

Introducing the FRBR Library Reference Model

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Abstract:

The FR family of conceptual models has grown to include three separate models prepared independently over many years by different working groups: FRBR for bibliographic data, FRAD for authority data, and FRSAD for subject authority data. Even as FRAD and FRSAD were being finalized in 2009-2010, it became clear that it would be necessary to combine or consolidate the FR family into a single coherent model to clarify the understanding of the overall model and remove barriers to its adoption. The FRBR Review Group has been working towards this since 2011, constituting a Consolidation Editorial Group in 2013. The consolidation task involves not only spelling out how the three existing models fit together, but requires taking a fresh look at the models to incorporate insights gained since their initial publications.

This paper, based directly on the work of the Consolidation Editorial Group, provides the first public report of the consolidated model, tentatively referred to as the FRBR-Library Reference Model (FRBR-LRM), and the guiding principles that have been applied in its development.

Keywords: FRBR, FRAD, FRSAD, FRBR-LRM, conceptual models.

1. INTRODUCTION

The FR family of conceptual models has grown to include three separate models for specific aspects of the bibliographic universe prepared independently over many years by different working groups: FRBR for bibliographic data, FRAD for authority data, and FRSAD for subject authority data. Inevitably the three models, although all created in an entity-relationship modeling framework, adopted different points of view and differing solutions for common issues. Attempting to adopt all three models in a single system required solving complex issues in an ad hoc manner with little guidance from the models. Even as FRAD and

FRSAD were being finalized in 2009 and 2010, it became clear that it would be necessary to combine or consolidate the FR family into a single coherent model to clarify the understanding of the overall model and remove barriers to its adoption.

2. CONSOLIDATION EDITORIAL GROUP

The FRBR Review Group has been actively working towards a consolidated model since 2010, in a series of working meetings held in conjunction with IFLA conferences and at an additional mid-year meeting in April 2012 during which the user task consolidation was first drafted. In 2013 in Singapore, the FRBR Review Group constituted a Consolidation Editorial Group (CEG) to focus on the detailed reassessment of attributes and relationships, and the drafting of the model document. Members are Pat Riva, chair (Canada), Patrick Le Bœuf (France), and Maja Žumer (Slovenia). The CEG (sometimes with other FRBR Review Group members) has held four multi-day meetings since then, as well as reporting on progress in detail to the FRBR Review Group during a working meeting in 2014 in Lyon.

This paper is based directly on the work of the Consolidation Editorial Group and constitutes the first public report of the consolidated model, tentatively referred to as the FRBR-Library Reference Model (FRBR-LRM), and the guiding principles that have been applied in its development.

3. METHODOLOGY

The consolidated FR model aims to be a high-level conceptual reference model within an entity-relationship modeling framework. The consolidation task is not simply an editorial process of fitting the three existing models together, rather a modeling exercise conducted taking a consistent point of view so as to resolve differences between the models. It requires taking a fresh look at the models to incorporate insights gained since their initial publications through user research and experience in working with the models.

The intention is to produce a model definition document that presents the model concisely and clearly, principally with formatted tables and diagrams, so that the definitions can be readily transferred to the IFLA FRBR namespace for use with linked open data applications. To facilitate the transition between the existing models and the consolidated model, transition mappings will be produced as a separate document.

4. USER TASKS

As in the existing FR models, the user tasks, and the user populations considered in framing the tasks, play an essential role in defining the scope of the model. The entities, attributes and relationships that are defined in any model are chosen in order to permit an information system based on that model to fulfil those tasks for those user groups. In selecting the user tasks that provide focus for the consolidated FRBR-LRM model, the needs of a wide range of users of bibliographic and authority data were considered. The data may be used by readers, students, researchers and other types of end-users, by library staff, by other actors in the information chain, including publishers, distributors, vendors, etc.

As with FRBR and FRSAD, the consolidated model is primarily concerned with the data and functionality required by end-users (and intermediaries working on behalf of end-users) to

meet their information needs. Library staff and others responsible for the creation and maintenance of the data often carry out similar tasks in the course of their duties, these tasks are also in scope of the model. However, administrative and rights metadata is also needed for the management of bibliographic and authority data to enable it to meet user needs. While this data and its associated administrative tasks are vital to the provision of service, these tasks are not in the scope or orientation of the model. The point-of-view of the FRAD model differed somewhat from the other two original models and from the consolidated model, as FRAD considered both end-user needs and library staff administrative uses in its definition of user tasks.

The consolidated model is based on five generic user tasks, defined in Table 1, which confirm its outward orientation to the end-user's needs. The user tasks are phrased from the point of view of supporting the end user's ability to carry them out. In the description of the tasks, the term "resource" is used very broadly to stand for any of the entities defined in the model, as well as actual library resources.

Breaking the information seeking process down into the five generic tasks is intended to draw out each of the basic aspects of this process. Although the tasks are listed in a particular order, there is no intention to imply that these are obligatory steps in an ideal information seeking process. In reality information seeking is iterative and may move in a tangent at any stage. Some user tasks may happen essentially simultaneously in the user's mind (*identify* and *select* for instance). In particular, *explore* is a separate dimension from the other tasks, in some cases providing starting points for further information seeking processes, and in others serving as the user's actual goal.

Table 1: User tasks

Find	To search on any relevant criteria in order to bring together information about one or more resources of interest
Identify	To clearly understand the nature of the resources found and to distinguish between similar resources
Select	To determine the suitability of the resources found and to choose (by accepting or by rejecting) specific resources
Obtain	To access the content of the resource
Explore	To use the relationships between one resource and another to place them in a context

The first four tasks (*find*, *identify*, *select*, *obtain*) are easily seen as generalizations of the four FRBR tasks of the same names. The tasks *find* and *identify* also appear in both FRAD and FRSAD; FRSAD includes *select* as well. The *explore* task is drawn from FRSAD, but is defined in the consolidated model so as to include the FRAD task *contextualize*. The final task from FRAD (*justify*), as it is a task relating to the work of library staff, is out of scope in FRBR-LRM.

5. ENTITIES

In an entity-relationship model, the entities defined are those identified as the key objects of interest to users. An entity is an abstract class or category of conceptual objects. Entities serve as domains and ranges of the relationships that are highlighted in the model. Attributes or properties are defined for each entity which serve to further define its scope.

In the consolidation process, each entity defined in the existing FR models was examined critically. The definitions were carefully considered, particularly for similar entities across models (such as FRAD:name and FRSAD:nomen), to determine whether the entities could be merged and generalized. Entities with no specific attributes or relationships were not retained. As a result of this examination, the existing entities (10 in FRBR, 16 in FRAD, 3 in FRSAD) were either retained (although sometimes redefined), merged, deprecated, considered out of scope, or regarded as types of other entities. New entities were established when this served to simplify the model, draw out underlying generalizations, and reduce redundancy in the declaration of relationships and attributes. The end result is 11 entities and 3 pre-defined types, as described in Table 2.

Table 2: Entities

Entity	Definition	Source
Res	Any entity in the universe of discourse	Renamed/redefined from FRSAD:Thema
Work		Retained from FRBR
Expression		Retained from FRBR
Manifestation		Retained from FRBR
Item		Retained from FRBR
Agent	An entity capable of exercising responsibility relationships relating to <i>works, expressions, manifestations</i> or <i>items</i>	New: superclass of <i>Person</i> and <i>Group</i>
Person	An individual human being	Retained from FRBR
Group	A gathering or organization of <i>persons</i> using a particular name and acting as a unit	New (includes types <i>Family</i> and <i>Corporate Body</i>)
Nomen	Any sign or arrangement of signs by which an entity is known	Merger of FRSAD:Nomen and FRAD:Name and Controlled Access Point (includes type <i>Identifier</i>)
Place	A given extent of space	Repurposed from FRBR:Place
Time-span	A temporal extent having a beginning, an end and a duration	New

The names of the entities are to some extent arbitrary. The name of an entity viewed alone is not intended to convey the full meaning behind the entity. To fully understand the intent of each entity, and the kinds of instances that belong to it, it is important to consult the definition and the full scope note.

Unlike the existing FR models, the FRBR-LRM model structures its entities with hierarchical relationships. This means that some entities are declared as superclasses of other entities which then have subclass relationships to it. Any instance of a subclass entity is also an instance of the superclass. This relationship can be expressed as “is a” (or *IsA*). This permits the model to be streamlined and avoid repetition in the attributes and relationships that are defined. For example, in FRBR-LRM the entity *person* is a subclass of the entity *agent*; this can be expressed as: *Person IsA Agent*. Since all *persons* are *agents*, any relationship or attribute that applies to the entity *agent* also applies to the entity *person*, without needing to be explicitly declared for the entity *person*. The reverse direction does not hold; relationships

or attributes explicitly defined for subclass entities do not automatically apply to the whole superclass. Thus, for instance, the entity *person* has a relationship to the entity *place* such as “is place of birth of”, this relationship does not hold for those *agents* which are *groups* (types *family* or *corporate body*).

In general, other than those entities related by IsA hierarchies, the entities declared in the model are disjoint. Disjoint entities can have no instance that is simultaneously an instance of more than one of these entities.

The FRBR-LRM model defines a single top-level entity (*res*, or “thing” in Latin, a generalization of the FRSAD entity *thema* beyond the needs of the subject relationship). The ten other entities are direct or indirect subclasses of *res*. Eight entities are direct subclasses of *res*: *work*, *expression*, *manifestation*, *item*, *agent*, *nomen*, *place*, *time-span*. The final two entities are subclasses of the entity *agent*: *person* and *group*. Finally, three specific types are pre-defined in the model: *family* and *corporate body* which are types of *groups*, and *identifier* which is a type of *nomen*.

In the previous FR models these pre-defined types were considered entities; however, in the consolidated model they do not meet the criteria of having specific attributes or relationships. In particular, the result of the definition of the superclass entities *agent* and *group* is that all the attributes and relationships that would have been defined for *family* and *corporate body* are declared at the more general level. Creating pre-defined types serves to show how these former entities fit into the consolidated model.

The final two FRAD entities (*agency* and *rules*), served in the modeling of library-internal processes for the assignment of controlled access points and are deemed outside of the functional scope of the consolidated model.

The entities from FRBR group 3 (*concept*, *object*, *event*, *place*), as entities that serve as objects of the subject relationship, are considered deprecated in the consolidated model. This means that they have no official standing in the model, but that if considered useful in a given application they can be used to sub-type the kinds of *res* that can serve as subjects. As a result, the term *place* could be repurposed in the consolidated model to serve as a general *place* entity. Along with the new *time-span* entity, *place* can be associated with any other entity, which serves to greatly streamline the attributes and relationships of many entities.

6. RELATIONSHIPS

Relationships are an essential part of the bibliographic universe: they connect instances of entity types and provide context for them. Relationships are included in all three FR models. While the relationships between *works*, *expressions*, *manifestations*, *items* (named primary in FRBR) remain the same over the three models, other relationships were modeled differently and in various degrees of generality. The decision of the CEG was to declare the relationships in a general, abstract way and thus enable implementers to include additional details in a consistent and coherent way by introducing additional specific types of relationships.

The relationships between *works*, *expressions*, *manifestations*, *items* remain the core of the model and can be considered mandatory, they are listed in Table 3. Other relationships are encouraged, since they enable exploration and are very important for users. It is also important to note that while relationships are declared between entity types, in reality they are established and exist between instances of these entity types.

Table 3: Core relationships

Domain	Forwards name	Reverse name	Range	Cardinality
WORK	is realized through	realizes	EXPRESSION	1 to M
EXPRESSION	is embodied in	embodies	MANIFESTATION	M to M
MANIFESTATION	is exemplified by	exemplifies	ITEM	1 to M

Relationships are declared in both directions, first from left to right, then right to left. Cardinality specifies the number of instances that are connected by the specific relationship. The cardinality 1 to M for the ‘is realized through’ relationship, for example, means that each *work* has one or more *expressions* that realize it and that each *expression* realizes exactly one *work*.

Since *nomen* was introduced as a separate entity, the appropriate relationship is declared, see Table 4.

Table 4: Appellation relationship

RES	has appellation	is appellation of	NOMEN	M to M
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After the introduction of the *agent* superclass, the responsibility relationships are simplified as indicated in Table 5.

Table 5: Responsibility relationships

WORK	was created by	created	AGENT	M to M
EXPRESSION	was created by	created	AGENT	M to M
MANIFESTATION	was created by	created	AGENT	M to M
MANIFESTATION	is distributed by	distributes	AGENT	M to M
MANIFESTATION	was produced	produced	AGENT	M to M
ITEM	is owned by	owns	AGENT	M to M
ITEM	was modified by	modified	AGENT	M to M

The subject relationship, as defined in FRBR and FRSAD, remains, see Table 6.

Table 6: Subject relationship

WORK	has as subject	is subject of	RES	M to M
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By introducing *place* and *time-span* as entities, many attributes (for example, place of publication, place of birth, date of birth) are now modelled as relationships, see Table 7. These two general relationships can be typed to provide more detail.

Table 7: Place and Time-span relationships

RES	has association with	is associated with	PLACE	M to M
RES	has association with	is associated with	TIME-SPAN	M to M

7. ATTRIBUTES

In the three existing FR models, the attributes were defined at different levels of granularity and detail. Since it is virtually impossible to include all attributes for all entities, the CEG decided to retain only the most significant and common ones and not strive to be exhaustive. In any implementation, additional attributes can be added for any or all entities, following the patterns provided, to cover, for example, particular resource types or more details about *agents*.

Since user studies indicate that end-users often see the original *expression* as separate from other *expressions* and as the best representation of the *work*, a new *expression* attribute was added to enable the assignment of the 'representative expression'. Such an *expression* is the basis of the *work* description and the relationship can now be made explicit.

8. CONCLUSION

FRBR-LRM will be discussed by the FRBR Review Group during the conference in Cape Town. The resulting draft will be reviewed by Standing Committees for Cataloguing, Classification & Indexing and Bibliography and it is expected that the world-wide review will start in early 2016. We encourage all members of IFLA to actively participate in this review process to ensure that the resulting model will be accepted by the library community and implemented to its full potential.

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