginalized. Miller warns, for example, that "Business interests recognize that users prefer to search a single resource and are working around the clock to prepare enticing information portals complete with their 'brands' of information," implying that if libraries cannot produce similar portals we will lose out in a competition with the business world for patrons' information dollars. (37) A caveat is in order, though. Many of the resources that would have to be merged into a "single resource" are not under the kind of authority control that allows libraries to help users find the authors, works and subjects they seek. If our normalized data is not searched and displayed separately from non-normalized data, all of the expensive work we do to link and demonstrate relationships (which seems to be admired by most of these writers) is lost in a sea of mud. Or, as Gorman puts it: "I did a search on 'Michael Gorman' on Google. It yielded 'about 7710' results. Three in the first 10 (supposedly the most relevant) related to me. The other

references were to a philosopher of that name in Washington, DC; a historian at Stanford; an Irish folk musician; and a consulting engineer in Denver, Colorado. The remaining 7700 entries are in no discernable order and some do not even relate to anyone called Michael Gorman." (38) If Gorman had done his search in a typical library catalog, he would have found his works listed separately from those of the philosopher, the historian and the musician, each set of works under its own author heading.

The rest of the world is champing at the bit for a chance to mark up their data to support more complex display and indexing. (39) We should consider ourselves fortunate that thanks to the foresight of people like Henriette Avram, catalogers have been creating a semantic Web for almost forty years, a Web that day in and day out allows users to explore the riches in our libraries, archives and museums. (40) Let us be careful not to destroy what we have in a rush to emulate the rest of the world, which may be on the threshold of recognizing its own need to develop solutions similar to the ones we in the library world already employ.

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APPENDIX AND FIGURES

APPENDIX, Example of an expression-based record for a film preserved at the UCLA Film and Television Archive with manifestations described as holdings appended to the expression record:

One hour with you / Paramount Publix Corp. ; an Ernst Lubitsch production ; produced and directed by Ernst Lubitsch ; assisted by George Cukor ; screenplay by Samson Raphaelson. -- United States : Paramount Publix Corp., 1932. --
Romantic comedy with songs; feature.

Based on the play Nur ein Traum, Lustspiel im 3 Akten (Only a dream) by Lothar Schmidt, which opened in Munich in 1909. Remake of The marriage circle.

CAST: Maurice Chevalier (Dr. Andre Bertier); Jeanette MacDonald (Colette Bertier); Genevieve Tobin (Mitzi Olivier); Charlie Ruggles (Adolph); Roland Young (Professor Olivier); Josephine Dunn (Mlle. Martel); Richard Carle (Detective Henri Pornier); Barbara Leonard (Mitzi's maid).

CREDITS: Photography, Victor Milner; camera operators, William Mellor and William Rand; assistant cameramen, Guy Roe and Lucien Ballard; gowns, Travis Banton; interpolated music, Richard A. Whiting; sound, M.M. Paggi.

Playing time on release was 75 or 80 min., according to: AFI catalog, 1931-1940.

Copyright notice on videodisc sleeve: c1932, Paramount Publix Corporation, renewed 1959 by EMKA, Ltd.

HOLDINGS:

1. Inventory number: VA11168 M
1 videocassette of 1 (VHS) (80 min.) : sd., b&w and col. ; 1/2 in.
Los Angeles, California : UCLA Film and Television Archive, March 1994.
Reproduced from 3/4 in. videocassettes (M56801). Reproduction for preservation purposes permitted by Universal.
Tinted sequences transferred as color on videotape.
2. Inventory number: M56801
2 videocassettes of 2 (80 min.) : sd., b&w and col. ; 3/4 in.
Los Angeles, California : UCLA Film and Television Archive, March 1994.
Reproduced at Video Craftsmen from 35 mm. prsv safety print (M32578). Reproduction for preservation purposes permitted by Universal.
Tinted sequences transferred as color on videotape.
3. Inventory number: M32578
5 reels of 5 (80 min.) (ca. 9000 ft.) : opt sd., b&w with b&w (tinted) sequences ; 35 mm. safety print.
Los Angeles, California : UCLA Film and Television Archive, 1986.
Reproduced from 35 mm. safety prsv dupe pic neg (XFE2240 -2248 M) and dupe track neg (XFE2250 -2258 M). Reproduction for preservation purposes permitted by Universal.
4. Inventory number: XFE2240 -2248 M

9 reels of 9 (80 min.) (ca. 9000 ft.) ; 35 mm. safety prsv dupe pic neg.
Los Angeles, California : UCLA Film and Television Archive, March 1994.
Reproduced from 35 mm. nitrate print (M2993). Reproduction for
preservation purposes permitted by Universal.

5. Inventory number: XFE2250 -2258 M
9 reels of 9 (80 min.) (ca. 9000 ft.) : opt sd. ; 35 mm. safety prsv dupe track
neg.
Los Angeles, California : UCLA Film and Television Archive, March 1994.
Reproduced from 35 mm. nitrate print (M2993). Reproduction for
preservation purposes permitted by Universal.

6. Inventory number: M2993
5 reels of 5 (80 min.) (ca. 9000 ft.) : opt sd., b&w with b&w (tinted)
sequences ; 35 mm. nitrate print.
CONDITION: Fragile; shrunken.

FIGURE 1, Example of an OPAC display that does not work due to the failure to suppress titles from title indexes based on MARC 21 indicators.

Headings	Records	Authority
Adventurous blonde Search under: Torchy Blane, the adventurous blonde [This line is derived from a uniform title authority record]	0	Yes
The adventurous blonde [This line is derived from a 245 00 field in a bibliographic record with a 130 field.]	1	

Note how the display of the title that is marked for suppression renders the authority record display meaningless and downright confusing.

FIGURE 2, OPAC display that includes titles that have been coded for suppression (marked with a *).

Current display in all online public access catalogs known to the author that allow the building of a title index using both authority records and bibliographic records:

*The rebel. A dash of gray
*The rebel. Absolution
Rebel de solitario
Rebel doctor
Rebel girls
Rebel (Motion picture)
 Search under: Call me genius
*Rebel. Night on a rainbow
Rebel (Television program : 1959-1962). Absolution
Rebel (Television program : 1959-1962). Dash of gray
Rebel (Television program : 1959-1962). Night on a rainbow

Example of the correct display:

Rebel de solitario
Rebel doctor
Rebel girls
Rebel (Motion picture)
 Search under: Call me genius
Rebel (Television program : 1959-1962). Absolution
Rebel (Television program : 1959-1962). Dash of gray
Rebel (Television program : 1959-1962). Night on a rainbow

Even better display (see Section V, 3a):

Rebel (Motion picture)
 Search under: Call me genius
Rebel (Television program : 1959-1962). Absolution
Rebel (Television program : 1959-1962). Dash of gray
Rebel (Television program : 1959-1962). Night on a rainbow
Rebel de solitario
Rebel doctor
Rebel girls

FIGURE 3, OPAC displays of subject headings with qualifiers

The ideal display:

Power (Christian theology)
Power (Mechanics)
Power (Philosophy)
Power (Social sciences)
Power (Theology)
 Search under Power (Christian theology)
Power amplifiers
Power electronics
Power of attorney
Power resources
Power spectra

Current display in all online public access catalogs known to the author:

Power amplifiers
Power (Christian theology)
Power electronics
Power (Mechanics)
Power of attorney
Power (Philosophy)
Power resources
Power (Social sciences)
Power spectra
Power (Theology)
 Search under Power (Christian theology)

FIGURE 4, OPAC displays of serial uniform titles with qualifiers

The ideal display:

Health (Canberra, A.C.T.)
Health (Chicago, Ill.)
Health (New York, N.Y. : 1981)
Health (San Francisco, Calif.)
Health advocate.
Health alert.
Health care costs.
Health care management review.

Health cost review.
Health news.
Health reports.

Current display in all online public access catalogs known to the author:

Health advocate.
Health alert.
Health (Canberra, A.C.T.)
Health care costs.
Health care management review.
Health (Chicago, Ill.)
Health cost review.
Health (New York, N.Y. : 1981)
Health news.
Health reports.
Health (San Francisco, Calif.)

FIGURE 5, OPAC displays of history headings with chronological subdivisions

The ideal display:

United States--History--Colonial period, ca. 1600-1775.
United States--History--Revolution, 1775-1783.
United States--History--1815-1861.
United States--History--Civil War, 1861-1865.
United States--History--1969-

Current display in all online public access catalogs known to the author:

United States--History--1815-1861.
United States--History--1969-
United States--History--Civil War, 1861-1865.
United States--History--Colonial period, ca. 1600-1775.
United States--History--Revolution, 1775-1783.