The FRBR Model As Applied to Continuing Resources

Ed Jones

The promulgation of the entity-analysis model set forth in Functional Requirements for Bibliographic Records *(FRBR) has led to its experimental application to a variety of collections of existing bibliographic records. Records for continuing resources (CR) have been deliberately excluded from these applications due to perceived difficulties in applying the model. These difficulties derive from a variety of sources: the imprecision of the more abstract FRBR Group 1 entities (work and expression), divergent definitions of two concepts central to bibliographic records—the work and authorship—when applied to continuing resources, and the relative merits of various mechanisms (e.g., main entries, MARC 21 linking entry fields) available for collocating records for CR. Additionally, because a particular library may own a single CR work as a sequence (overlapping or otherwise) of partially complete manifestations, the Group 1 hierarchy of the FRBR model tends to be inefficient for presenting these holdings to the user in a concise manner.*

On September 5, 1997, at the International Federation of Library Associations (IFLA) conference in New Delhi, the Standing Committee of the Section on Cataloguing approved the final report of the IFLA Study Group on the Functional Requirements for Bibliographic Records. The report, commonly referred to by its acronym FRBR, was published the following year.[1]

A rudimentary understanding of the model that underlies FRBR is helpful in appreciating the discussion that follows. FRBR employs an entity-analysis model that describes various *entities* (bibliographic resources, persons and corporate bodies, and subjects), their *attributes* (characteristics), and their *relationships* with other entities. In particular, FRBR posits that bibliographic resources (Group 1 entities) exist at four levels of abstraction:

- *items* (individual copies);
- *manifestations* (the totality of *items* that together constitute a single publication);
- *expressions* (the totality of *manifestations* that are expressed in a common notation (alpha-numeric, musical, sound, image, and so on) but may have been issued by different publishers at different times); and
- *works* (the totality of *expressions* that are commonly held to represent the same essential intellectual or artistic content).

FRBR does not explicitly distinguish *expressions* from *works,* noting that the conceptual boundary between these entities is culturally determined. One cataloging code may place the boundary at one location, while another places it elsewhere. Nevertheless, because examples are essential to an understanding of a conceptual model such as FRBR, the IFLA study provisionally categorizes certain

Ed Jones (ejones@nu.edu) is Bibliographic and Metadata Services Coordinator, National University Library, San Diego, Calif.

modifications of *works* as *expressions* and others as new *works.*[2] This vague line of demarcation between *expressions* and *works* must be borne in mind when this paper discusses the degree to which continuing resources (CR) fit into the FRBR conceptual model. The discussion will be drawing to a certain extent from these FRBR working definitions and examples and from the Anglo-American "cultural context" as expressed in the Anglo-American Cataloguing Rules.

The four FRBR Group 1 entities, like all FRBR entities, have attributes (e.g., *items* may have shelf locations and barcodes, *manifestations* may have ISBNs and prices). They also have relationships with other entities. For example, they may relate to other bibliographic resources (Group 1 entities) at various levels of abstraction: *work, expression, manifestation, item.* They may also relate to persons and corporate bodies (Group 2 entities) that may be involved with those resources at those levels (for example, a publisher involved at the *manifestation* level, an illustrator involved at the *expression* level). This is another area where concern arises that CR may not fit well into the FRBR model, both because of the multiplicity of relationships in which such resources may be involved and because these relationships may obtain at multiple levels within the Group 1 hierarchy.

These concerns are not new, nor are they restricted to CR. Interest in FRBR has long been intense and has led to the examination of existing cataloging codes and communication formats for conformity with the FRBR model and experimentation in applying the model to collections of existing bibliographic records.[3] The purpose of the former activity has been to determine how well existing cataloging codes map to FRBR and vice versa, and how much those codes (or FRBR) may needed to be modified to make the mapping cleaner. The purpose of the latter activity has been to determine how much records created according to existing (pre-FRBR) national bibliographic standards can be restructured to conform to the FRBR model and produce user displays that take advantage of that model. These latter experiments have been for the most part restricted to literary and musical works by voluminous authors and composers, works that derive the greatest benefit from application of the model. The results of these experiments have been promising.[4]

Continuing resources have been conspicuously absent from these early experiments, primarily because they have proved to be problematic. At the level of the more abstract FRBR Group 1 entities—*works* and *expressions*—bibliographic records for CR tend to be fairly straightforward and so produce relatively modest returns from the application of the FRBR model. On the other hand, at the *expression* and *manifestation* levels bibliographic records for CR tend to be very complex. The multiplicity of relationships in which CR are involved—epitomized by the array of MARC linking entry fields—and the multiplicity of carriers for identical or near-identical content tend to wreak havoc on the FRBR model. In part, this is just the newest incarnation of what used to be called the multiple versions or format variation problem, long the bane of serials catalogers.[5] But it may also say something about the nature of CR. The reluctance to include bibliographic records for CR in early FRBR-ization experiments implies that further work may be needed to better integrate CR into the FRBR model.

In May 2002, the Cooperative Online Serials (CONSER) program, an international cooperative serials cataloging program, formed a task group on FRBR and Continuing Resources to address this need, and in 2003 the IFLA FRBR Review Group formed an analogous Working Group on Continuing Resources.[6] The CONSER task group has so far produced some preliminary recommendations and observations and has forwarded these to the FRBR Review Group, which in turn has forwarded them to its working group on CR. The IFLA working group is in the process of establishing itself and gathering documentation. In the end it will be the IFLA working group, informed by contributions from the community at large, that will determine what concrete measures, if any, will be necessary to integrate CR into the FRBR model. While leaving CR out of the model altogether is conceivable, imaging this as a desirable outcome is difficult.

The remainder of this paper examines major areas of concern in applying the FRBR model to CR in an Anglo-American context. It may be possible to address these concerns by revising the FRBR model and the international standards that it draws on or by revising AACR2 and MARC 21, or both. The concerns can be categorized as follows: (1) the nature of the *work* in FRBR and Anglo-American cataloging; (2) the hierarchies used for expressing bibliographic resources; (3) the level of abstraction at which bibliographic resources are described; and (4) the varying techniques for expressing relationships among bibliographic resources. Each of these is examined in turn.

Two Kinds of *Work*

The serial *work* is problematic, to say the least. Over the past century, serials have been the object of a succession of seemingly contradictory cataloging conventions that have attempted to define the serial *work,* either implicitly or explicitly. Each of these conventions, viewed in its own context, can be seen as a pragmatic response to the nature of the contemporary library catalog and so consistent with that context. Within that context, they also define the boundaries of the serial *work*.

Prior to the twentieth century and the widespread use of catalog cards in libraries, book catalogs were the norm. The physical constraints of the book form determined the

mechanisms for making and amending entries in these catalogs. An entry was typically made for a serial under the title it had when it first entered the library, with sufficient space left under the entry to accommodate a description of its subsequent history. References were made under later titles, pointing to this earliest entry where the bibliographic history of the serial as a whole—what FRBR might call the *work*—was recorded. This practice worked well for book catalogs with their limited space and limited ability to predict where growth might occur, and it favored an expansive definition of the serial *work*.

In the early twentieth century, the book catalog was displaced by the more flexible card catalog. With the advent of card catalogs, the physical constraint that had encouraged earliest-entry cataloging ceased to apply. Now if a title changed, the library could replace the old card set with an updated set under the new title with references (or added entries) for earlier titles. The bibliographic history of the serial was still collected in one place, but now under the current (latest) entry rather than the earliest. While the main entry had shifted from earliest to latest, the expansive definition of the serial *work* continued.

However, latest-entry cataloging rules that consolidated serial entries under the most recent entry had consequences not just for serials. On the same principle, publications of corporate bodies were collected under the most recent name of the body, and books in monographic series were collected under the most recent title of the series. Changes to the name of a corporate body or the title of a series often triggered the revision of vast numbers of catalog cards. As catalogs, especially those of major research libraries, became larger, the amount of work required to maintain this regimen became unsupportable.

In 1961, a solution arrived in the *Statement of Principles* adopted by the International Conference on Cataloguing Principles in Paris (the Paris Principles) that introduced in point 11.5 a new convention, now known as successive-entry cataloging.[7] When a serial's title changed—unless the change was minor or short-lived—the existing entry was closed and a new entry was opened under the new title. A similar provision was made for changes to corporate names in point 9.4.5. Successive-entry cataloging is the principle currently in force in the Anglo-American cataloging community. The proposed successor to the Paris Principles currently under review, the draft "Statement of International Cataloguing Principles," contains no analogous point, though it accomplishes the same purpose in its point 4.1 where it incorporates by reference the International Standard Bibliographic Description.[8]

Successive-entry cataloging was incorporated into the *Anglo-American Cataloguing Rules* (AACR1) in 1967.[9] Successive-entry cataloging was adopted by the Library of Congress in 1971 and by the CONSER project (for cur-

rent cataloging) at its inception in 1975. The convention was strengthened when it was adopted by the International Serials Data System, the precursor of today's International Standard Serials Number (ISSN) Network, as the basis for assigning an ISSN to a serial.[10] Finally, its international position was solidified when it was included in the first International Standard Bibliographic Description for Serials (ISBD[S]) as the trigger for creating a new bibliographic description.[11] Good reasons for moving to successive-entry cataloging existed, though some resistance was also present (as evidenced by the Library of Congress's four-year delay in implementing the relevant rule from AACR1). Eventually, as before, the form of the catalog impelled the community towards a pragmatic solution. But in the move from latest- to successive-entry cataloging, the de facto definition of the serial *work* changed from that which had underlain earliest- and latest-entry cataloging (and continued to apply to nonserial multipart items). Under the new convention, a change in the title or main entry heading now signaled not just a revision of the existing record to accommodate the change, but the closing of the existing record and creation of a new one.

The adoption of AACR2 in 1981 brought two major changes in serials cataloging, the combined effect of which was to modify the practice, if not the principle, of successive-entry cataloging.[12] First, entry under corporate name was restricted under the new code, leading to an increase in entry under comparatively unstable generic titles (e.g., Report, Bulletin, Journal). Second, the basis of the bibliographic description shifted from the latest issue received to the earliest issue received. These two changes led in turn to an increase in the classes of title change considered minor under AACR2. This was done to minimize recataloging due to such minor changes, but an unintended consequence was that, for this class of serials at least, catalogers began employing a form of earliest-entry cataloging, entailing a more expansive de facto definition of a serial *work*.

To complete the circle, with the 2002 revision of AACR2, catalogers also have begun employing latest-entry cataloging for the growing subset of CR known as integrating resources. While the goal in all these cases has been to save the time of the user and avoid unnecessary cataloging, the different practices can lead to confusion for the uninitiated.

As noted above, one can view pre- and post-Paris cataloging codes as applying different definitions of a serial *work*. Before 1961, the definition was based on a perceived integrity of content, which typically was reflected in a continuity of issue numbering. Changes of title or issuing body were treated as secondary events. Serial *works* were treated like nonserial *works*, and their definition corresponded to FRBR's "distinct intellectual or artistic creation."[13]

With point 11.5 of the Paris Principles, this changed. Catalog codes and standards, at both the national and international levels, began to apply de facto different

definitions of *work* to serials and other bibliographic resources, a dichotomy that continues to this day.

In this dichotomy, the definition of *work* for nonserial bibliographic resources, including integrating resources (IR), corresponds to the FRBR definition. For serials, however, the definition of *work* is based on the persistence of a physical mark—the title proper (allowing for minor variations in that mark). Cohesion or integrity of content—certainly implied in FRBR's "distinct intellectual or artistic creation"—is relegated to a secondary role, demarcated by title changes that do not qualify as minor.[14] This difference in the definition of *work* is present by implication in FRBR because it is present in two of FRBR's source documents: the Paris Principles and ISBD(CR), both of which define serial extent in terms of the title proper. But this is not stated explicitly in FRBR, which as noted defines a *work* simply as a "distinct intellectual or artistic creation." FRBR elaborates this definition by casting it in terms of the framework of Group 1 entities:

> A *work* is an abstract entity; there is no single material object one can point to as the *work*. We recognize the *work* through individual realizations or *expressions* of the *work,* but the *work* itself exists only in the commonality of content between and among the various *expressions* of the *work*.[15]

The key point here is that the *work* is described in terms of content, not in terms of a physical mark on a *manifestation*. The *work* shares content with its *expressions* and *manifestations;* it does not necessarily share a title proper.

In AACR2, the term *work* is used throughout part 2 of the code (the part devoted to access points) and throughout the glossary, but it is never defined. Although AACR2 has gone through substantial revision and amendment over the past twenty-five years, a definition of *work* is only now being proposed for inclusion (along with the other FRBR Group 1 entities), as part of the revised edition projected for publication in 2008.[16] But despite the absence of a definition of *work* from the AARC2 glossary, a working definition can be extracted from the use of the term throughout the code, and, at least for nonserial bibliographic resources, it seems to approximate the FRBR definition.

One reason a certain uneasiness overcomes catalogers of CR when confronted with the FRBR definition of *work* is that they know that they make no judgment about distinct intellectual or artistic creations when determining when to create a new catalog record. They are bound by rules separate from those applied by their monographic colleagues.

The rules for choice of entry for CR have, at least since point 11.5 of the Paris Principles, been bound up in the rules for bibliographic description. The ISBD(S) and now the ISBD(CR) are unique among ISBDs in that they deal not just with bibliographic description but also with the conditions that determine when a new description should be created. As noted earlier, these conditions relate exclusively to the form of the title proper.[17]

Differing definitions of *work* have practical consequences when attempting to apply the FRBR model to CR (or accommodate CR within the FRBR model). To illustrate, the examples in figures 1 through 4 are drawn from the CONSER database. They were chosen because they are typical of the problems they exemplify, and they present these problems in their simplest forms.

The first case (see figure 1) concerns the Russian journal Математический сборник, which has been published under that title since 1866 (with a brief hiatus for the Russian civil war). In 1967, the American Mathematical Society (AMS) began translating this journal and publishing the translation under the title *Mathematics of the USSR. Sbornik*. In 1991, the USSR ceased to exist and, in 1993, the AMS changed the title of the translation to take this into account.

This example presents two major discrepancies: (1) the title of the translation (an *expression* for purposes of the FRBR study) changes while the title of the CR in the original language remains the same; and (2) the translation begins a century after the publication in the original language and so does not represent the complete original. This is not uncommon with translations of serials. The former discrepancy also may occur in reverse, where the title of the original publication changes, but that of the translation does not. These two discrepancies imply a need to explicitly identify *expressions* and *manifestations* that incompletely correspond to the entity at the next level of abstraction, whether because of an asynchronous title change or because of incomplete correspondence in coverage. Changes in the title proper may or may not determine the boundaries of a *work,* depending on the circumstances. At present, catalogers create a new bibliographic record when the title of a serial changes, whether or not it is the title of a translation. In the FRBR model, with its commonality of content between *expressions* and *works,* this may cause problems and will at least require a mechanism of some sort—perhaps an extent element in uniform titles—to bridge the gap when different *expressions* have different extents in relation to the same *work*.

For the present, CONSER practice in such cases is to create a linking-entry citation that is a combination of the uniform title with the title proper of the related title.[18] This

Original publication	Translation
Математический сборник (1866-)	Mathematics of the USSR. Sbornik (1967-1993) Sbornik. Mathematics (1993-)

Figure 1. Title changes in one expression but not another

accomplishes the goal of differentiating citations for the two *expressions*, but at some cost in terms of MARC coding. For example, the citation in the CONSER database to the latter *expression* is:

> [785]$tMatematicheskii sbornik. English. Sbornik. Mathematics.[19]

This citation is highly structured in the target record, with each element separately coded:

> [130]$aMatematicheskii sbornik.$lEnglish.
> [245]$aSbornik.$pMathematics.

However, in the record of origin the whole text resides in a single subfield $t in a linking entry field. To function effectively as a relationship in a FRBR environment, the same amount of structure would be desirable in both records. A more succinct form of citation, which obviates the need for including the title proper as well as the uniform title, likewise might be desirable.

In the next example (figure 2), the editorial content of two print editions with a regional focus differs somewhat from that of the original print edition. The editorial content of the online version corresponds to the *combined* editorial content of all the print editions, with some additional online-only content. This is a case of a part being greater than (or as great as) the whole.

To varying degrees, the advertising content and much structured content (e.g., financial tables, weather) differs among all editions and versions of a publication of this type, and may ultimately disappear entirely from the online edition. This sort of content would typically be excluded from consideration in determining whether multiple *expressions* realize a common *work*. The determination would be based instead on the *editorial* content common to all editions. However, in this case, one *expression*—the online *expression*—contains *all* the editorial content of the other *expressions*. This is another case of incompleteness. The online version is *de facto* complete in its editorial content, while the regional editions, including the flagship London edition, are not. Catalogers are used to seeing this situation in the case of metropolitan newspapers that also publish abbreviated national editions. The case of FT.com is likely to be the future norm for this type of publication as they migrate online: an online *expression* that is *more* complete than any single print *expression*.

The migration of a publication online may also create problems in terms of the definition of the *work*, in that online *expressions* may shed earlier titles borne by their print analogs. An example can be seen in *Online Reference Review,* previously *Online & CD-ROM Review*. All mention of the earlier title (and ISSN) has disappeared from

the online version at the publisher's Web site, and the corresponding earlier issues have been subsumed under the later title.[20] In doing this, the publisher has made a de facto determination that no significant change in content was signaled by the change in title, and the current title can encompass it all. For the user, the earlier title can be found only as an artifact on the PDF page images of individual articles from those issues, where it appears as a running title at the bottom of the images. This retroactive retitling by the publisher creates a certain incentive to consider latest-entry cataloging in these cases, if only to prepare the user for an online version that will be found under a different title than the one expected. But such a solution would create inter-*expression* problems such as was experienced in the case of Математический сборник, multiple partial print *expressions* would correspond to a single complete online *expression*. The effect this would have on FRBR-driven catalog displays is unclear. Currently in these cases, a CONSER library creates a catalog record for the online version of the earlier title, sometimes derived from the record for the corresponding print version, even though the user will not find that title mentioned anywhere on the Web site.

The next example is drawn from FRBR itself (figure 3).[21] The example is very straightforward and, to that extent, might be considered very unserial-like.

The Group 1 entities parade out two by two, with a pleasing order—a *work* with two *expressions,* each with two *manifestations*—and one can readily see how with FRBR everything falls into place. But anyone familiar with the bibliographic history of the *Wall Street Journal* may be puzzled, because left out of the FRBR example is the curious incident of the Midwest edition. As with the

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Original publication
Financial times (London)
published 1888-

Editions and versions
Financial times (Frankfurt)
published 1979-
Financial times (New York)
published 1985-
Ft.com [online]
published 1996-

Figure 2. Differences in text for various expressions

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w_1 *The Wall Street Journal*
  e_1 the Eastern edition
    m_1 the print format of the Eastern edition
    m_2 the microfilm of the Eastern edition
  e_2 the Western edition
    m_1 the print format of the Western edition
    m_2 the microfilm of the Western edition

Figure 3. Serial example from FRBR

Russian translation journal, this is a case of the title of an *expression* changing while the title of the *work* remains constant, but it is more complex than it first appears.

The Midwest edition of the *Wall Street Journal* was published from 1951 to 1996 and for most of its first year was called the Chicago Journal of Commerce edition rather than the Midwest edition. Prior to that, it was the *Chicago Journal of Commerce and La Salle Street Journal,* a separate publication having no relationship whatsoever to the *Wall Street Journal.* In 1996, the Midwest edition merged with the Southwest edition to become the Central edition.

In the CONSER database, the Midwest and Chicago Journal of Commerce editions are treated as a single *manifestation* with Chicago Journal of Commerce ed. in the edition statement and "Midwest ed." in the uniform title. A Library of Congress Rule Interpretation (LCRI) mandates combining these successive editions into a single bibliographic record on the basis that no change in scope is implied in the changed name of the edition.[22] The LCRI instructs the cataloger to determine the boundaries of the *work* on the basis of content rather than physical mark (in this case, the edition statement), though the physical mark serves as the basis of this determination. This imperfect relationship between physical marks and content is characteristic of the current approach to defining serial *works,* both in AACR2 and in the related international standards.

The expanded hierarchy in figure 4 shows the difficulties introduced to displays by changes that occur at one level of abstraction and are not mirrored at higher levels. Additionally, it presents a potential conundrum where one serial is continued by an edition of another serial.

In terms of the FRBR model such changes can create something of a muddle, especially when title changes and mergers occur at the *expression* level but not at the *work* level. In figure 4, title changes are signaled by decimal numbering and mergers by combined numbering.

The display in figure 4 also shows the difficulties in identifying a collection of entities at one level that correspond to a single entity at a higher level (in this case the Midwest edition and its predecessors). This question has no answer, but the condition can occur even at the highest level of abstraction, when different entry conventions (earliest-entry versus latest-entry versus successive-entry) may result in different *works* identified for the same content. Rosenberg and Hillman have suggested that squaring this circle of entry conventions may be possible through the introduction of a "super-*work*."[23] This super-*work* would represent all the titles borne by a given serial during its lifetime and would link both to *work* records for the individual titles and to publication history records providing a complete accounting of the issues or other component parts. While Rosenberg and Hillman do not propose what title, if any, would be borne by the super-*work* itself, use studies suggest that current issues, bearing the latest title, would be the ones most frequently sought by users.[24] While such a solution might solve some problems, it also would complicate the cataloger's task by defining two sets of *work* boundaries: one—presumably based on the FRBR definition of a "distinct intellectual or artistic creation"—for the super-*work,* and a narrower one—presumably based on current practice—for the component *works.*

Up to now, this paper has been treating traditional serials: publications made up of sequential issues made up in turn of articles by various authors. Delsey and Riva point out separately that such serial *works* are "aggregate *works*"; that is, they are *works* composed of other *works*: the physical issue (itself an aggregate *work*) and the individual contributions within the issue (component *works*).[25] Aggregate *works* have characteristics that make them particularly amenable to serial treatment: a common title, availability by subscription, and discrete component parts that can be checked in. Other classes of serials—those that in their online version are susceptible to become integrating resources—are more akin to the *works* represented by frequently revised *expressions* in the FRBR model. This is true of publications that typically are represented online as databases and of publications
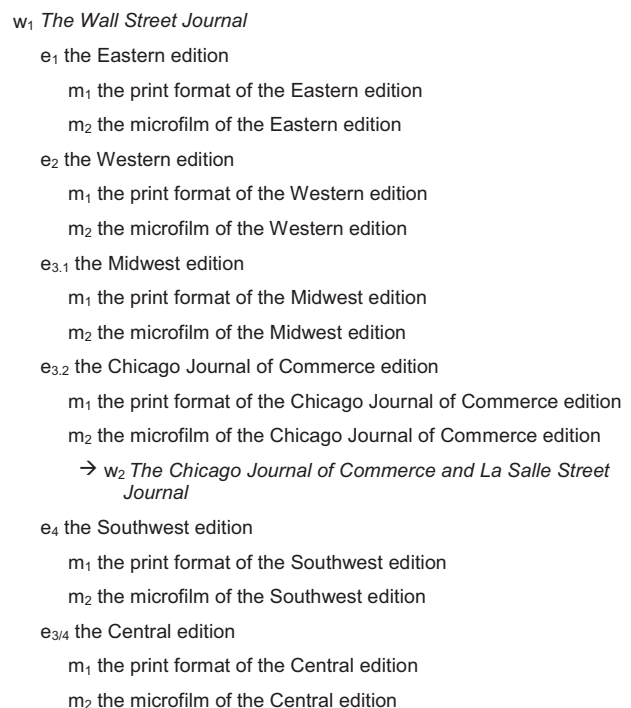
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w_1 *The Wall Street Journal*

  e_1 the Eastern edition

    m_1 the print format of the Eastern edition

    m_2 the microfilm of the Eastern edition

  e_2 the Western edition

    m_1 the print format of the Western edition

    m_2 the microfilm of the Western edition

  $e_{3.1}$ the Midwest edition

    m_1 the print format of the Midwest edition

    m_2 the microfilm of the Midwest edition

  $e_{3.2}$ the Chicago Journal of Commerce edition

    m_1 the print format of the Chicago Journal of Commerce edition

    m_2 the microfilm of the Chicago Journal of Commerce edition

    → w_2 *The Chicago Journal of Commerce and La Salle Street Journal*

  e_4 the Southwest edition

    m_1 the print format of the Southwest edition

    m_2 the microfilm of the Southwest edition

  $e_{3/4}$ the Central edition

    m_1 the print format of the Central edition

    m_2 the microfilm of the Central edition

Figure 4. Elaboratd FRBR example

that, in their online form, are in a state of continuous revision. This class is explored below.

Entity Hierarchy: The Dual Nature of Frequently Revised *Works* and Questions of Personal Authorship

When Delsey and Riva describe serial *works* as aggregate *works*, they are not describing all CR (or all serials), but rather a subset characterized by issues containing contributions by individual authors, the subset that is most often analyzed in abstracting and indexing services. Treating a bibliographic resource as a CR is usually a practical matter, a means of limiting the amount of cataloging effort without unnecessarily limiting the amount of access provided to a *work*. To this extent, CR treatment ignores the peculiar characteristics of the individual CR (such as whether or not it is an aggregate *work*) and examines only those characteristics that make it a candidate for such treatment.

One such class of nontraditional CR comprises *works* that undergo frequent revision. This class is very different from the traditional serial and poses its own challenges for the FRBR model. Frequently revised *works* pose challenges both to the preferred hierarchical structure for CR and to the notion of personal authorship as embodied in AACR2. Beyond this, such *works* are most likely to be transformed into integrating resources if they migrate online, because the focus of their primary market is the current information embodied in the most recent edition.

For frequently revised *works*, two competing FRBR hierarchical models are available, depending on whether a title receives monographic or CR treatment. For the title receiving monographic treatment, the FRBR model is one of a *work* and its *expressions*, the *expressions* comprising the successive editions of that *work*. These editions may appear in various physical media (e.g., print, CD-ROM) and may also appear dynamically online in the form of an integrating resource (a database or Web site). Because these *works* in their iterations share certain core content, monographic treatment of them utilizes the standard FRBR levels-of-abstraction hierarchy for bibliographic resources. However, if one selects CR treatment for the same title, one must opt for the FRBR whole-part hierarchy reserved for aggregate *works*.

A user requesting *The World of Learning* would not typically be looking for a particular edition from the past, but rather for the most up-to-date edition available and, in this sense, would be viewing *The World of Learning* as a single integral *work*. From this point of view, the various annual editions of *The World of Learning* are *expressions*, and the user wants the one that is most up-to-date. This user is the primary market for *The World of Learning*. A historian, however, or anyone interested in the information that was available at a particular time in the past, might view each edition of *The World of Learning* as distinctive in its own right—a component *work*, part of a larger aggregate *work*.

The library can adopt either treatment, depending on whether it caters to one market or the other (or both), with very different results for record structure. CR treatment would produce two *expressions*—a serial textual *expression* (that may include print and microfilm *manifestations*) and an IR online *expression*. Note that in this case the print *expression* would be an aggregate *expression* and would not strictly correspond to the IR online *expression* in this respect. Non-CR treatment, on the other hand, will yield multiple textual *expressions*—one for each successive edition. In both models, the online integrating resource is a separate *expression*. In the non-CR model, the online *expression* corresponds (roughly) to the latest print *expression*; in the CR model, it corresponds (roughly) to the latest component *work/expression*).

Typically, CONSER libraries treat these resources as CR (favoring an aggregate *work* structure). However, in the world of online resources, uniform application of any model for this class of resource may prove difficult.
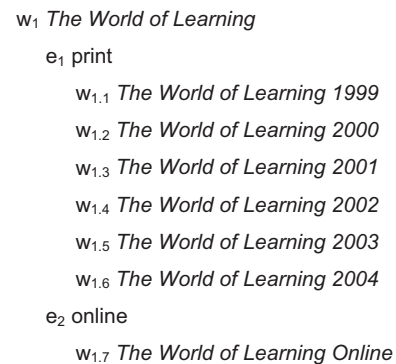
w_1 *The World of Learning*
   e_1 print
      $w_{1.1}$ *The World of Learning 1999*
      $w_{1.2}$ *The World of Learning 2000*
      $w_{1.3}$ *The World of Learning 2001*
      $w_{1.4}$ *The World of Learning 2002*
      $w_{1.5}$ *The World of Learning 2003*
      $w_{1.6}$ *The World of Learning 2004*
   e_2 online
      $w_{1.7}$ *The World of Learning Online*

Figure 5. FRBR hierarchy using an aggregate-work structure

w_1 *The World of Learning*
   e_1 *The World of Learning 1999*
   e_2 *The World of Learning 2000*
   e_3 *The World of Learning 2001*
   e_4 *The World of Learning 2002*
   e_5 *The World of Learning 2003*
   e_6 *The World of Learning 2004*
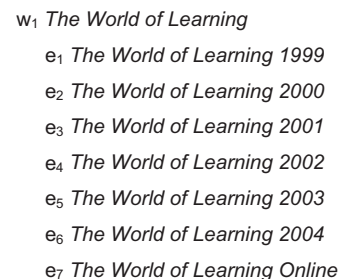 e_7 *The World of Learning Online*

Figure 6. FRBR hierarchy using an expressions-of-a-single-work structure

For example, many e-book publishers treat individual editions as discrete e-books and supply edition-specific MARC records to subscribing libraries, implicitly favoring the non-CR *work-expression* structure (though some use the analytical model embodied in LCRI 13.3 where the issue designation is treated as a dependent part of the title proper). As a result, library catalogs increasingly may carry competing bibliographic record structures for the same bibliographic resource. Current American cataloging practice as embodied in the *Library of Congress Rule Interpretations* is to treat a frequently revised *work* as a CR or a monograph strictly on the basis of the frequency of its revision.[26]

Frequently revised *works* are generally produced under editorial direction, in which case they are entered under title proper or uniform title (or rarely under issuing body). However, some such *works* are the product of personal authorship, in which case AACR2 (and the Paris Principles) direct that they be entered under the heading for the author. Here the imperatives of the cataloging code (and of the Paris Principles, in general) appear to be in at least potential conflict. Applied strictly, both AACR2 and the Paris Principles imply that serials that are the product of personal authorship are entered under the heading for the author. When the author changes, a new catalog record is created, regardless of whether or not the title has changed. However,

point 11.5 of the Paris Principles implies that a new catalog record is created *only* when the title changes.

While AACR2 does not address this potential conflict, it is addressed in LCRI 21.1A2, which comes down firmly on the side of limiting as much as possible the application of personal authorship to CR (figure 7). This limitation derives from treating CR, or serials, as aggregate *works:* while a component *work* can have a personal author, the aggregate *work* of which it forms a part can do so only in rare circumstances.

The effects of LCRI 21.1A2 (compounding the effects of the competing hierarchical models) can be seen clearly when looking at a frequently revised *work* that is also a *work* of personal authorship, such as *Frommer's San Diego* (figures 8 and 9).

When *Frommer's San Diego* is viewed as a monograph that undergoes successive revisions, it is entered under its personal author according to AACR2 rule 21.1A2. Successive editions are treated as *expressions* of the same underlying *work.* However, when the authorship changes, *Frommer's San Diego* is viewed as a new *work,* the assumption being that a change in authorship, with no connection in the statement of responsibility to the former author, has entailed a substantial revision of content. As a result, during the period 1999 through 2004, monographic treatment would have produced three distinct print *works* under FRBR and AACR2 (figure 8). The online version at the Frommer's Web site would be viewed as an *expression* of the latest *work* (and would conceivably need to migrate from *work* to *work* as the authorship of the latest edition changed).

When *Frommer's San Diego* is viewed as a CR, the resulting display is quite different (figure 9). Here each print edition is a component *work* (or, in the example, representing an individual library catalog, a component *item*) and the online edition is an integrating resource corresponding to an updated version of the latest print edition.

In this case, *Frommer's San Diego* is covered by the first stipulation of LCRI 21.1A2. Because differ-

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LCRI 21.1A2 (abridged)

1. Consider the entire run of a serial before entering under personal author. Do not enter under personal author if different issues "have been or are likely to be" created by different persons;

2. Enter under personal author only if the person "is so closely connected to or involved with the serial that the publication seems unlikely to continue without that person;"

3. "Always lean toward *not* entering a serial under the heading for a person."

Figure 7. LCRI 21.1A2 governing entry of serials under personal author

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w$_1$ **Hansen, Elizabeth:** *Frommer's San Diego*
  e$_1$ Frommer's San Diego 1999

w$_2$ **Yates, Stephania Avnet:** *Frommer's San Diego*

  e$_1$ Frommer's San Diego 2000

  e$_2$ Frommer's San Diego 2001

  e$_3$ Frommer's San Diego 2002

  e$_4$ Frommer's San Diego 2003

w$_3$ **Swanson, David:** *Frommer's San Diego*

  e$_1$ Frommer's San Diego 2004 [text]

  e$_2$ Complete Guide to San Diego [online]

Figure 8. FRBR Group 1 hierarchies without applying LCRI 21.1A2 (monographic treatment)

$_1$ *Frommer's San Diego*

$_1$ Frommer's San Diego [text]

  $_{1.1}$ 1999

  $_{1.2}$ 2000

  $_{1.3}$ 2001

  $_{1.4}$ 2002

  $_{1.5}$ 2003

  $_{1.6}$ 2004

$_2$ Complete Guide to San Diego [online]

Figure 9. FRBR Group 1 hierarchies applying LCRI 21.1A2

ent editions have been created by different persons, the whole aggregate *work* is entered under title proper. Such treatment has had unintended consequences in that serials catalogers, trained not to mention or make added entries for editors of serials, frequently apply the same practice to personal authors of serials, failing to make added entries for them or mention them in the bibliographic description.

For the FRBR model, the most important consequence of both the spare application of the principle of personal authorship to CR and the exceptional concept of the *serial work* is that several user objectives of FRBR (and of the Paris Principles) are undermined: the user's ability to retrieve all the *expressions* of a *work,* to identify the *works* of a given author, and to select from among these the most appropriate to his or her needs.

Entities: CONSER "Manifestation-Plus" Cataloging

Previous sections of this paper have dealt with concerns that relate to CR in general. What follows relates rather to two clearly delineated subsets of CR for which, over time, special practices have been developed within the CONSER program. These practices address very real practical difficulties that have arisen when dealing with: (1) microfilm reproductions of newspapers; and (2) serials represented by articles (complete or text-only) in online aggregations.

In discussions of FRBR and current Anglo-American cataloging practice, it is often noted that we catalog at the level of the *manifestation*.[27] This is not always true. An individual CR may be held by an institution in a variety of formats that together cover the entire run of the CR but that individually cover incomplete portions of the run. Bibliographic data on the various formats may be combined in a single catalog record in order to concisely present information on the CR to the user. This constitutes a slight erosion of the practice of *manifestation*-level cataloging, and has occurred both within individual institutions and, to a lesser extent, within the CONSER program as a whole.

In one respect—the cataloging of microform reproductions—CONSER began experimenting with FRBR before FRBR existed, trying to come to grips with what was once known as the multiple versions problem. Today two ad hoc solutions to this problem within CONSER have effectively modified *manifestation*-level cataloging for two subclasses of CR, though the nature of the modifications differs in each case.

The first case arose in the context of the US Newspaper Program (USNP), the cataloging aspect of which constituted a semiautonomous spin-off of the CONSER program with its own purposes and concerns. One of these concerns was the creation of a union list of historical collections of United States newspapers, regardless of format. USNP felt that their union list would best serve users if it was organized at a level in which holdings in multiple formats could be presented under a single catalog entry and holding institution. To achieve this end, the bibliographic record was made to describe the newsprint version (whether or not such a version still existed), and data elements relating to reproductions were recorded on location- and format-specific holdings records.

Looked at in FRBR terms, USNP moved some *manifestation* data onto the *item* record, which may or may not be desirable, depending on the user. If a user wants access to as complete a run in newsprint as possible, then format should take precedence over location. If speedy access to the content is paramount, then location should take precedence over format. In a union list with relatively few locations and formats, both purposes could be served by a single display.

The practical effect of USNP on the CONSER database was to suppress bibliographic information relating to reproductions, since this information is not stored in the USNP bibliographic record. This means that while United States newspapers are represented in CONSER, only one *manifestation* of an *expression* is explicitly represented: that of the original newsprint. This approach would not have been strictly possible under AACR2, were it not for the Library of Congress's decision not to apply AACR2 chapter 11 to reproductions. By this decision, a reproduction was not described directly but rather in a note in a bibliographic description that otherwise was based on the print original. With reproduction aspects relegated to a note, moving this note and related fixed-field data from the bibliographic record to the holdings record was a relatively simple matter.

For the FRBR model, however, the USNP solution raises questions about the representation of holdings where some components are held in one format (*manifestation*) while others are held in one or more other formats (*manifestations*). Some institutions have chosen to apply this model to all their CR holdings involving microreproductions, and even to their monograph holdings. If *manifestations* can thus be represented in both bibliographic records and holdings records, FRBR-based systems may encounter difficulties in representing the *manifestation* level for these resources, at least for reproductions.

The second CONSER dispensation from *manifestation*-level cataloging involves online article-level aggregations of serial content. When CONSER was confronted with the growing cacophony of the Web in terms of multiple sources and formats for the same online serial content, its solution was to block out much of the noise through the use of what are called aggregator-neutral records. These records describe a single online *manifestation* but can explicitly include, via URLs, other *manifestations* representing intact serial issues such as those on publisher Web sites. However,

libraries are free to use these records for all online versions of serial, including those that do not present intact issues or even, in cases where formatting and graphics have been omitted, complete articles.

The publisher's Web site is allowed in on these terms, as well as Web hosting services such as ingenta, High Wire Press, and OCLC ECO, though the bibliographic description will typically be based on the version available at the publisher's site. Not allowed in on these terms are the content aggregators—Web sites that host abstracting and indexing data and, as a support for such data, the full text, graphics, or both, of the indexed or abstracted articles. As with the USNP, the purpose here was pragmatic. The full-text content of aggregator databases tends to be volatile, depending as it does on ongoing (and changeable) agreements with publishers, and the aggregations themselves tend to come into and go out of existence with alarming unpredictability. Additionally, because institutions typically subscribe to only a small subset of the aggregations in which the full text of a given serial may be available, CONSER felt that aggregator data would tend to clutter the catalog record and introduce maintenance costs that would be hard to justify.[28]

A single example demonstrates the wisdom of the aggregator-neutral record in this regard. Figure 10 represents the various *manifestations* of the *Financial Times* available from a single aggregator (Factiva) in a variety of its aggregations.

Figure 10 also illustrates that all online versions are not equal. These *manifestations* represent only the text from the corresponding print edition, omitting any accompanying photos, charts, and so on. Similarly, four levels of abstraction may not be optimal for display purposes. In figure 10, the online version may be more usefully presented as an *expression* of an *expression,* with the version lacking graphics as a further *expression* of that *expression*. Electronic products, with their highly structured markup languages, are susceptible of almost infinite derivation and reconfiguration.

CR thus can be seen as presenting both challenges and opportunities for the FRBR model in terms of the Group 1 entities (*works, expressions, manifestations, items*). Fortunately, they do not present similar challenges for the *attributes* of those entities. Here there is much less cause for concern with CR than with non-CR resources, because attributes such as responsible persons and agencies (illustrators, translators) are not generally involved in differentiating CR *expressions*. One may argue that some attribute of a CR is more appropriate to a different Group 1 entity than the one to which it was provisionally assigned in the model, but the consequences of such a disagreement are not major.

What can be said for attributes, however, cannot be said for relationships. In the case of the *relationships* among Group 1 entities, the challenges for CR are simi-lar to those presented by the entities themselves and require further elaboration.

Relationships among Group 1 Entities

Relationships among Group 1 entities are integral to CR, so much so that for many years the data fields used to express such relationships in MARC (fields 760 through 787) occurred only in the serials format. This relationship intensity is due in part to the highly *organic* nature of CR. They are born, give birth, marry, separate, die, and are sometimes born again. These various events signal what FRBR calls successor relationships. Beyond these are a multitude of supplementary and complementary relationships, as well as relationships based on identical or nearly identical content. The FRBR report used the UNIMARC format as its source for elaborating relationships among entities, but the MARC 21 format is more relevant to cataloging in the Anglo-American community. The current discussion will therefore take place in the context of MARC 21, relying to some degree on Delsey's *Functional Analysis of the MARC 21 Bibliographic and Holdings Formats* to identify the potential stumbling blocks to migrating CR records to a FRBR record structure.[29]

Linking entry fields were introduced to the MARC serials format in 1976, following the creation of the International Serials Data System (ISDS), the predecessor of today's ISSN Network. The fields were intended to provide a method for linking between ISDS records, using the ISSN and key title as the basis of the link. To facilitate this purpose, the structure of the linking entry fields (760–787) was made to mirror that of field 222 (key title), with the content of subfields $t and $c of fields 760–787 corresponding exactly to that of subfields $a and $b of field 222 on the related record, and subfield $x corresponding to subfield $a of field 022 on the related record. This was the prescribed form of linking note on CONSER records through 1980 and is still the preferred

w_1 Financial times (London)

  e_1 (London edition)

   m_1 [online: text only]. — Factiva, 1980- — (Dow Jones interactive)
   m_2 [online: text only]. — Factiva, 1980- — (Factiva alerts)
   m_3 [online: text only]. — Factiva, 1980- — (Factiva developer. Search)
   m_4 [online: text only]. — Factiva, 1980- — (Factiva developer. Track)
   m_5 [online: text only]. — Factiva, 1980- — (Factiva extranets)
   m_6 [online: text only]. — Factiva, 1980- — (Factiva extranets. Financial services)
   m_7 [online: text only]. — Factiva, 1980- — (Factiva search module)
   m_8 [online: text only]. — Factiva, 1980- — (Factiva select. Headline)
   m_9 [online: text only]. — Factiva, 1980- — (Factiva track module)
   m_{10} [online: text only]. — Factiva, 1980- — (Factiva.com search)
   m_{11} [online: text only]. — Factiva, 1980- — (Factiva.com track)
   m_{12} [online: text only]. — Factiva, 1980- — (Reuters business briefing)

Figure 10. FRBR Group 1 hierarchy (in part) without applying CONSER "aggregator–neutral" cataloging policy

method of linking at the international level.[30] Because North American cataloging practice sometimes resulted in the creation of new catalog records without a corresponding change in the title or ISSN (for example, when an issuing body used as the main entry heading changed), record control subfields ($w) were added to the linking entry fields and explicit linking entry notes were added in field 580 to facilitate record-to-record linking in these circumstances. The 580 note took the form: Continued by: [key title], [ISSN], issued by: [name heading].

With the adoption of AACR2 in 1981, the prescribed form of linking notes on CONSER records was changed to the catalog entry of the related record. In revising the MARC format to accommodate this change, the Association for Library Collections & Technical Services, the Library and Information Technology Association, and the Reference and User Services Association's Machine-Readable Bibliographic Information (MARBI) Committee abandoned the strict subfield-level correspondence just described in favor of a structure where subfields in the linking entry fields in the records of origin corresponded to *entire fields* in the target records. As familiarity with AACR2 grew, CONSER practice changed further, in that a subfield $s was defined to accommodate uniform titles *in certain circumstances,* and (for cases where the related record reflected pre-AACR2 cataloging rules) a subfield $b was defined to accommodate edition statements (in lieu of uniform title qualifiers). While these changes resulted in a catalog in which linking entry fields could generate visually meaningful (and more user-friendly) notes, they complicated the use of the bibliographic data in the linking entry fields to facilitate machine linking. In one complication, the uniform title in field 130 was mapped to subfield $s of a linking entry field if it represented a translation but to subfield $t if it represented any other type of uniform title. Likewise, a title proper (245 subfields $a, $n, and $p) was mapped to subfield $t of a linking entry field if no uniform title was present or if the uniform title differed from the title proper (other than by the addition of qualifying terms) but otherwise was not mapped at all.

Given these complications, machine-based linking in these fields may be facilitated by the use of the control subfields $x and $w (when present), but even these present problems. As already noted, the ISSN (subfield $x) may apply legitimately to more than one AACR2 record (such as a printed serial and one or more microreproductions, or the same title entered under successive main entry headings). The record control number (subfield $w), on the other hand, is not specific to any particular standard identifier scheme, and must be broken into two parts: (1) a parenthetical MARC organization code for the scheme to which the number belongs; and (2) the number itself, which

must be interpreted in the context of the related scheme, which may itself be inconsistent.[31] This presents problems insofar as using the linking entry fields for real-time linking. Additionally, linking entries can be used for creating FRBR structures only if the related record is present in the database, and no way exists *a priori* to make this determination for a particular catalog.

Linking entry fields therefore present problems by themselves as a FRBR linking mechanism, but Delsey notes that FRBR relationships are reflected in a variety of MARC fields, not just the linking entry fields:

> 5.1.2 Relationships between works, expressions, manifestations, and items
>
> *Work*-to-*work* relationships are reflected in a variety of MARC data elements. Added entry fields (700-730) may contain data pertaining to a related *work*. Certain linking entry fields (770 and 772) are defined specifically to convey *work*-to-*work* relationships, while others (760–786), although not specifically defined as *work*-to-*work* relationships, may contain data associated with the related entity at the *work* level (e.g., in the form of a uniform title in subfield ‡s). A number of note fields (510, 525, 555, and 556) also contain data reflecting a *work*-to-*work* relationship.
>
> *Expression*-to-*expression* relationships may appear in added entry fields (700–730), and in certain linking entry fields (765, 767, and 775).
>
> *Manifestation*-to-*manifestation* relationships appear in series added entries (440, 800-830), in certain note fields (530, 533, and 534), and in a number of linking entry fields (760, 762, 773, 774, and 776). *Manifestation*-to-*manifestation* relationships may also appear in added entries (700–730). Aspects of *manifestation*-to-*manifestation* relationships are also reflected in coded form in field 006/008 for serials and in field 007 for maps, globes, and computer files.
>
> An *item*-to-*item* relationship is reflected in field 544.[32]

Bibliographic data in these various field blocks have very different capabilities. Added entries (fields 700–730) provide access for related *works* without specifying the relationship involved. Series added entries (fields 440 and 800–830), on the other hand, invariably describe whole-part *manifestation*-to-*manifestation* relationships. The linking entry fields (fields 760–787) fall somewhere in the middle. Having been defined for a purpose other than FRBR, their correspondence to FRBR relationships tends to be serendipitous at best. MARC 21 records describe, for the most part, *manifestations,* but relationships in FRBR may be

assigned to various levels within the Group 1 entities. Figure 11 presents FRBR relationships

This poses general challenges for mapping MARC 21 data to the FRBR model. If MARC 21 bibliographic records continue to describe *manifestations*—as seems likely and reasonable in a shared cataloging environment—should relationships at the *work* and *expression* levels be moved to authority records for those *works* and *expressions*? If so, should they be moved to authority records in all cases or only in cases where *works* and *expressions* comprise more than one *manifestation*? These are questions of structure that go beyond the FRBR model, but catalogs that incorporate the FRBR model will need answers to these questions, and revisions to AACR2 and MARC 21 to accommodate the FRBR model will need to provide those answers.

Beyond these general concerns are specific concerns about the precision of the correspondences between relationships described in the FRBR model and linking entry fields in the MARC 21 format. Many FRBR relationships—abridgement, revision (of the whole *work*), musical arrangements, complements, summarization, transformation, and imitation relationships—seldom or never apply to CR; on the other hand, those that remain—successor, supplementary, reproduction, alternate, and translation relationships—apply to them with great frequency. These latter relationships will be the focus of the remainder of this paper.

Manifestation-to-manifestation Relationships: Reproductions and Alternates

FRBR defines two relationships at the *manifestation* level: *reproductions* and *alternates;* all other relationships are defined only at the *expression* or *work* levels. For the MARC 21 format, this implies that *manifestation*-level data in linking fields, specifically the record control numbers in subfield $w, is useful only for *reproduction* and *alternate* relationships.

FRBR makes clear that although *reproduction* is typically a *manifestation-to-item* relationship (for example, a single print copy is reproduced in multiple microfilm copies), it is treated as such in FRBR only when it is useful to identify the specific *item* reproduced (such as reproduction of a particularly distinctive copy of a rare book). Otherwise, *reproduction* is treated as a relationship between *manifestations*. This works for serials cataloging, where, especially for older serials, it may have been necessary to combine volumes or issues from several separate incomplete originals to produce a single complete *reproduction*. In FRBR, *reproduction* includes macroreproductions and microreproductions, reprints, photo-offset reprints, facsimiles, and mirror sites.

FRBR distinguishes *reproductions* from *alternates*, which represent the same content in an alternate format (vinyl versus CD, videocassette versus DVD) or a simultaneously released edition (by different publishers in different countries). These are extremely rare with serials of the periodical type but are more common with book-like serials. Conceivably, a computer file serial might be (or might have been) issued in different formats for different types of operating system or for different disk drive capabilities. Such *alternates* are not separately described in CONSER records.

In the MARC 21 format, no linking fields are specifically set aside for reproductions or alternates, though fields 775 and 776 may contain reproduction data, depending on the nature of the reproduction. Note, however, that neither field is restricted to reproductions in the FRBR sense, and may contain other types of FRBR relationship. This lack of exact correspondence between MARC 21 and the FRBR model may be ameliorated to a certain extent by the fact that reproductions presumably also can be identified for purposes of collocation in the catalog from a combination of traditional citation elements (MARC fields 1XX, 240, and 245 $a, $n, and $p) and the coding of the form of reproduction fixed field element.

The MARC 21 format does not define a separate linking field for macroreproductions (such as photocopies), and it includes microreproductions with other physical forms (e.g., CD-ROM, audiocassette, Braille) in field 776. In terms of the FRBR model, some of these other forms would be alternate *manifestations* while others (e.g., audiocassettes) might be parallel *expressions*. Again, this

Work-to-work	Expression-to-work
Successor	All the *work*-to-*work* relationships
Supplement	
Complement	
Summarization	**Manifestation-to-manifestation**
Adaptation	Reproduction
Transformation	Alternate
Imitation	
Whole/part *work*-to-*work*	Whole/part *manifestation*-to-*manifestation*
	Manifestation-to-item
	Reproduction
Expression-to-expression	
Abridgement	
Revision	**Item-to-item**
Translation	
Arrangement (music)	Reconfiguration
… and all the *work*-to-*work* relationships	Reproduction
Whole/part *expression*-to-*expression*	Whole/part *item*-to-*item*

Figure 11. FRBR Relationships between works, expressions, manifestations, and items

problem might be ameliorated by substituting, for col-location purposes, a combination of citation elements and reproduction fixed field coding. In this regard, the FRBR subclassification of *reproductions* implies that additional fixed field values will need to be defined, specifically for *facsimile* and *alternate format*.

Current use of field 776 is complex. While the *CONSER Editing Guide* instructs catalogers to use this field to link from records for microreproductions to the record for the original publication, such linking is optional. Catalogers are explicitly instructed not to make reciprocal links for micro-reproductions except to records for preservation microfilm master negatives (for which use of the field is manda-tory). In records for microreproductions, the original print publication is identified by the term "Original" in field 776 subfield $c. In records for print originals, preserva-tion microfilm master negatives are identified by the term "Microfilm" in field 776 subfield $c. Note that in certain circumstances the *CONSER Editing Guide* allows a single 776 field to include the record control numbers of multiple related records, producing, in terms of the FRBR model, a one-to-many relationship in a single datafield (for example, when a single AACR2 microform record corresponds to multiple pre-AACR2 print records).

The MARC 21 format lumps reprints together with "other editions" in field 775 and does not distinguish between regular print reprints, photo-offset reprints, and facsimiles. As FRBR points out, however, facsimiles differ from other reproductions in that the intent is to preserve not only the intellectual and/or artistic content, but also the look and feel of the original. A facsimile thus addresses a different user need from other reproductions, and should, in future, be separately identified in catalog records. CONSER practice is to record reprint notes in field 580, with a non-displaying field 775 to link to the record for the original print publication (with no reciprocal link).

Finally, while FRBR treats mirror Web sites for remote electronic resources as separate *manifestations,* CONSER practice is not to describe these separately, but to identify them in CONSER records via multiple 856 fields on a single record representing the remote electronic resource.

Expression-to-expression and Work-to-Work Relationships: Translation, Successor, and Supplement

While *expression*-to-*work* relationships are described in FRBR, these are defined as relationships between a given *expression* of a *work* and a totally different *work*. No examples of such relationships have been identified among serials. Consequently, they are not treated here. All *work*-to-*work* relationships—successor, supplement, complement, summarization, adaptation, transformation, and imitation—are also defined as *expression*-to-*expression* relationships.

Consequently, they are treated under *expression*-to-*expres-sion* relationships below.

In the MARC 21 format, the *translation* relationship is recorded in the reciprocal fields 765 and 767. Because CONSER requires that this relationship always be recorded in these fields, the linking entry fields for translations should operate smoothly under FRBR (bearing in mind the prob-lem mentioned earlier relating to the inconsistent subfield-ing of uniform title data in linking entry fields). As with *expression*-to-*expression* and *work*-to-*work* relationships, while the ISSN in subfield $x of fields 765 and 767 would still be valid at the *expression* and *work* levels, the record control numbers in subfield $w would not. Users clicking on a FRBR-based link in a CONSER record presumably would be taken to an *expression*- or *work*-level display of the translation or translated title.

Succession is also a very straightforward relationship in MARC 21, coded in fields 780 and 785, with the particular form of succession specified by the value of the second indi-cator of those fields. The majority of serial linking entries represent *successor* relationships. As with translations, plac-ing the *successor* relationship at the *expression* and *work* level similarly breaks the *manifestation*-to-*manifestation* connection. Again, while the ISSN in subfield $x of fields 780 and 785 would still be valid at the *expression* and *work* levels, the record control numbers in subfield $w would not, and users clicking on a FRBR-based link in a CONSER record would presumably be taken to an *expression*- or *work*-level display of the preceding or succeeding title.

The last relationship to be considered here—the *sup-plement* relationship—is recorded in reciprocal MARC 21 fields 770 and 772. This is a more narrow interpretation of *supplement* than that provided in FRBR, which includes relationships in which one resource that may not call itself supplement can nevertheless be said to supplement another. Because of this, it includes relationships with nonserials as well as serials, and with resources—indexes, concordances, teacher's guides, glosses, appendices—not always thought of as supplements.

Fields 770 and 772 would not capture those resources that FRBR treats as supplements but CONSER does not. In some cases (such as cumulative indexes) the supplementary material might routinely be recorded on the parent record. In other cases, it might be cataloged as a monograph, with an added entry for the resource it supplements.

CONSER practice requires that the supplement rela-tionship be recorded on both the record for the supplement and that for the supplemented resource. This means that these relationships can be mapped to FRBR with relative ease. Again, as with the other expression-to-expression and work-to-work relationships, while the ISSN in subfield $x of fields 770 and 772 would still be valid at the expression and work levels, the record control numbers in subfield $w would

not, and users clicking on a FRBR-based link in a CONSER record would presumably be taken to an expression- or work-level display of the supplement/supplemented title.

Conclusion

This paper has discussed four broad areas of concern regarding continuing resources as they relate to the FRBR model. Further examination of the issues involved will be necessary before CR can be fully and economically expressed within that model (if they can be so expressed). The areas of concern are summarized and recapitulated below, along with some tentative conclusions.

First, the introduction of the FRBR model offers the opportunity to reconcile the different operational definitions of *work* used within the Anglo-American cataloging community, where we currently use a content-based definition for most bibliographic resources and a title-based definition for serials. While both these definitions are implicitly present in FRBR itself (because they are present in the international standards on which FRBR draws), they create contradictions within the model by leading to different boundaries for the same *work* at different levels of abstraction. For example, a title change may occur in one *expression* but not in others, or in one *manifestation* but not in others. While this situation can be dealt with artificially through the use of uniform titles that impose title changes on *expressions* and *manifestations* where none have occurred, a more satisfactory resolution might be the abandonment of the title-based definition of *work*. However, a formidable barrier to such a resolution lies in the vast store of legacy data contained in the millions of bibliographic records, both serial and monographic, created over the past thirty years—including the whole of the ISSN system—all premised upon that title-based definition.

Second, the CR class represented by frequently revised *works* poses a challenge to the FRBR model because this class can be represented within that model by two competing hierarchical structures and two competing citation structures. When viewed as a sequence of monographs, each edition is an *expression* of a single *work* comprising all editions. When viewed as a serial, each edition is a *work* (a component *work*) that is part of larger work (an aggregate *work*) comprising all editions. When revision is sufficiently frequent, serial catalogers typically apply the latter approach. In contrast, suppliers of MARC records for e-books, which tend to be marketed individually, typically apply the former approach. This can result in a schizophrenic representation of such works in the catalog. This schizophrenia is compounded by the differing rules of entry and citation applied to the two approaches. A serial approach will tend to favor citation under title proper, while a monographic approach will tend to favor citation under personal author (when applicable). This situation is already occurring in library catalogs, but the problem is brought into starker relief when expressed in terms of the FRBR model. While it may be possible to devise mappings between the two competing structures, machine-based conversion of data from one structure to the other is complicated by the different identifiers—ISBNs and ISSNs—used by the two structures to represent the same bibliographic resource.

Third, current CONSER cataloging practice recognizes levels of cataloging intermediate between the FRBR *manifestation* and *expression* levels. These are applied to microform reproductions of newspapers, which are represented by the bibliographic record for the printed newspaper, and issue-based online versions of serials, which are represented by a single bibliographic record, regardless of the number and variety of online versions. In these cases, the bibliographic record describes a single *manifestation* but represents multiple *manifestations*. Any migration to a FRBR model would require either the recognition and theoretical justification of these intermediate levels or the creation of additional *manifestation* records (for microforms and possibly online versions) or *item* records (possibly for online versions) to accommodate data for the *manifestations* and *items* currently subsumed under a single CONSER record.

Fourth and finally, the relationships currently encoded in MARC 21 serial records do not, in most cases, easily map to the relationships and multiple levels of abstraction contained in the FRBR model, though it seems that some level-of-abstraction relationships can be extrapolated from citation data and form of reproduction codes. Relationships fail to map well for several reasons: (1) the same relationship is not explicitly and exclusively defined or coded in both the MARC 21 format and the FRBR model; (2) the existence of the related serial within a given catalog cannot be deduced from its presence in a MARC 21 linking entry field; and (3) relationships at the FRBR *expression* and *work* level are typically recorded in MARC 21 records at the *manifestation* level. It appears that if relationships in the FRBR model are to be accommodated within MARC 21, it will require extensive modifications to the bibliographic format and, if *works* and *expressions* will utilize authority records, to the authorities format. It will also entail potentially labor-intensive re-evaluation of relationship data in existing MARC 21 bibliographic records to fit the FRBR model.

All these concerns have been presented here in a preliminary form. The profession is still at an early point in the examination, much less the application, of the FRBR model, and the model itself remains in a state of flux. While the 1997 FRBR study employs an entity-relationship conceptual model, current discussions between a working group of the FRBR Review Group and members of ICOM-CIDOC (the International Committee for Documentation

of the International Council of Museums) are investigating an object-oriented conceptual model that will differ in significant ways from the model that has been discussed above, primarily in attempting to accommodate a broader range of "cultural heritage objects" than is customarily collected by libraries.[33] Within the Anglo-American cataloging community, work on catalog code revision aims to incorporate FRBR concepts and eliminate or restrict anomalies that do not adhere to the conceptual model. At the same time, explorations relating to an International Cataloguing Code, proceeding via a series of regional meetings, have already produced a FRBR-aware draft successor to the Paris Principles of nearly half a century ago.

In many ways, the profession is on the threshold of a brave new cataloging world with impressive possibilities. Given the work already accomplished and the work now underway, this has seemed an opportune time to address the major questions affecting the reconciliation of CR cataloging with the cataloging of other bibliographic resources within the FRBR model.

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