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FRBR-Library Reference Model

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Consolidation Editorial Group
of the IFLA FRBR Review Group

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Chapter 1 Introduction

1.1 Background

Since the initial publication of the *Functional Requirements for Bibliographic Records* (FRBR) in 1998, the FR family of conceptual models grew to include three separate models for specific aspects of the bibliographic universe. In addition to FRBR for bibliographic data, the FR family of conceptual models included the *Functional Requirements for Authority Data* (FRAD) and the *Functional Requirements for Subject Authority Data* (FRSAD).

These models were prepared independently over many years by different working groups:

- FRBR was the final report of the IFLA Study Group on the Functional Requirements for Bibliographic Records. The Study Group was constituted in 1992, and the report was approved by the Standing Committee of the Section on Cataloguing on September 5, 1997.
- FRAD was the outcome of the IFLA Working Group on Functional Requirements and Numbering of Authority Records (FRANAR). FRANAR was established in April 1999 by the Division of Bibliographic Control and the Universal Bibliographic Control and International MARC Programme (UBCIM). The report was approved by the Standing Committees of the Cataloguing Section and the Classification and Indexing Section in March 2009.
- FRSAD was the report of the IFLA Working Group on the Functional Requirements for Subject Authority Records (FRSAR), which was formed in 2005. The report was approved by the Standing Committee of the IFLA Section on Classification and Indexing in June 2010.

Section 3.2.2 of the FRBR *Final report*, concerning the definition of the entity *expression*, was amended as a result of the adoption of the recommendation of Working Group on the Expression Entity (2003-2007). Additionally, the Working Group on Aggregates, established by the FRBR Review Group in 2005, was tasked to consider the modelling of various types of aggregates. Its recommendations were adopted by the FRBR Review Group in August 2011, in San Juan, Puerto Rico, and its final report was submitted in September 2011.

Inevitably the three models, although all created in an entity-relationship modelling framework, adopted different points of view and differing solutions for common issues. Although all three models are needed in a complete bibliographic system, 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.

The FRBR Review Group worked actively towards a consolidated model starting in 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 this model document. The CEG (at times with other FRBR Review Group members or invited experts) held five multi-day meetings, as well as discussing progress in detail with the FRBR Review Group as a whole during a working meeting in 2014 in Lyon and another in 2015 in Cape Town.

A World-Wide Review of the FRBR-Library Reference Model was conducted from (??-??) 2016.

The resulting model definition was approved by the FRBR Review Group (date), and then by the Standing Committees of the Sections on Cataloguing, Classification & Indexing, and Bibliography (dates). The final document was approved by the IFLA Committee on Standards (date).

1.2 Contributors

The Consolidation Editorial Group had the principal responsibility for drafting this FRBR-LRM model definition document. All members of the FRBR Review Group and liaisons during the consolidation project, and during the lead-up to the formal consolidation project, made considerable contributions during working meetings and through written responses. Members of the CIDOC CRM Special Interest Group who participated in the development of FRBRoo version 2.0 (which incorporated the FRAD and FRSAD models) raised issues and provided significant reflections.

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Chapter 2 Methodology

2.1 Scope and Objectives

The FRBR-Library Reference Model aims to be a high-level conceptual reference model developed within an entity-relationship modelling framework. The model covers bibliographic data as understood in a broad, general sense. In terms of general approach and methodology, the modelling process that resulted in the FRBR-LRM follows from the approach taken in the original FRBR study, where it was described as follows:

> "The study uses an entity analysis technique that begins by isolating the entities that are the key objects of interest to users of bibliographic records. The study then identifies the characteristics or attributes associated with each entity and the relationships between entities that are most important to users in formulating bibliographic searches, interpreting responses to those searches, and "navigating" the universe of entities described in bibliographic records. The model developed in the study is comprehensive in scope but not exhaustive in terms of the entities, attributes, and relationships that it defines. The model operates at the conceptual level; it does not carry the analysis to the level that would be required for a fully developed data model." (FRBR, p. 4)

The model aims to uncover general principles behind the logical structure of bibliographic information, without making any presuppositions about how that data might be stored in any particular system or application. As a result, the model does not make a distinction between data traditionally stored in bibliographic or holdings records and data traditionally stored in name or subject authority records. For the purposes of the model, all of this data is included under the term bibliographic information and all such data is within the scope of the model.

The FRBR-LRM takes its functional scope from the user tasks (see section 3), these are defined from the point of view of the end-user and the end-user's needs. As a result, administrative metadata used by libraries and bibliographic agencies for their internal functions is deemed out of scope of the model.

The model considers bibliographic information pertinent to all types of resources generally of interest to libraries, however, the model seeks to reveal the commonalities and underlying structure of bibliographic resources. The model selected terms and created definitions so that they may be applicable in a generic way to all types of resources, or to all relevant entities. In consequence, any data elements that are viewed as specialized or are specific to certain types of resources, are deliberately not represented in the model. The model is comprehensive at the conceptual level, but only indicative in terms of the attributes and relationships that are defined.

2.2 Conceptual Model as the Basis for Implementation

The conceptual model as declared in the FRBR-LRM is a high-level conceptual model and as such is intended as a guide or basis on which to elaborate cataloguing rules and implement bibliographic systems. The FRBR-LRM is not intended to be implemented directly as it stands. Any practical application will need to determine an appropriate level of precision, requiring either expansion within

the context of the model, or possibly some omissions. However, for an implementation to be viewed as a faithful implementation of the model, the basic structure of the entities and the relationships among them (including cardinality), and the attachment of those attributes implemented, needs to be respected.

Most of the attributes and relationships declared are not mandatory for implementation. Should some of them be omitted as unneeded in a particular application, the resulting system can still be considered an implementation of FRBR-LRM.

The FRBR-LRM provides a number of mechanisms that permit the expansions that are likely to be needed in any actual implementation. Category attributes are defined for many entities, permitting implementations to create those sub-types of the entities that might be useful. Additional specialized attributes can be added for any or all entities, following the patterns provided, to cover, for example, particular resource types or to provide more details about *agents*. Other attributes, such as the Manifestation Statement, are intended to be sub-typed according to the provisions of the cataloguing rules applied by the bibliographic agency. Many relationships are defined at a general level, again with the intention that implementations would define pertinent sub-types. The model provides a structure and the guidance needed so that implementations can introduce detail in a consistent and coherent way, fitting it into the basic structure of the model.

Definitions of certain key elements in the FRBR-LRM are intended to be compatible with the operationalization of the model through a variety of cataloguing codes. One case is the *expression* attribute *Representativity*, which records whether an expression is considered representative of the *work* or not, without predetermining the criteria that may be used in making this determination in a particular cataloguing code. A wide range of decisions made in cataloguing rules can be accommodated by the model. For example, the exact boundaries of the instances of entities *work* and *expression* are not governed by the model. As a result, the model does not determine the level of adaptation required to create a new *work* instead of a new *expression* of an existing *work*. However, for practical purposes, examples used reflect generally accepted existing practice as to where these boundaries lie.

2.3 Process of Consolidation of the FR Family of Conceptual Models

The model consolidation task was more than a simple editorial process to fit the three models in the FR family (FRBR, FRAD, FRSAD) together. Since the three models differed significantly in their scopes and points of view, as well as in the solutions adopted to certain common issues, choices had to be made in order to ensure the internal consistency of the conceptualization that underlies the model. It was essential to adopt a consistent point of view at the outset, so as to have a principled basis on which to resolve the differences between the models. This required taking a fresh look at all the models, which also offered an opportunity to incorporate insights gained since their initial publications through user research and experience in working with the models.

For each element in the model (user tasks, entities, attributes, relationships), the existing FRBR, FRAD, and FRSAD definitions were examined in parallel, seeking to align them based on their intended meanings, and then to develop generalizations. User tasks were examined first, as this provided a focus and functional scope for the rest of the modelling decisions. Entities were the next element examined, then relationships and attributes alternately. The modelling of entities, attributes and relationships was accomplished through several iterations, as each pass revealed simplifications and refinements which then needed to be applied consistently throughout the model. Finally, all definitions, scope notes and

examples were drafted and the full model definition checked for consistency and completeness.

A major criterion for the retention or establishment of an entity, was that it had to be needed as the domain or range of at least one significant relationship that could not logically be generalized to a superclass of the entity. An important factor in the assessment of relationships and attributes was to determine whether they could be generalized, including whether they could be declared at a higher level using a super-class entity. Entities were added if they could then be used to streamline the model by permitting the reduction of relationships or attributes.

While entities, and the relationships between them, provide the structure of the model, attributes are what gives flesh to the description of an instance of an entity. The logical repeatability or non-repeatability of attributes is not prescribed by the model. There are basically two ways to represent an attribute in an actual implementation:
- an attribute can be represented as a mere literal (a string, a number…): this is what OWL regards as "datatype properties";
- an attribute can be represented as a URI pointing to an external source (a referential or normative document of any kind, such as an authority file, or a list of coded values), in which case it could have been modelled as a relationship rather than a mere attribute, but the model is meant to remain agnostic as to the way it is to be implemented: this is what OWL regards as "object properties". Some attributes can be represented either way, some can only be represented as literals; for those that can only be represented as URIs, the preference was to model them as relationships.

The FRBR-LRM is presented as a concise model definition document, principally consisting of formatted tables and diagrams. Previous experience in creating IFLA vocabularies for the FR family of conceptual models indicated that a highly structured document can more readily be transferred to the appropriate registries for use with linked open data applications. The context has changed since the FRBR model was originally developed, and new needs have emerged, particularly in terms of reuse of data in semantic web applications, making this step an integral part of the model definition from the outset.

The definition of the FRBR-LRM presented in the current document is fully self-contained. No other document is required to follow the model. Specifically, the model definition documents of the three previous models are superseded.

2.4 Relationship to Other Models

In the same time-period as the FRBR-LRM was being developed, a parallel process was taking place in the object-oriented definition of FRBR. FRBRoo version 1.0 (first published in 2009) expressed the original FRBR model as an extension of the CIDOC Conceptual Reference Model (CIDOC CRM) for museum information. It was expanded to include the entities, attributes and relationships declared in FRAD and FRSAD, resulting in FRBRoo version 2.4 (approved in 2015). The modelling exercise behind that expansion informed the work of consolidation being undertaken in the entity-relationship formalism of the model, but did not predetermine any of the decisions taken in the definition of the FRBR-LRM. FRBR-LRM aims to be a very general high-level model; it operates at a greater level of generality than FRBRoo, which seeks to be comparable in terms of generality with CIDOC CRM.

FRBR-LRM issues from, but is distinct from, the three previous models in the FR family of conceptual

models, FRBR, FRAD, and FRSAD. To facilitate the transition between the three previous models and the FRBR-LRM, an overview of the major differences and detailed transition mappings have been produced as a separate companion document. These mappings cover every user task, entity, attribute, and relationship defined in FRBR, FRAD, and FRSAD. Starting from an alignment of the respective FRBR, FRAD, and FRSAD elements, the transition mappings document the resulting disposition of those elements in the FRBR-LRM. Elements may have been: retained (possibly under a different name, or with a generalized definition), merged, generalized, modelled differently, or deprecated (deemed out of scope, or otherwise not appropriate for the level of the model). A frequent example of a difference in modelling is the case of many former attributes, which in the FRBR-LRM have been modelled as relationships to the entities *place* and *time-span*. The transition mappings are a one-time companion document, they are not needed for an understanding of the FRBR-LRM itself. Their main purpose is to assist in the transition of an existing application to the FRBR-LRM. The mappings are also of interest to anyone following the development over time of the conceptual models. The transition mappings will not be maintained to reflect any future development of the FRBR-LRM.

FRBR-LRM
Chapter 3 Users and User Tasks

3.1 User Population Considered

In framing the user tasks that provide focus for the 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. Many of the uses made of the data by these groups of people can be viewed as specific use cases of the five generic user tasks defined below.

The 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.

3.2 User Tasks Summary

The five generic user tasks described in this chapter serve as a statement of the model's functional scope and 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 here 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 example). 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 3.1 User Tasks Summary	
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

3.3 User Tasks Definitions

Table 3.2 Definitions of User Tasks		
Task	**Definition**	**Comment**
Find	To search on any relevant criteria in order to bring together information about one or more resources of interest	The *find* task is about searching. The user's goal is to bring together one or more things (entities) as the result of a search. The user may search using an attribute or relationship of an entity, or a combination of attributes and/or relationships. To facilitate this task the information system seeks to **support searching**; that is, to enable effective searching by offering appropriate search elements or functionality.
Identify	To clearly understand the nature of the resources found and to distinguish between similar resources	The user's goal in the *identify* task is to confirm that the entity described corresponds to the entity sought, or to distinguish between two or more entities with similar characteristics. In “unknown item” searches, the user also seeks to recognize the basic characteristics of the resources presented. To facilitate this task the information system seeks to **clearly describe the resources** it covers. The description should be recognizable to the user and easily interpreted.
Select	To determine the suitability of the resources found and to choose (by accepting or by rejecting) specific resources	The *select* task is about reacting to possible options. The user's goal is to make choices from among the resources presented about which of them to pursue further. The user's secondary requirements may involve aspects of content, intended audience, physical format, availability, etc. To facilitate this task the information system needs to **allow/support relevance judgments** by providing sufficient appropriate information about the *resources* found to allow the user to make this determination.
Obtain	To access the content of the resource	The user's goal in the *obtain* task is to move from consulting a surrogate to actually interacting with the information resource itself. To fulfill this task the information system needs to either provide direct links to online information or location information for physical resources, as well as any instructions required to complete the transaction or any restrictions on access.
Explore	To use the relationships between one resource and another to place them in a context	The *explore* task is the most open-ended of the user tasks. The user may be browsing, relating one resource to another, making unexpected connections, or getting familiar with the information resources available for future use. The *explore* task acknowledges the importance of serendipity in information seeking. To facilitate this task the information system seeks to **support discovery** by making relationships explicit, by providing contextual information and navigation functionality.

Chapter 4 Model Definition

The formal model definition presented in this chapter covers the three elements used in entity-relationship models:

- entities, the classes or categories of conceptual objects which are the focus of the data, described in section 4.1;
- attributes, the types of data which characterize instances of entities, described in section 4.2;
- relationships, the properties which link instances of entities, described in section 4.3.

Every element in the model is numbered for unambiguous reference. The numbering convention adopted is the prefix "LRM-", a letter corresponding to the type of element (E = entity; A = attribute; R = relationship) and a sequential number. Each entity, attribute and relationship is also given a brief name. While these names were chosen with the intention of conveying the spirit of the corresponding entity, attribute or relationship, it is impossible for a brief term or phrase to fully capture the specific meanings of the elements within the model. Before applying an aspect of the model, it is important to always become familiar with the definition and full scope notes of the entity, attribute or relationship.

Section 4.1 Entities

4.1.1 Introduction

The entities defined in the model are those identified as the key objects of interest to users of library information systems. These entities are defined in general, inclusive, terms so as to draw out the most relevant features required to fulfill user needs. Entities serve as domains and ranges of the relationships highlighted in the model. Attributes or properties defined for each entity serve to further define its scope.

An entity is an abstract class or category of conceptual objects, there are many instances of each entity which are described in bibliographic, holdings or authority data. One entity may be declared a superclass of other entities which then have a subclass relationship 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). For example, 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 example, 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 *collective agents*.

Constraints may operate between different entities. 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. This means, for example, that an entity cannot be both a *person* and a *collective agent*. However, an entity can be both a *collective agent* and an *agent*. Similarly, an entity cannot be both a *manifestation* (an abstract entity which is a set) and an *item* (a concrete entity).

4.1.2 Class or "IsA" Hierarchy for Entities

Table 4.1 below shows in tabular form the superclass and subclass relationships defined between the entities in Table 4.2. The model includes a single top-level entity (*res*), shown in the first column of the table; all other entities are direct or indirect subclasses of *res*. The eight entities that are direct subclasses of *res* are shown in the second column: *work*, *expression*, *manifestation*, *item*, *agent*, *nomen*, *place*, *time-span*. The third column shows the two entities that are subclasses of the entity *agent*: *person* and *collective agent*.

Table 4.1 Entity Hierarchy

Top Level	Second Level	Third Level
LRM-E1 Res		
--	LRM-E2 Work	
--	LRM-E3 Expression	
--	LRM-E4 Manifestation	
--	LRM-E5 Item	
--	LRM-E6 Agent	
--	--	LRM-E7 Person
--	--	LRM-E8 Collective Agent
--	LRM-E9 Nomen	
--	LRM-E10 Place	
--	LRM-E11 Time-span	

4.1.3 Entities Detailed Definition

Each entity declared in the model is described in Table 4.2 below. Entities are numbered sequentially from LRM-E1 to LRM-E11. Following the number, first the name of each entity is given, then a brief definition, and a statement of relevant constraints in the same row. A longer scope note and a selection of examples of instances of that entity are in subsequent table rows. 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. The names of the entities are to some extent arbitrary, they are intended to serve as shorthand to refer to the entities in the sections on attributes and relationships that follow. The name of an entity viewed alone is not intended to convey the full meaning behind the entity.

In considering the examples of all the entities other than the entity *nomen*, it is important to bear in mind that instances of entities need to be referred to by a *nomen* associated with that instance, but it is the instance itself which is the example, not the *nomen*. When necessary to highlight the distinction between a *res* and a *nomen* representing the *res*, such as in the examples of the *res* and *nomen* entities, a description of the instance of the *res* entity is given in curly braces ({}), while the *nomen* is given in single quotes (' ').

Table 4.2 Entities			
#	**Name**	**Definition**	**Constraints**
LRM-E1	Res	Any entity in the universe of discourse	
	Scope notes	*Res* (“thing” in Latin) is the top entity in the model. *Res* includes both material or physical things and conceptual objects. Everything considered relevant to the bibliographic universe, the universe of discourse in this case, is included. *Res* is a superclass of all the other entities that are explicitly defined, as well as of any other entities not specifically labeled. The *res* is the concept or thing itself behind the entity. The *res* is distinct from and not to be unified with, any of the *nomens* or identifiers used to refer to it in any identification system (thus in particular, a *res* is not the same as a URI assigned to refer to it in a namespace, as the URI is an identifier, a type of *nomen*).	
	Examples	• {Homer's Odyssey} • {Henry Gray's Anatomy of the human body} • {Codex Sinaticus} • {Henry Gray} • {Agatha Christie} • {Miss Jane Marple} [character in numerous Agatha Christie novels and stories] • {IFLA} • {the Romanov family} • {Italian-Canadians} • {Job} [the Biblical figure] • {graduates of Queen's University between 1980-1990} [a group of people who are not a *collective agent*] • {anatomy} [a subject concept] • {the Tibetan script} • {Eiffel Tower} • {the table in my office} [a specific object] • {Paris, France} • {the 1920s} [a time-span] • {the Battle of Hastings} • {horses} [species of mammal] • {the racehorse Seabiscuit} [a specific, named animal]	
#	**Name**	**Definition**	**Constraints**
LRM-E2	Work	The intellectual or artistic content of a distinct creation	Superclass: *Res* The entities *Work*, *Expression*, *Manifestation*, *Item* are disjoint
	Scope notes	A *work* is an abstract entity that permits the identification of the commonality of content between and among various *expressions*. A *work* is a conceptual object, no single material object can be identified as the *work*.	

Table 4.2	**Entities**	
		The essence of the *work* is the constellation of concepts and ideas that form the shared content of what we define to be *expressions* of the same *work*. A *work* comes into existence simultaneously with the creation of its first *expression*, no *work* can exist without there being (or there having been at some point in the past) at least one *expression* of the *work*. A *work* can be recognized retrospectively from an examination of the individual realizations or *expressions* of the *work*. The *work* consists of the intellectual or artistic creation that lies behind all the various *expressions* of the *work*. As a result, the *work* can evolve as new *expressions* of it are created. Bibliographic and cultural conventions play a crucial role in determining the exact boundaries between one instance of *work* and related *works*. User needs are the basis for determining whether instances of *expression* are considered to belong to the same instance of *work*. When the majority of users, for most general purposes, would regard the *expression* instances as being intellectually equivalent, then these *expressions* are considered to be *expressions* of the same *work*. Generally, when a significant degree of independent intellectual or artistic effort is involved in the production of an *expression*, the result is viewed as a new *work* with a derivation relationship to the source *work*. Thus paraphrases, rewritings, adaptations for children, parodies, musical variations on a theme and free transcriptions of a musical composition are considered to represent new *works*. Similarly, adaptations of a *work* from one literary or art form to another (e.g., dramatizations, adaptations from one medium of the graphic arts to another, etc.) are considered to represent new *works*. Abstracts, digests and summaries are also considered to represent new *works*.
	Examples	• Homer's *Odyssey* • Henry Gray's *Anatomy of the human body* • Agatha Christie's *They do it with mirrors* • Laura Hillenbrand's *Seabiscuit: an American legend* • J.S. Bach's *The art of the fugue* • W.A. Mozart's *Piano sonata KV 281 in B flat major* • J. Brahms's *String quartet Op. 51 n. 1 in C minor* • *The Wall Street Journal* • *Jules et Jim* • *Microsoft Excel* • The Dewey Decimal Classification (DDC) • WebDewey [software for displaying and searching the DDC, created by Pansoft GmbH]

Table 4.2	**Entities**		
		• The Ordnance Survey's *1:50 000 Landranger series* • Auguste Rodin's *The thinker* • Raoul Dufy's *Racecourse in Epsom*	
#	**Name**	**Definition**	**Constraints**
LRM-E3	Expression	A distinct constellation of signs conveying intellectual or artistic content	Superclass: *Res* The entities *Work*, *Expression*, *Manifestation*, *Item* are disjoint
	Scope notes	An *expression* is a distinct constellation of signs of any form or nature intended to convey intellectual or artistic content and identifiable as such. An *expression* is an abstract entity distinct from the carriers used to record it. An *expression* is the specific intellectual or artistic form that a *work* takes each time it is "realized". *Expression* encompasses, for example, the specific words, sentences, paragraphs, etc. that result from the realization of a *work* in the form of a text, or the particular sounds, phrasing, etc. resulting from the realization of a musical *work*. The boundaries of the entity *expression* are defined, however, so as to exclude incidental aspects of physical form, such as typeface and page layout for a text, unless, due to the nature of the *work*, these are integral to the intellectual or artistic realization of the *work* as such. The process of abstraction leading to the identification of the entity *expression* indicates that the intellectual or artistic content embodied in one *manifestation* is in fact the same, or substantially the same, as that embodied in another *manifestation* even though the physical embodiment may differ and differing attributes of the *manifestations* may obscure the fact that the content is similar in both. On a practical level, the degree to which bibliographic distinctions are made between variant *expressions* of a *work* will depend to some extent on the nature of the *work* itself, on the anticipated needs of users and on what the cataloguer can reasonably be expected to recognize from the instance of the *manifestation* being described. Variations within substantially the same *expression* (e.g., slight variations that can be noticed between two states of the same edition in the case of hand press production) would be ignored in most applications. However, for some applications of the model (e.g., early texts of rare manuscripts), each variation may be viewed as a different *expression*. Inasmuch as the form of *expression* is an inherent characteristic of the *expression*, any change in form (e.g., from written notation to spoken word) results in a new *expression*. Similarly, changes in the intellectual	

Table 4.2	Entities		
		conventions or instruments that are employed to express a *work* (e.g., translation from one language to another) result in the production of a new *expression*. If a text is revised or modified, the resulting *expression* is considered to be a new *expression* of the *work*. Minor changes, such as corrections of spelling and punctuation, etc., may be considered as variant instances within the same *expression*. When an *expression* of a *work* is accompanied by augmentations, such as illustrations, notes, glosses, etc. that are not integral to the intellectual or artistic realization of the *work*, such augmentations are considered to be separate *expressions* of their own separate *work(s)*. Such augmentations may, or may not, be considered significant enough to warrant distinct bibliographic identification.	
	Examples	• The English translation by Robert Fagles of Homer's *Odyssey*, copyright 1996 • The English translation by Richmond Lattimore of Homer's *Odyssey*, copyright 1965 • English text of Agatha Christie's *They do it with mirrors*, original copyright 1952 [same English text also published under the title *Murder with mirrors*] • DDC23, English edition • CDD23, French translation of DDC23 • Composer's score of Franz Schubert's *Trout quintet* • A recording of a specific performance by the Amadeus Quartet and Hephzibah Menuhin on piano of Franz Schubert's *Trout quintet*	
#	**Name**	**Definition**	**Constraints**
LRM-E4	Manifestation	A set of all carriers that are assumed to share the same characteristics as to intellectual or artistic content and aspects of physical form. That set is defined by both the overall content and the production plan for its carrier or carriers.	Superclass: *Res* The entities *Work*, *Expression*, *Manifestation*, *Item* are disjoint
	Scope notes	A *manifestation* results from the capture of one or more *expressions* on a carrier or set of carriers. As an entity, *manifestation* represents the common characteristics shared by those carriers, in respect to both intellectual or artistic content and physical form. A *manifestation* is recognized from the common characteristics exhibited by the *items* resulting from the same production process. The specification of the production process is an intrinsic part of the manifestation. The production may be explicitly planned so as to take place over time, as, for example, in printing on demand. The production plan may involve aspects that are not under the direct control of the producer, such as the specific digital storage media onto which an online file is downloaded by the user.	

Table 4.2	Entities	
		Production processes cover the range from formal industrial processes to artisanal or artistic processes. A production process may result in a set of multiple, essentially identical, *items* that are interchangeable for most purposes. The *manifestation* can be defined by the specific properties and attributes that any *item* belonging to that *manifestation* should portray. In other cases, such as many artisanal or artistic productions, the intention is that the production process result in a single, unique *item*. The *manifestation* in this case is the singleton set (a set with a single member) that captures the idea of the *item* in question. The boundaries between one *manifestation* and another are drawn on the basis of both intellectual or artistic content and physical form. When the production process involves changes in physical form, the resulting product is considered a new *manifestation*. Changes in physical form include changes affecting display characteristics that are incidental to the conception of the *work* (e.g., a change in typeface, size of font, page layout, etc.), changes in physical medium (e.g., a change from paper to microfilm as the medium of conveyance), and changes in the container (e.g., a change from cassette to cartridge as the container for a tape). Where the production process involves a publisher, producer, distributor, etc., and there are changes signaled in the product that are related to publication, marketing, etc. (e.g., a change in publisher, repackaging, etc.), the resulting product may be considered a new *manifestation*. Whenever the production process involves modifications, additions, deletions, etc. (other than minor changes to spelling, punctuation, etc.) that affect the intellectual or artistic content, the result is a new *expression* of the *work* which is embodied in a new *manifestation.* Changes that occur deliberately or inadvertently during the production process that affect the *items* result, strictly speaking, in a new *manifestation* of the same *expression*. A *manifestation* resulting from such a change may be identified as a particular "state" or "issue" of the publication. Changes that occur to an individual *item* after the production process is complete (e.g., damage, wear and tear, the loss of a page, rebinding, etc.) are not considered to result in a new *manifestation*. That *item* is simply considered to be an exemplar of the *manifestation* that no longer fully reflects the original production plan.
	Examples	• *The Odyssey of Homer / translated with an introduction by Richmond Lattimore*, first Harper Colophon edition published in the Perennial library series by Harper & Row, ISBN 0-06-090479-8 • Homer. *The Odyssey / translated by Robert Fagles*, Penguin Classics, Deluxe edition published by Penguin Books in 1997, ISBN 0-670-82162-4

Table 4.2	**Entities**		
		• *Vieux-Québec / textes de Guy Robert ; gravures d'Albert Rousseau* published in 1982 in Montréal by Editions du Songe and Iconia • *Seabiscuit: an American legend / Laura Hillenbrand* published in 2001 by Random House, ISBN 978-0-375-50291-0 • *They do it with mirrors / Agatha Christie* published in the UK by William Collins & Sons in 1952 • *Murder with mirrors / Agatha Christie* published in the US by Dodd, Mead & Co. in 1952	
#	**Name**	**Definition**	**Constraints**
LRM-E5	Item	A physical object carrying signs resulting from a production process and intended to convey intellectual or artistic content	Superclass: *Res* The entities *Work*, *Expression*, *Manifestation*, *Item* are disjoint
	Scope notes	In terms of intellectual or artistic content and physical form, an *item* exemplifying a *manifestation* normally reflects all the attributes that define the *manifestation* itself. An *item* is in many instances a single physical object, but in other cases an *item* may comprise multiple physical pieces or objects. An *item* may be a part of a larger physical object, for example, when a file is stored on a disc which also contains other files, the portion of the disc holding the file is the physical carrier or *item*.	
	Examples	• Codex Sinaticus • The manuscript known as the *Book of Kells* • Numbered copy 4 (of a limited edition of 50) of *Vieux-Québec / textes de Guy Robert ; gravures d'Albert Rousseau* published in 1982 in Montréal by Editions du Songe and Iconia	
#	**Name**	**Definition**	**Constraints**
LRM-E6	Agent	An entity capable of exercising responsibility relationships relating to *works*, *expressions*, *manifestations* or *items*	Superclass: *Res* Subclasses: *Person*, *Collective Agent*
	Scope notes	The entity *agent* is a superclass strictly equivalent to the union of the entities *person* and *collective agent*. It is defined to reduce redundancy in the model by providing a single class to serve as the domain or range of certain relationships that apply to all specific types of *agents*. Being an *agent* requires having, or having had, the potential of intentional relationships with instances of entities of bibliographic interest (*works*, *expressions*, *manifestations*, *items*), whether that specific *agent* has ever done so or not. Human beings are directly or indirectly the motive force behind all such actions taken by all *agents*. Automatons (such as, weather recording devices, software translation	

Table 4.2	**Entities**		
		programs, etc.), sometimes referred to as technological agents, are in this model viewed as tools used and set up by an actual *agent*.	
	Examples	• Margaret Atwood • Hans Christian Anderson • Queen Victoria • BBC Symphony Orchestra • Symposium on Glaucoma	
#	**Name**	**Definition**	**Constraints**
LRM-E7	Person	An individual human being	Superclass: *Agent* The entities *Person* and *Collective Agent* are disjoint
	Scope notes	The entity *person* is restricted to real persons who live or are assumed to have lived. Strict proof of the existence of a *person* is not required, as long as there is a general acceptance of their probable historicity. However, figures generally considered fictional, literary or purely legendary are not instances of the entity *person*.	
	Examples	• Pythagoras • Marco Polo • Henry Gray • Agatha Christie • Richmond Lattimer • Robert Fagles • J.S. Bach • Raoul Dufy	
#	**Name**	**Definition**	**Constraints**
LRM-E8	Collective Agent	A gathering or organization of persons bearing a particular name and acting as a unit	Superclass: *Agent* The entities *Person* and *Collective Agent* are disjoint
	Scope notes	The entity *collective agent* designates a wide range of named groups of *persons* that bear a particular name and act together as a unit. In addition to families, commercial or corporate entities and other legally registered bodies, the entity *collective agent* includes organizations and associations, musical, artistic or performing groups, territorial governments, and any of their subunits. The membership of many types of *collective agents* will continue to evolve over time. Occasional groups and groups that are constituted as meetings, conferences, congresses, expeditions, exhibitions, festivals, fairs, etc., also fall under the definition of *collective agent* as long as they are identified by a particular name and can act as a unit.	

Table 4.2	**Entities**		
		A gathering of people is considered a *collective agent* only when it exhibits organizational characteristics that permit them to perform actions that reflect agency with respect to instances of entities of bibliographic interest (such as approving a report, publishing the proceedings of a conference). Groups of *persons* that do not qualify as *agents* (for example, cultural or ethnic groups, gatherings referred to by a general descriptive term instead of a particular name) are not instances of the entity *collective agent*. The essential distinction between a *collective agent* and a gathering of people which is not an instance of the entity *collective agent*, is that the name used by the instance of the entity must be a specific name and not just a generic description for the gathering. Families and corporate bodies are specific types of *collective agents* that may be relevant in a particular bibliographic application.	
	Examples	• IFLA • 81st World Library and Information Conference, held 15-21 August 2015 in Cape Town, South Africa • Bibliothèque nationale de France • Pansoft GmbH • The Beatles (Musical group) • City of Ottawa • Medici (Royal house) • Random House	
#	**Name**	**Definition**	**Constraints**
LRM-E9	Nomen	A designation by which an entity is known	Superclass: *Res*
	Scope notes	A *nomen* is whatever appellation is used to refer to any entity found in the bibliographic universe. It can be expressed in the form of a sequence of characters or symbols within a writing system, chemical structure symbols, sound symbols, etc. Any entity referred to in the universe of discourse is named. The association of a *nomen* to the entity it represents is a cultural or linguistic convention, there is no inherent meaning embedded in the *nomen*. Depending on context of use, the same sequence of symbols can be assigned as a *nomen* of different entities in the real world even within the same language (polysemy and homonymy). Conversely, the same entity can be referred to by any number of *nomens* (synonymy). The association of nomens to entities is in general many-to-many. The identity of a *nomen* is given by the choice and order of the symbols used within it. Variation in the symbols used (such as transliteration into another script) or variation in their ordering usually results in a different	

Table 4.2	Entities	
		nomen, but variation in the visual representation of the symbols (such as different fonts used to present alpha-numeric or character strings) does not result in a different *nomen*. An arbitrary sequence of signs is not a *nomen* until it is assigned to be an appellation for something in some context. Only at this point is it significant in the bibliographic universe. The attributes of the *nomen* entity actually characterize the relationship between the *nomen* and the thing (*res*) that is named. *Nomens* are assigned and associated with instances of entities either formally (such as by bibliographic agencies) or informally through common usage. When *nomens* are assigned formally, the construction of the *nomen* may follow predetermined rules. A *nomen* may consist of components or parts. The composition of such a *nomen* may be governed by rules (for example, the ordering of name-title access points for *works*, the citation order in a faceted classification scheme, or the order of subdivisions in a subject heading system). The components of a *nomen* may themselves be *nomens*. In such cases, a whole-part relationship exists between the *nomens*. The whole-part relationship for *nomens* permits the handling of the attributes of components of constructed *nomens*, as attributes such as language may differ between the parts of a compound *nomen*. Although both *nomens* and *expressions* consist of combinations of signs and thus are similar in nature, the difference between these two entities lies in the functions they perform: a *nomen* serves as an appellation to name an entity or instance of an entity, while an *expression* realizes the intellectual or artistic content of a *work*. Even though, for example, the whole text of a very brief poem (*expression*) can be used as its title (*nomen*), this does not imply that an *expression* can have the same function in the model (be characterized by the same attributes or relationships) as a *nomen*.
	Examples	*Nomens* for Dame Agatha Christie, Lady Mallowan: • 'Agatha Christie' • 'Agatha Mary Clarissa Miller' • 'Lady Mallowan' • 'Mary Westmacott' • 'Christie, Agatha, 1890-1976' [preferred access point according to RDA for her mystery novels and stories] • 'Westmacott, Mary, 1890-1976' [preferred access point according to RDA for her romance novels] *Nomens* for a single corporate body in several languages: • 'United Nations' • 'Nations Unies'

Table 4.2	**Entities**		
		• 'Nazioni Unite' • 'Vereinigte Nationen' *Nomens* for a *work:* • 'Christie, Agatha, 1890-1976. Murder with mirrors' [preferred access point in the LC/NACO authority file] • 'Christie, Agatha, 1890-1976. They do it with mirrors' [variant access point in the LC/NACO authority file] *Nomens* for the one day *time-span* 2015-03-01: • March 1, 2015 [Gregorian calendar] • 5775 Adar 10 [Hebrew calendar] • 1936 Phalguna 10 [Indian civil calendar] *Nomens* for a subject concept: • Music [valid term in LCSH] • 780 [classification number in DDC] • Music [valid genre term in LCGFT] *Nomens* in the form of identifiers: • 978-0-375-50291-0 [ISBN for the *manifestation: Seabiscuit: an American legend / Laura Hillenbrand* published in 2001 by Random House] • 0000 0001 2102 2127 [ISNI for Agatha Christie] • 0000 0003 6613 0900 [ISNI for Mary Westmacott]	
#	**Name**	**Definition**	**Constraints**
LRM-E10	Place	A given extent of space	Superclass: *Res*
	Scope notes	The entity *place*, as relevant in a bibliographic context, is a cultural construction, it is the human identification of a geographic area or extent of space. *Places* are usually identified through a physical object (a geographical feature or a man-made object), or due to their relevance with regards to a particular *agent* (geopolitical entities such as countries, cities), or as the location of an event. *Places* can be contemporary or historical, on Earth or extra-terrestrial. Imaginary, legendary or fictional places are not instances of the *place* entity. A *place* can have fuzzy boundaries. The boundaries of a *place* can change over time (such as a city that absorbs adjacent suburbs) without changing the identity of the *place* for bibliographic purposes. As it can be a moving frame of reference, the entity *place* is not necessarily identified by its geospatial coordinates alone.	
	Examples	• Montréal (Québec) [city culturally identified as a *place* although it has absorbed adjacent towns throughout its history] • Lutèce • Greenland • Italy • Africa	

Table 4.2	**Entities**		
		• St. Lawrence River • Lake Huron • Mars • Halley's Comet	
#	**Entity**	**Definition**	**Constraints**
LRM-E11	Time-span	A temporal extent having a beginning, an end and a duration	Superclass: *Res*
	Scope notes	A *time-span* is a period of time that can be identified by specifying its beginning and end. The resulting duration can be associated with actions or occurrences that happened during that period of time. Even a very precise *time-span* has a measurable duration, however brief it may be. In library implementations, the instances of *time-span* considered useful in bibliographic or authority data are often expressed in years (year of birth of a person, year of death of a person, year a corporate body ceased to exist, year of publication of a manifestation), even though the associated event only took place during a portion of the year. Dates serve as the appellations or *nomens* for *time-spans* in different calendar or time-keeping systems. *Time-spans* can also be referred to by more general terms, such as for ages, geological eras, epochs.	
	Examples	NB: all examples have to be expressed using *nomens* to represent the instances of *time-spans*, but the entity illustrated in this section is the *time-span*, not the *nomen* • 2015 A.D. [*time-span* of a year expressed as *Anno Domini*] • 2015 CE [*time-span* of a year expressed in common era] • 2015-03-01 [*time-span* of a day expressed in the Gregorian calendar in YYYY-MM-DD format] • 20120808094025.0 [*time-span* of one-tenth of a second expressed in YYYYMMDDHHMMSS.S format] • Twentieth Century • Ordovician Period [*time-span* lasting from 488.3 to 443.7 millions of years before present] • 488.3 millions of years before present [*time-span* since the beginning of the Ordovician period] • Ming Dynasty • Bronze Age [designates a *time-span* although the exact time covered will vary depending on location] • Age of Enlightenment	

Section 4.2 Attributes

4.2.1 Introduction

Attributes characterize specific instances of an instance of an entity. None of the attributes defined in the model are **required** for any given instance of an entity, attributes may be recorded if applicable and easily ascertainable, when the data is considered relevant to the purpose of the application. The conceptual model defines and describes the content of the attribute, each application needs to provide details on the method for recording the data. Data for an attribute may be recorded in accordance with a controlled list or vocabulary, or as a natural language literal in a language and script preferred by the agency recording the data. Given instances of entities may have several values for a particular attribute, either simultaneously or over time.

The attributes listed under each entity are representative and are not in any way to be considered an exhaustive listing of attributes that might be determined to be useful in a particular application. An application can define additional attributes to record additional relevant data or to record data at a greater level of granularity than is illustrated. Certain attributes that are important to the model or are frequently relevant in bibliographic systems are listed here. However, the listing of an attribute in the model is not intended in any way to imply that these attributes are mandatory or required for any application.

Only the entities declared in section 4.1.3 have attributes defined for them in the model. The entity *collective agent* does not have any defined attributes. Entity sub-classing results in attribute sub-types. For example, as the entities *person* and *collective agent* are subclasses of the entity *agent*, all attributes defined for the *agent* entity can also be applied to the *person* or *collective agent* entities, and do not need to be explicitly defined for those entities. However, the reverse does not hold. Attributes specifically defined for the entity *person* cannot be extended to the superclass entity *agent*.

4.2.2 Remarks on Specific Attributes in the Model

Category attributes: Apply to many entities. Serve to sub-type or sub-categorize the entity according to a typology or categorization scheme relevant to a particular application. Several independent types of categorizations may be applied to an entity in a particular implementation. Depending on the needs of the implementation, the entity types defined through the use of the category attribute can function as specific entities that are sub-classes of the entity in question. This mechanism serves to extend the model with specific details. The examples given are not intended to be interpreted as proposing controlled vocabularies for these means of categorization, any established controlled vocabulary can be adopted.

Note attribute: Declared for the entity *res*, the *Note* attribute can be sub-typed to apply to any entity. Notes permit the association of unstructured information relating to an instance of an entity with that entity. The *Note* attribute can be implemented to accommodate information which is stored as free-text as opposed to as a specific attribute or relationship.

4.2.3 Attributes Detailed Definition

Each attribute declared in the model is described in Table 4.3 below. Attributes are numbered sequentially from LRM-A1 to LRM-A37. The attributes are grouped by the entity to which each attribute is attached. The entities are presented in the order that follows their presentation in Table 4.2 (Entities) in section 4.1.3. The order of presentation of attributes within each entity is as follows: the *Category* attribute (if relevant for the entity) is listed first, then attributes are listed by logical grouping, then in alphabetical order. For each attribute, the columns of the first row in the table list, after the number and the entity, a brief name of the attribute, followed by a brief definition. A longer scope note, if needed, and a selection of examples of that attribute, are given in subsequent table rows. To fully understand an attribute, it is important to consult the definition and the full scope note. The name of an attribute viewed alone is not intended to convey the full meaning behind the attribute.

Under the entity *expression*, the attributes marked with an asterisk (*) are those linked to the representative *expression*. The function in the model of the representative *expression* and the attributes linked to it is detailed in section 5.4 **Representative Expressions**.

As this model is meant to remain extremely generic, this Table focuses on those attributes that can serve to describe any type of instance of a given entity. However, some more specific attributes are also provided. As a model emanating from and intended to be used by the library community, the significance and utility of attributes pertaining to texts, such as the *Language* attribute, or music, such as the *Medium of performance* attribute, is recognized. These more specific attributes are listed, for the entity *expression*, after the more generic ones, and are introduced by a statement which indicates that they do not apply to all types of instances of the entity to which they are attached.

Most attributes are repeatable, although Table 4.3 does not explicitly state which are and which are not. It only is a matter of sound sense: a *work* cannot be both a monograph and a serial at the same time, an *expression* cannot be said to be simultaneously representative and non-representative for the *work* it realizes.

In most cases when an attribute can be represented either as a literal or as a URI, the examples provide illustrations of both possibilities (although no effort is made towards completeness). A majority of the examples are taken from actual databases, or from existing authoritative documentation (such as the *UNIMARC Manual)*, as of 2015. Occasionally, some examples are taken from sources external to libraries, in order to show that this model, although focusing on library applications, is not meant to limit itself to the library community. Although many examples are given in various MARC formats (namely MARC21, UNIMARC, and INTERMARC), this model is developed very much with semantic web technologies in mind, and it is hoped that in the future, an update of this document will provide RDF examples as well.

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A1	RES	Category	A type to which the *res* belongs
		Scope notes	
		Examples	• object • work • concept • event • family • corporate body
#	**Entity**	**Attribute**	**Definition**
LRM-A2	RES	Note	Textual material providing any kind of information about a *res* that is not recorded through the use of specific attributes and/or relationships
		Scope notes	
		Examples	• Imprint stamped on verso of t.p. [*general note on a manifestation*] • Includes index. [*general note on a manifestation*] • Fourth manned mission in the Apollo program. [*general note on an object*] • Surgery performed on an outpatient basis. May be hospital-based or performed in an office or surgicenter. [*general note on a concept*] • Deacidified copy. [*general note on an item*] • 317 ## $aInscription on the title page in sixteenth century hand, ‘Iohannes Wagge me iure tenet’$5DB/S-5-KK.555 [*note on ownership history of an item as expressed in a UNIMARC field*]
#	**Entity**	**Attribute**	**Definition**
LRM-A3	WORK	Category	A type to which the *work* belongs
		Scope notes	The *Category* attribute can characterize a given *work* with regard to various categorizations: - categorization as to termination intention, - categorization as to creative domain, - categorization as to form / genre, - etc.
		Examples	<u>Categorization as to termination intention:</u> • monograph • serial

Table 4.3 Attributes			
			Categorization as to creative domain: • literature • music • fine arts Categorization as to form / genre: • novel • play • poem • symphony • concerto • sonata • drawing • painting • photograph
#	**Entity**	**Attribute**	**Definition**
LRM-A4	EXPRESSION	Category	A type to which the *expression* belongs
		Scope notes	The *Category* attribute can characterize a given *expression* with regard to various categorizations: - content type, - categorization as to revisability, - format of notated music, - etc.
		Examples	Content type, expressed in natural language, in English: • written notation • musical notation • recorded sound Content type, expressed as English language terms from the ISBD Content Form controlled vocabulary: • dataset • image • music • text Content type, expressed as URI from the ISBD Content Form controlled vocabulary: • http://iflastandards.info/ns/isbd/terms/contentform/T1001 • http://iflastandards.info/ns/isbd/terms/contentform/T1002 • http://iflastandards.info/ns/isbd/terms/contentform/T1004 • http://iflastandards.info/ns/isbd/terms/conten

Table 4.3 Attributes			
			tform/T1009 Categorization as to revisability expressed in natural language, in English: • draft • final Categorization (applicable to content type of notated music) as to format of notated music, expressed in natural language, in English: • score • vocal score • part • piano conductor part • etc.
#	**Entity**	**Attribute**	**Definition**
LRM-A5	EXPRESSION	Representativity	A statement of whether the *expression* is regarded as representative for the *work* it realizes or not
		Scope notes	The *Representativity* attribute is a "yes/no" attribute that flags the *expression* as the one that is considered representative in a particular context.
		Examples	Only two values are possible: • yes • no
#	**Entity**	**Attribute**	**Definition**
LRM-A6	EXPRESSION	Extent	A quantification of the extent of the *expression*
		Scope notes	The value of the *Extent* attribute must consist of three elements: - a type of extent (e.g., length of text, envisioned duration of performance of musical notation, actual duration of recorded performance, etc.), - a number, - and a measurement unit (words, minutes, etc.).
		Examples	• approximately 8 minutes [*performance time stated in natural language, in English, on a musical score*] • 306 ## ‡a 002052 ‡a 000415 ‡a 000956 ‡a 003406 [*durations encoded in a MARC21 field*]
#	**Entity**	**Attribute**	**Definition**
LRM-A7	EXPRESSION	*Intended audience	A class of users for which the *expression* is intended

Table 4.3 Attributes			
		Scope notes	The *Intended audience* attribute can characterize a given *expression* with regard to various categorizations of intended audience: - categorization as to age group, - categorization as to educational level, - etc.
		Examples	<u>Categorization as to age group:</u> • children • young adults • adults <u>Categorization as to educational level:</u> • primary • secondary
#	**Entity**	**Attribute**	**Definition**
LRM-A8	EXPRESSION	Rights	A class of use restrictions to which the *expression* is submitted
		Scope notes	
		Examples	• Reproduction is submitted to authorization. [*rights expressed in natural language, in English*] • The play can be read or performed anywhere, by any number of people. Anyone who wishes to do it should contact the author's agent [...], who will license performances free of charge provided that no admission fee is charged and that a collection is taken at each performance for Medical Aid for Palestinians [...]. [*performing rights attached to Caryl Churchill's play* Seven Jewish children, *expressed in natural language, in English*]
		***Attributes applicable only to specific types of* expression**	
#	**Entity**	**Attribute**	**Definition**
LRM-A9	EXPRESSION	*****Language	A language used in the *expression*
		Scope notes	The *Language* attribute is specific to *expressions* consisting solely or partially of linguistic signs. The *Language* attribute of the *expression* may comprise a number of languages, each pertaining to an individual component of the *expression*.
		Examples	• it [*language expressed as an ISO 639-1 code*]

Table 4.3 Attributes			
			• bre [*language expressed as an ISO 639-2 code*] • Slovene [*language expressed as an English natural term*] • Slovenian [*alternative name for a language expressed as an English natural term*] • http://id.loc.gov/vocabulary/iso639-1/zu [*language expressed as a URI*]
#	**Entity**	**Attribute**	**Definition**
LRM-A10	EXPRESSION	*Key	A pitch structure (musical scale, ecclesiastic mode, raga, maqam, etc.), that characterizes the *expression*
		Scope notes	The term Key is broadly defined to encompass various musical traditions. The *Key* attribute is specific to *expressions* of musical *works*.
		Examples	• C major [*key expressed in natural language, in English*] • 128 […] $ddm [*key expressed as a code in a UNIMARC subfield*] • Hypolydian mode [*mode expressed in natural language, in English*] • 8th ecclesiastical mode [*mode expressed in natural language, in English*] • Bayati [*maqam expressed in natural language, in English*] • بياتي [*maqam expressed in natural language, in Arabic*]
#	**Entity**	**Attribute**	**Definition**
LRM-A11	EXPRESSION	***Medium of performance	A medium of performance stated, intended, or actually used in the *expression*
		Scope notes	The *Medium of performance* attribute is specific to *expressions* of musical *works*. The value of the *Medium of performance* attribute must include at least one unit consisting of: - a number (implicit through the use of a singular noun, or explicitly stated), - and a type of performing tool (which may include: types of human voice tessitura, types of individual instruments, types of ensembles, etc.).

Table 4.3 Attributes			
		Examples	• flute, oboe, glass harmonica, viola, cello [*medium of performance expressed in natural language, in English; number of performers (1 per instrument) is implicit through the use of singular nouns*] • flutes (2), oboes (2), clarinets (2), horn, bassoon [*medium of performance expressed in natural language, in English; number of performers is either implicit (when it equals 1) or explicitly stated (2)*] • clarinet or viola [*medium of performance expressed in natural language, in English, including an alternative*] • 382 0# ‡atrumpet ‡n2 ‡atrombone ‡n2 ‡s4 [*medium of performance expressed in a MARC21 field*] • 146 0# abc01svl####$c01kpf####$i002a [*medium of performance expressed as codes in a UNIMARC field*] • http://id.loc.gov/authorities/performanceMediums/mp2013015841 [*medium of performance expressed as a URI*] • <perfMedium><performer><instrVoice>violin</instrVoice></performer><performer><instrVoice>viola</instrVoice></performer><performer><instrVoice>violoncello</instrVoice></performer></perfMedium> [*medium of performance expressed in the MEI (Music Encoding Initiative) schema*]
#	**Entity**	**Attribute**	**Definition**
LRM-A12	EXPRESSION	***** Scale	A ratio of distances in a cartographic *expression* to the actual distances they represent
		Scope notes	The *Scale* attribute is specific to *expressions* of cartographic *works*. The *Scale* attribute may apply to horizontal, vertical, angular, and/or other distances represented in the *expression*.
		Examples	• Scale 1 : 10,000 [*scale expressed in natural language, in English*] • 034 1# ‡aa ‡b100000 [*scale expressed in normalized form in a MARC21 field*]

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A13	MANIFESTATION	Category of carrier	A type of material to which all physical carriers of the *manifestation* are assumed to belong
		Scope notes	The *Category of carrier* attribute can characterize a given *manifestation* with regard to various categorizations: - categorization as to general type of carrier, - categorization as to physical material employed in manufacturing the carriers, - categorization as to the physical material that is applied to the base material of the carriers, - categorization as to the means used to record notation, sound, or images in the production of a *manifestation*, - etc. The carrier for a *manifestation* comprising multiple physical components may include more than one form (e.g., a filmstrip with an accompanying booklet, a separate sound disc carrying the sound track for a film, etc.).
		Examples	Categorization as to general type of carrier, expressed in natural language, in English: • sound cassette • videodisc • microfilm cartridge • transparency Categorization expressed as English language terms from the ISBD Media Type controlled vocabulary: • audio • electronic • microform • video Categorization expressed as URI from the ISBD Media Type controlled vocabulary: • http://iflastandards.info/ns/isbd/terms/mediatype/T1001 • http://iflastandards.info/ns/isbd/terms/mediatype/T1002 • http://iflastandards.info/ns/isbd/terms/mediatype/T1003 • http://iflastandards.info/ns/isbd/terms/mediatype/T1007

Table 4.3 Attributes			
			Categorization as to physical material employed in manufacturing the carriers: • paper • wood • plastic • metal Categorization as to the physical material that is applied to the base material of the carriers: • oil paint [applied to canvas] • chemical emulsion [applied to a film base] Categorization as to the means used to record notation, sound, or images in the production of a *manifestation*: • analogue • acoustic • electric • digital • optical
#	**Entity**	**Attribute**	**Definition**
LRM-A14	MANIFESTATION	Extent	A quantification of the extent observed on a physical carrier of the *manifestation* and assumed to be observable on all other physical carriers of the *manifestation* as well
		Scope notes	The value of the *Extent* attribute must consist of three elements: - a type of extent (e.g., numbering of physical units, height, width, diameter, etc.), - a number, - and a measurement unit (e.g., volumes, pages, sheets, discs, reels, etc.; cm, inches, etc.; Mb/Megabytes; etc.).
		Examples	• 300 ## $a 301 p., [8] p. of plates [*number of pages, recorded according to AACR2 and expressed in a MARC21 subfield*] • 215 ## $a1 score (vi, 63p.)$d20cm.$a16 parts$d32 cm. $e1 booklet [*number of pages, and their height; number of parts, and their height; and number of accompanying material elements, expressed in various subfields of a UNIMARC field*] • 4 3/4 in. [*diameter, expressed in natural language, in English*]

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A15	MANIFESTATION	Intended audience	A class of users for which the physical carriers of the *manifestation* are intended
		Scope notes	The *Intended audience* attribute can characterize a given *manifestation* with regard to various categorizations of intended audience: - categorization as to sensory impairment (visual impairment, hearing impairment, etc.), - categorization as to age group (young children, etc.), - etc.
		Examples	Categorization as to sensory impairment: • users able to read braille • users needing large print • users needing a visual description • users needing closed captioning Categorization as to age group: • young children needing board books • young children needing bath books
#	**Entity**	**Attribute**	**Definition**
LRM-A16	MANIFESTATION	Manifestation statement	A statement appearing in the *manifestation* and deemed to be significant for users to understand how the resource represents itself
		Scope notes	The *Manifestation statement* attribute is a statement normally transcribed from a source in a *manifestation*. Transcription conventions are codified by each implementation. A *manifestation* is likely to be characterized by multiple statements of different types. In most implementations, these statements would likely be typed at a level of granularity considered appropriate for user needs. For example, the *Manifestation statement* attribute may include transcribed elements such as: publication statement (as a whole), or alternatively, place of publication statement + publisher name statement + date of publication statement (as three individual statements).
		Examples	• 우리말의 수수께끼 : 역사 속으로 떠나는 우리말 여행 / 박영준...[등]지음 [*complete ISBD area 1*] • Edinburgi : venundantur apud M. R.

Table 4.3 Attributes			
			Freebairn, J. Paton et G. Brown, 1716 [*complete publication statement*] • Edinburgi [*place of publication statement*] • venundantur apud M. R. Freebairn, J. Paton et G. Brown [*publisher name statement*] • 1716 [*date of publication statement*] • De l'imprimerie des aristocrates, chez Pluton, aux portes de l'Enfer : et se trouve chez la garde bréviaire de l'abbé Maury, Marie Margot, rue Troussevache [*complete publication statement, lacking a date of publication statement*] • 4th revised ed. [*edition statement, following ISBD transcription conventions*] • 4th revised edition [*edition statement, following RDA transcription conventions*] • (Miscellaneous report / Geological survey of Canada = Rapport divers / Commission géologique du Canada) [*complete ISBD area 6*]
#	**Entity**	**Attribute**	**Definition**
LRM-A17	MANIFESTATION	Access conditions	Information as to how any of the physical carriers of the *manifestation* are likely to be obtained
		Scope notes	The *Access conditions* attribute includes: - Source of acquisition, - System requirements, - Mode of access, - etc.
		Examples	• 538 ## ‡aSystem requirements: IBM 360 and 370; 9K bytes of internal memory; OS SVS and OSMVS. [*system requirements expressed in a MARC21 field*] • 538 ## ‡aBlu-ray 3D: requires Blu-ray player; 3D version requirements: full HD TV, compatible 3D glasses, Blu-ray 3D Player or PS3, and high speed HDMI cable. [*system requirements for a video disc expressed in a MARC21 field*] • 538 ## ‡aPSP (PlayStation portable); region 1; wi-fi compatible. [*system requirements for a video game expressed in a MARC21 field*]

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A18	MANIFESTATION	Rights	A class of use and/or access restrictions to which all physical carriers of the *manifestation* are assumed to be submitted
		Scope notes	The *Rights* attribute includes: - Terms of availability, - Access restrictions, - etc.
		Examples	• Freely available to members of the Club. [*rights expressed in natural language, in English*] • Restricted to institutions with a subscription. [*rights expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A19	ITEM	Location	The collection and/or institution in which the *item* is held, stored, or made available for access
		Scope notes	This information can be specified at whatever level of precision is required in order to guide users to the right place to find the *item.*
		Examples	• 252 ## $aDLC $bManuscript Division $cJames Madison Memorial Building, 1st &; Independence Ave., S.E., Washington, DC USA $f4016 [*location as expressed in a UNIMARC field*] • 852 01 $aViBlbV $bMain Lib $bMRR $kRef $hHF5531.A1 $iN4273 [*location as expressed in a MARC21 field*]
#	**Entity**	**Attribute**	**Definition**
LRM-A20	ITEM	Rights	A class of use and/or access restrictions to which the *item* is submitted
		Scope notes	
		Examples	• Only the microfilm collections may be viewed by researchers. [*rights expressed in natural language, in English*] • Film restricted to classroom use. [*rights expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A21	AGENT	Contact information	Information useful for communicating with or getting in contact with the *agent*

Table 4.3 Attributes			
		Scope notes	
		Examples	• P.O. Box 95312, 2509 La Haye. Contact : 31.70.3140884. Télécopie : 31.70.3834827. Adresse électronique : IFLA@ifla.org [*contact information expressed in natural language, in French*]
#	**Entity**	**Attribute**	**Definition**
LRM-A22	AGENT	Field of activity	A field of endeavour, area of expertise, etc., in which the *agent* is engaged or was engaged
		Scope notes	
		Examples	• 780 [*field of activity expressed as a Dewey classification number*]
#	**Entity**	**Attribute**	**Definition**
LRM-A23	AGENT	Language	A language used by the *agent* when creating an *expression*
		Scope notes	A given *agent* can use more than one language, simultaneously or over time. The type of use of a given language can be specified (e.g., use of the English language for the creation of original content, use of the English language as source language of translations, etc.).
		Examples	• 041 ## $aeng$afre[…] [*languages used by Samuel Beckett for the creation of original content, expressed as codes in INTERMARC subfields*] • 041 ## […]$teng$tfre [*languages used by Samuel Beckett as source languages of translation, expressed as codes in INTERMARC subfields*] • http://id.loc.gov/vocabulary/iso639-1/zu [*language expressed as a URI*]
#	**Entity**	**Attribute**	**Definition**
LRM-A24	PERSON	Profession / Occupation	A profession or occupation in which the *person* works or worked
		Scope notes	
		Examples	• librarian [*a profession expressed in natural language, in English*]
	COLLECTIVE AGENT	***No attributes restricted to this entity, see* agent *for relevant attributes***	

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A25	NOMEN	Category	A type to which the *nomen* belongs
		Scope notes	*Nomens* may be categorized in terms of: - the thing named (personal name, work title, etc.), - the source of the *nomen* (spine title, running title), - the function of the *nomen* (identifier, controlled access point, classification notation, etc.).
		Examples	• http://id.loc.gov/vocabulary/identifiers/isbn-a [*category (more specifically, a kind of identifier), expressed as a URI*] • controlled access point [*category, expressed in natural language, in English*] • spine title [*category, expressed in natural language, in English*] • running title [*category, expressed in natural language, in English*] • key title [*category, expressed in natural language, in English*] • pseudonym [*category, expressed in natural language, in English*] • married name [*category, expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A26	NOMEN	Scheme	The scheme in which the *nomen* is established
		Scope notes	The *Scheme* attribute includes: - value encoding schemes (subject heading lists, thesauri, classification systems, name authority lists, etc.) - and syntax encoding schemes (standards for encoding dates, etc.). When the same value of one of the other *nomen* attributes (such as *Intended audience*, *Language*, *Script*) is applicable to all the *nomens* in a particular scheme, the value can be implemented at the scheme level.
		Examples	• http://id.loc.gov/authorities/performanceMediums [*value encoding scheme expressed as a URI*] • http://id.loc.gov/authorities/classification [*value encoding scheme expressed as a URI*] • ISO 8601 [*syntax encoding scheme*]

Table 4.3 Attributes			
#	**Entity**	**Attribute**	**Definition**
LRM-A27	NOMEN	Intended audience	A class of users for which the *nomen* is considered appropriate
		Scope notes	
		Examples	• sj [*intended audience expressed as a code used as a prefix in all Library of Congress children's subject headings*]
#	**Entity**	**Attribute**	**Definition**
LRM-A28	NOMEN	Context of use	Information as to the context of use of the *nomen* of an *agent* which is also referred to through other, distinct *nomens*
		Scope notes	The *Context of use* attribute includes domains associated with a *nomen* used by an *agent*.
		Examples	• literary works [*context of use expressed in natural language, in English*] • critical works [*context of use expressed in natural language, in English*] • works on mathematics [*context of use expressed in natural language, in English*] • detective novels [*context of use expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A29	NOMEN	Reference source	A source in which there is evidence for the use of the *nomen*
		Scope notes	A *Reference source* attribute value may refer to: - biographical dictionaries, encyclopedias, etc., - other schemes, - any publications, - etc.
		Examples	• 670 ## |a Adamson, J. Groucho, Harpo, Chico, and sometimes Zeppo, [1973] [*reference source expressed in a MARC21 field*] • 670 ## |a nuc89-22212: Her RLIN II processing for UC online catalog input, 1984 |b (hdg. on WU rept.: Coyle, Karen; usage: Karen Coyle) [*reference source expressed in a MARC21 field*] • 810 ## $aLes clowns et la tradition clownesque / P. R. Lévy, 1991 [*reference source expressed in a UNIMARC field*]

Table 4.3 Attributes			
			• 810 ## $aOxford dictionary of national biography [*reference source expressed in a UNIMARC field*] • 810 ## $aLCSH, 1988-03 [*reference source expressed in a UNIMARC field*]
#	**Entity**	**Attribute**	**Definition**
LRM-A39	NOMEN	Language	The language in which the *nomen* is expressed
		Scope notes	
		Examples	• http://id.loc.gov/vocabulary/iso639-1/zu [*language expressed as a URI*]
#	**Entity**	**Attribute**	**Definition**
LRM-A31	NOMEN	Script	The script in which the *nomen* is expressed
		Scope notes	
		Examples	• Tibetan [*script expressed in natural language, in English*] • Tibt [*script expressed as a code in the ISO 15924 standard*] • t [*script expressed as a code used in INTERMARC format*]
#	**Entity**	**Attribute**	**Definition**
LRM-A32	NOMEN	Script conversion	The rule, system, or standard that was used to render the *nomen*
		Scope notes	A *Script conversion* attribute value may refer to: - transliterations, - script conversions that cannot be reversed, - etc.
		Examples	• ISO 9 [*script conversion from Cyrillic alphabet to Latin alphabet*] • Wade-Giles [*script conversion from Chinese script to Latin alphabet*]
#	**Entity**	**Attribute**	**Definition**
LRM-A33	NOMEN	Status	The status of the *nomen* in the scheme in which the *nomen* is established
		Scope notes	For natural language: - obsolete, literary, dialect For formal schemes: - proposed, provisional, obsolete, currently valid
		Examples	• valid [*status expressed in natural language, in English*]

Table 4.3 Attributes			
			• provisional [*status expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A34	PLACE	Category	A type to which the *place* belongs
		Scope notes	
		Examples	• town [*category expressed in natural language, in English*] • country [*category expressed in natural language, in English*] • continent [*category expressed in natural language, in English*]
#	**Entity**	**Attribute**	**Definition**
LRM-A35	PLACE	Location	A delimitation of the physical territory included within the *place*
		Scope notes	
		Examples	• 123 ## $dE1444300 $eE1482200 $fS0403900 $gS0433900 [*location expressed as codes in a UNIMARC field*]
#	**Entity**	**Attribute**	**Definition**
LRM-A36	TIME-SPAN	Beginning	A value for the time at which the *time-span* started, expressed in a precise way in an authoritative external system to allow temporal positioning of events
		Scope notes	The level of precision can vary according to the context.
		Examples	• 19850412T101530 [*beginning expressed according to the ISO 8601 standard*] • 488.3 millions of years before present [*beginning of the Ordovician period, a geological period*]
#	**Entity**	**Attribute**	**Definition**
LRM-A37	TIME-SPAN	Ending	A value for the time at which the *time-span* ended, expressed in a precise way in an authoritative external system to allow temporal positioning of events
		Scope notes	The level of precision can vary according to the context.
		Examples	• 19860513T112536 [*ending expressed according to the ISO 8601 standard*]

Table 4.3 Attributes			
			• 443.7 millions of years before present [*ending of the Ordovician period, a geological period*]

Section 4.3 Relationships

4.3.1 Introduction

Relationships are an essential part of the bibliographic universe: they connect instances of entities and provide context for them. In the FRBR-LRM model, the relationships are declared in a general, abstract way and thus enable implementers to include additional details in a consistent and coherent way by introducing additional types.

The first relationship in Table 4.4 below (RES 'is associated with' RES) is the top-level, general relationship. All other relationships declared in the model are specific sub-types of this relationship which add to the semantic content of the specific association between particular domain and range entities, and specify stricter constraints where this is meaningful. Any additional relationships needed by a particular implementation can be defined as sub-types of the additional relationships defined in the model, or of the top relationship. In the context of a subject thesaurus, the specific thesaural relationships between *res* that serve as subjects would be defined as sub-types of the top relationship.

The relationships between *works, expressions, manifestations, items* are the core of the model and can be considered mandatory. Other relationships are encouraged, since they enable exploration and discovery and are very important for users.

The relationships declared in the model can serve as building blocks for "compound" or multi-step relationships. Traversing two or more relationships is referred to as a "path". When a particular path is frequently required in a particular application, it can be implemented as a single relationship which serves as a shortcut for the more developed path. The intermediate node(s) or entities become implicit. One shortcut is sufficiently important that it is declared in the model:

(LRM-R17) NOMEN 'is equivalent to' NOMEN

is the same as the following pair of relationships:

(LRM-R13i) NOMEN1 'is appellation of' RES +
(LRM-R13) RES 'has appellation' NOMEN2

The entity subclass/superclass relationship (IsA) can also be used in a path to restrict the domain or range entities in a relationship. The pair of relationships:

PERSON IsA AGENT +
AGENT 'created' WORK

imply the shortcut relationship:

PERSON 'created' WORK

This latter specific relationship can be implemented directly if it is considered desirable.

The relationships are declared on the class level. It is important to note that while relationships are declared between entity types, in reality they are established and exist between instances.

Relationships that express states or ongoing activities are named in the present tense (such as 'is

associated with', 'is member of', 'is subject of'), while relationships that express actions that were logically completed in the past are named in the past tense (such as 'was created by', 'created', 'was assigned by').

4.3.2 Relationships Detailed Definition

Each relationship declared in the model is described in Table 4.4 below. Relationships are numbered sequentially from LRM-R1 to LRM-R34. Reverse (reciprocal) relationships can be referred to by the number of the forwards relationship plus the suffix "i".

Relationships are declared in both directions, first from left to right ("forwards"), then right to left ("backwards"). For each relationship, the columns of the first row in the table list, after the number, first the domain (source) entity for the forwards relationship, the name of the forwards relationship, the name of the reverse (or reciprocal) relationship, then the range (target) entity for the forwards relationship, and the cardinality. In the reverse relationships the entity from the **Range** column serves as the domain, the entity from the **Domain** column serves as the range, and the reverse name of the relationship should be used. For example, the forwards and reverse relationships represented in the second entry of the table should be read as:

(LRM-R2)	WORK 'is realized through' EXPRESSION	(forwards reading)
(LRM-R2i)	EXPRESSION 'realizes' WORK	(reverse reading)

Relationships are **recursive** when the same entity serves as both domain and range, and are called **symmetric** when the forwards and reverse relationship names are the same. In addition to the top relationship (RES 'is associated with' RES), the nomen-equivalence (NOMEN 'is equivalent to' NOMEN) and the manifestation-alternate (MANIFESTATION 'has alternate' MANIFESTATION) relationships are both recursive and symmetric. The 'has part/is part of' relationships are an example of relationships that are recursive without also being symmetric.

Cardinality specifies the number of instances of the domain and range entities that may be connected by the specific relationship. The cardinality 1 to M (meaning many) 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*. Similarly, in the 'is exemplified by' relationship, each *item* is an exemplar of a single *manifestation*, while each *manifestation* is exemplified by one or more *items*. The cardinality M to M for the *work* 'was created by' *agent* relationship, for example, means that any *agent* may create many *works* and a *work* may be the result of creative contributions from several *agents*.

For each relationship, the definition with any scope notes, and a selection of examples of instances of that relationship are in subsequent table rows.

Table 4.4 Relationships					
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R1	Res	is associated with	is associated with	Res	M to M
	Definition	This relationship links two *res* that have an association of any kind			
	Scope notes	This is a general relationship valid for all entities in the bibliographic universe. In general, specific types would be defined.			
	Examples	• Topic to topic, *e.g.:* {Quantum theory} *is associated with* {Thermodynamics} • Work to work, *e.g.:* the work titled *Through the Looking-Glass and What Alice Found There is associated with* the work titled *Alice's Adventures in Wonderland* • Person to collective agent, *e.g.:* Nathaniel Hawthorne *is associated with* the Phi Beta Kappa Society • Person to time-span, *e.g.:* Emily Dickinson *is associated with* the time-span from 1830 (the year she was born) to 1886 (the year she died)			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R2	Work	is realized through	realizes	Expression	1 to M
	Definition	This relationship links a *work* with any of the *expressions* the signs of which convey the same intellectual or artistic content			
	Scope notes	The logical connection between *work* and *expression*, as reflected in the model through the relationship link, serves as the basis both for identifying the *work* represented by an individual *expression* and for ensuring that all *expressions* of a *work* are linked to the *work*. Indirectly the relationships between a *work* and the various *expressions* of that *work* also serve to establish a "sibling" relationship between the various *expressions* of the *work*.			
	Examples	• The work known as *Eine kleine Nachtmusik is realized through* the musical notation of Mozart's autograph manuscript of the work known as *Eine kleine Nachtmusik*			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R3	Expression	is embodied in	embodies	Manifestation	M to M
	Definition	This relationship links an *expression* with a *manifestation*, indicating that an *expression* is included in a *manifestation*			
	Scope notes	A *manifestation* may embody one or more *expressions* and any *expression* may be embodied in one or more *manifestations*. This logical connection serves as the basis both for identifying the *expression* of a *work* embodied in an individual *manifestation* and for ensuring that all *manifestations* of the same *expression* are linked back to that *expression*.			
	Examples	• The musical notation of Mozart's autograph manuscript of the work known as *Eine kleine Nachtmusik is embodied in* the publication by			

Table 4.4 Relationships					
		Bärenreiter in 1989 containing a facsimile of Mozart's autograph manuscript of the work known as *Eine kleine Nachtmusik*			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R4	Manifestation	is exemplified by	exemplifies	Item	1 to M
	Definition	This relationship connects a *manifestation* with any *item* that reflects the characteristics of that *manifestation*			
	Scope notes	The logical connection serves as the basis both for identifying the *manifestation* exemplified by an individual *item* and for ensuring that all *items* of the same *manifestation* are linked to that *manifestation*. Indirectly the relationships between a *manifestation* and the various *items* exemplifying that *manifestation* also serve to establish a "sibling" relationship between the various *items* of a *manifestation*.			
	Examples	• The publication by Bärenreiter in 1989 containing a facsimile of Mozart's autograph manuscript of the work known as *Eine kleine Nachtmusik is exemplified by* the exemplar held by the Music Department of the National Library of France, shelf number VMA-991(2,26)			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R5	Work	was created by	created	Agent	M to M
	Definition	This relationship links a *work* to an *agent* responsible for the creation of the intellectual or artistic content			
	Scope notes	The evidence for this relationship is in the original *expression* as embodied in the original *manifestation*. The logical connection between a *work* and a related *agent* serves as the basis both for identifying an *agent* responsible for an individual *work* and for ensuring that all *works* by a particular *agent* are linked to that *agent*.			
	Examples	• The literary work known as *Hamlet was created by* William Shakespeare • The musical work known as *Eine kleine Nachtmusik was created by* Wolfgang Amadeus Mozart			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R6	Expression	was created by	created	Agent	M to M
	Definition	This relationship links an *expression* to an *agent* responsible for the realization of a *work*			
	Scope notes	This relationship applies both to the creation of the original *expression* and any subsequent modifications such as translations, revisions and performances. An *agent* responsible for the intellectual or artistic content of a *work* is responsible for the conception of the *work* as an abstract entity; an *agent* responsible for the *expression* of the *work* is responsible for the specifics of the intellectual or artistic realization or execution of the			

Table 4.4	Relationships				
		expression. The logical connection between an *expression* and a related *agent* serves as the basis both for identifying an *agent* responsible for an individual *expression* and for ensuring that all *expressions* realized by an *agent* are linked to that *agent.*			
	Examples	• Majda Stanovnik *created* the Slovenian translation of A. A. Milne's *Winnie the Pooh* • Le Concert des Nations, conducted by Jordi Savall, *created* the performed expression of the musical work known as *Eine kleine Nachtmusik* found on the CD released by Alia Vox and identified by UPC/EAN 7619986398464 • Matthew Cameron *created* the piano arrangement of Mozart's *Eine kleine Nachtmusik* published in 2006			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R7	Manifestation	was created by	created	Agent	M to M
	Definition	This relationship links a *manifestation* to an *agent* responsible for creating and publishing the *manifestation*			
	Scope notes	The logical connection between a *manifestation* and a related *agent* could serve as the basis both for identifying an *agent* responsible for creating a *manifestation* and for ensuring that all *manifestations* created by an *agent* are linked to that *agent*.			
	Examples	• Brill *created* the 2014 publication of Muḥsin Mahdī's critical edition of the literary work known as *The thousand and one nights* • The monastery of Lindisfarne *created* the overall content and layout of the Lindisfarne Gospels • Streamline Records *created* the publication of Lady Gaga's sound recording titled *Poker face: remixes,* UPC/EAN 602517965393			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R8	Manifestation	is distributed by	distributes	Agent	M to M
	Definition	This relationship links a *manifestation* to an agent responsible for making *items* of that *manifestation* available			
	Scope notes	The *items* can be made available through the traditional distribution processes for physical *items*, or by making electronic *items* available for download, streaming, etc.			
	Examples	• The 2001 publication of Cai Hua's *A Society Without Fathers or Husbands: the Na of China,* published by Zone Books (New York), *is distributed by* the MIT Press (Cambridge, Mass.) • The Canadian Broadcasting Corporation (CBC) distributes the episodes of the radio show *Podcast playlist* by making the files available for downloading at http://www.cbc.ca/radio/podcasts/podcast-playlist/ or for streaming at http://www.cbc.ca/radio/podcastplaylist			

Table 4.4 Relationships					
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R9	Manifestation	was produced by	produced	Agent	M to M
	Definition	This relationship links a *manifestation* to an agent responsible for the fabrication or manufacture of the *items* of that *manifestation*			
	Scope notes	The manifestation may be produced through industrial processes or through artisanal methods.			
	Examples	• The 2013 publication by the Historical Society of Western Pennsylvania titled *The Civil War in Pennsylvania was produced by* the printing company named Heeter (Canonsburg, Pa.) • The monastery of Lindisfarne *produced* the manuscript known as the Lindisfarne Gospels			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R10	Item	is owned by	owns	Agent	M to M
	Definition	This relationship links an *item* to an *agent* that is or was the owner or custodian of that *item*			
	Scope notes	The logical connection between an *item* and a related *agent* could serve as the basis both for identifying an *agent* that owned or had custodianship of an *item* and for ensuring that all *items* owned by, or in the custodianship of, a particular *agent* are linked to that *agent*.			
	Examples	• The exemplar with shelf number VMA-991(2,26) of the publication by Bärenreiter in 1989 containing a facsimile of Mozart's autograph manuscript of the work known as *Eine kleine Nachtmusik is owned by* the Music Department of the National Library of France • The exemplar VM2-457 of the publication by Le Clerc in 1765 of Jean-Jacques Rousseau's *Le devin du village is owned by* Marie-Antoinette			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R11	Item	was modified by	modified	Agent	M to M
	Definition	This relationship links an *item* to an *agent* that made changes to this particular *item* without creating a new *manifestation*			
	Scope notes	Examples include adding annotations, adding an ex-libris, removing pages, rebinding.			
	Examples	• The autograph manuscript of Jean-Paul Sartre's *La nausée was modified by* bookbinder Monique Mathieu			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R12	Work	has as subject	is subject of	Res	M to M
	Definition	This relationship links a *work* to its topic(s)			
	Scope notes	The logical connection between a *work* and a related subject entity serves			

Table 4.4	**Relationships**				
		as the basis both for identifying the subject of an individual *work* and for ensuring that all *works* relevant to a given subject are linked to that subject.			
	Examples	• {black holes} *is subject of* Stephen Hawking's *A Brief history of time*			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R13	Res	has appellation	is appellation of	Nomen	1 to M
	Definition	This relationship links any entity with a sign or combination of signs by which that entity is known			
	Scope notes	In general, the appellation relationship would be many-to-many, however, in the context of a particular library system, the intention is that each *nomen* is used in an unambiguous sense by being associated with a single *res*. Although in theory, one instance of *nomen* (a subclass of *res*) could be associated to another instance of *nomen* via the appellation relationship, in practice the general case would not be provided for in implementations. Structurally, in a system implementation where instances of the entity *nomen* are assigned an internal identifier (also a *nomen* of a specific type) this relationship would be implicit in the system design. An example of this situation could be found in a linked data implementation which assigns a URI (*nomen*) to instances of *nomen* of other types.			
	Examples	• {the author of one of the earliest known grammars of Sanskrit, known as *Ashtadhyayi*} *has appellation* 'Pāṇini' • {the concept of infinity} *has appellation* '∞' • {black holes} *has appellation* 'trous noirs' • {black holes} *has appellation* 'črne luknje' • {black holes} *has appellation* '黑洞'			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R14	Agent	assigned	was assigned by	Nomen	1 to M
	Definition	This relationship links an *agent* with a particular *nomen* that was assigned to a *res* by this *agent*			
	Scope notes	In the bibliographic context, *nomen* assignment is applied to the creation of subject terms, controlled access points, identifiers, etc.			
	Examples	• ISBN agency *assigned* '0553109537' to the 1998 publication of Stephen Hawking's *A Brief history of time* • Call number 'QB981 .H377 1998' was assigned to the 1998 publication of Stephen Hawking's *A Brief history of time* by the Library of Congress • The term 'proton' *was assigned by* Ernest Rutherford to the hydrogen nucleus in 1920			

Table 4.4 Relationships					
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R15	Res	has association with	is associated with	Place	M to M
	Definition	This relationship links any entity with a geographic location			
	Scope notes	In most implementations this relationship would be sub-typed to reflect the exact nature of the association, for example, place of work conception or creation, place of expression creation (e.g. place of musical performance), place of publication or manufacture, current or former location of an *item*, and location of an *agent*.			
	Examples	• Emily Dickinson *has association with* Amherst, Mass., the town where she was born • Zone Books *has association with* New York City, the city where this publisher is located • *Gone With the Wind has association with* Atlanta, Georgia			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R16	Res	has association with	is associated with	Time-span	M to M
	Definition	This relationship links any entity with a time interval			
	Scope notes	In most implementations this relationship would be sub-typed to reflect the exact nature of the association, for example, time of work conception or creation, time of expression creation (e.g. time of musical performance), time of publication or manufacture, period of ownership of an *item*, date of birth of a *person*, time of validity of the *nomen* for a particular *res*.			
	Examples	• The 1998 publication of Stephen Hawking's *A Brief history of time has association with* 1998 • The Phi Beta Kappa Society *has association with* December 5, 1776, when it was founded • The term 'Happenings (Art)' *has association with* the date/time 20151205060018.0, when this term became the valid LCSH heading due to the corresponding authority record being updated, replacing the term 'Happening (Art)' • Emily Dickinson *has association with* the time-span from 1830 to 1886			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R17	Nomen	is equivalent to	is equivalent to	Nomen	M to M
	Definition	This is the relationship between two *nomens* which are appellations of the same *res*			
	Scope notes	This is a shortcut of a fully developed path: NOMEN1 is appellation of RES + RES has appellation NOMEN2			
	Examples	• 'USA' *is equivalent to* 'United States of America' • 'Анна Павловна (Матвеевна) Павлова' *is equivalent to* 'Anna Pavlovna (Matveyevna) Pavlova'			

Table 4.4 Relationships					
		• 'Bill Clinton' *is equivalent to* 'William Jefferson Clinton' • 'Norma Jeane Mortenson' *is equivalent to* 'Marilyn Monroe' • 'τὰ βιβλία' *is equivalent to* 'The Bible'			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R18	Nomen	is part of	has part	Nomen	M to M
	Definition	This relationship indicates that one *nomen* is a component of another *nomen*			
	Scope notes	The whole-part relationship for *nomens* is essential in handling the attributes of components of constructed *nomens*, as such attributes as Language may differ between the parts of a compound *nomen*.			
	Examples	• 'Shakespeare' *is part of* 'William Shakespeare' • 'Measles' *is part of* 'Measles/epidemiology' • 'Twelfth Night, or What You Will' *has part* 'Twelfth Night'			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R19	Nomen	is derivation of	has derivation	Nomen	M to 1
	Definition	This relationship indicates that one *nomen* was used as the basis for another *nomen*, both of which are appellations of the same *res*			
	Scope notes	A *nomen* may be derived from another due to formal modifications in the notation used (such as transliteration) or cultural or linguistic conventions (creation of abreviated or shortened or variant forms).			
	Examples	• 'USA' *is derivation of* 'United States of America' • 'Анна Павловна (Матвеевна) Павлова' *has derivation* 'Anna Pavlovna (Matveyevna) Pavlova' • 'Bill Clinton' *is derivation of* 'William Jefferson Clinton'			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R20	Work	is part of	has part	Work	M to M
	Definition	This is the relationship between two *works*, where the content of one is a component of the other			
	Scope notes	Examples include movements of concertos, poems within poetry cycles, multipart novels, triptychs.			
	Examples	• Mozart's *Piano Sonata* Nr. 14, KV 533/494 *has part* Mozart's *Rondo* KV 494			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R21	Work	precedes	succeeds	Work	M to M
	Definition	This is the relationship of two *works* where the content of the second is a logical continuation of the first			
	Scope notes	The relationship is about a sequence of ideas and should not be confused with the time of creation of the respective *works*.			

Table 4.4	Relationships				
	Examples	• Margaret Mitchell's *Gone With the Wind precedes* both Alexandra Ripley's *Scarlett* and Donald McCaig's *Rhett Butler's People* • Margaret Mitchell's *Gone With the Wind succeeds* Donald McCaig's *Ruth's Journey* • The TV series *Better Call Saul! precedes* the TV series *Breaking Bad* [written later, the first series fills in the back-story of characters in the second series] • *A wizard of Earthsea* precedes *The tombs of Atuan*, which precedes *The farthest shore*, all in the *Earthsea trilogy* by Ursula K. Le Guin			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R22	Work	accompanies / complements	is accompanied / complemented by	Work	M to M
	Definition	This is the relationship between two *works* which are independent, but can also be used in conjunction with each other as complements or companions			
	Scope notes	The two *works* may be adding value to each other (in this case the relationship is symmetrical), in other cases one of the *works* is considered secondary.			
	Examples	• Leigh Lowe's *Prima Latina: an introduction to Christian Latin. Teacher manual accompanies* Leigh Lowe's *Prima Latina: an introduction to Christian Latin. Student book* • Eric Gill's set of illustrations for the *Song of Songs accompanies* the *Song of Songs* in the 1931 publication by the Cranach Press • Wole Soyinka's foreword to the Universal declaration of human rights *accompanies* the Universal declaration of human rights in the 1994 publication by African Book Builders			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R23	Work	is inspiration for	is inspired by	Work	M to M
	Definition	This is the relationship between two *works* where the content of the first served as the source of ideas for the second			
	Scope notes				
	Examples	• The musical *West Side Story is inspired by* the play *Romeo and Juliet* • The painting *Plan for a City Gate in Kiev* by Hartman *is inspiration for* the musical piece *The Great Gate of Kiev* from *Pictures at an Exhibition* by Modest Mussorgsky			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R24	Work	is a transformation of	was transformed into	Work	M to 1
	Definition	This relationship indicates that a new *work* was created by changing the genre or literary form (dramatization, novelization), target audience (adaptation for children), or style (paraphrase, imitation, parody) of a			

Table 4.4	**Relationships**				
		previous *work*			
	Scope notes	Some transformations may be considered as being only inspired by a previous *work*.			
	Examples	• Mary Lamb's *Cymbeline*, from Charles and Mary Lamb's *Tales from Shakespeare, is a transformation of* William Shakespeare's *Cymbeline* • Seth Grahame-Smith's *Pride and prejudice and zombies is a transformation of* Jane Austen's *Pride and prejudice*			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R25	Expression	was derived into	was derived from	Expression	1 to M
	Definition	This relationship indicates that of two *expressions* of the same *work*, the first was used as the source for the other			
	Scope notes	In many cases the exact source of, for example, a translation, adaptation, revision, or arrangement is not known. If it is, it may be an interesting aspect for the user. The derivation relationship may be sub-typed to provide more detailed information about the nature of the transformation.			
	Examples	• The French translation of Yukio Mishima's 天人五衰 published as "L'ange en décomposition" *was derived from* the English translation of Yukio Mishima's 天人五衰 published as "The decay of the angel" • The 1965 recording of a performance of Anton Bruckner's Symphony No. 2 in C minor by the Toronto Symphony Orchestra directed by Herman Scherchen *was derived from* the particular score of Anton Bruckner's Symphony No. 2 in C minor found in the 1892 edition (Doblinger) supervised by Cyrill Hynais with revisions by Bruckner • The original score of André Boucourechliev's *Lit de neige* Op. 26 *was derived from* the German text of Paul Celan's *Schneebett*, and *was derived from* the French translation of Paul Celan's *Schneebett* by André Du Bouchet [comment: the composer set both texts to music within the same musical piece, and they are to be performed in both languages, one after the other] • The French translation of *Wong's essentials of pediatric nursing* published as *Soins infirmiers : pédiatrie* by Chenelière éducation (Montréal, Québec), ©2012, *was derived from* the 8th English edition, appearing in the *manifestation* published by Mosby/Elsevier (St. Louis, Missouri), ©2009			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R26	Manifestation	has reproduction	is reproduction of	Manifestation	1 to M
	Definition	This is the relationship between two *manifestations* providing the user with exactly the same content, such as facsimiles, reproductions, reprints, and reissues			

Table 4.4	**Relationships**				
	Scope notes	Although a particular *item* may have been used as a source of reproduction, this *item* should be considered to represent the source *manifestation* as a whole. The process of reproduction always results in a new *manifestation*, even when only a single *item* was produced from that *manifestation*.			
	Examples	• The 2015 publication of Harry Partch's *Two studies on ancient Greek scales* by Schott *is reproduction of* the holograph manuscript of Harry Partch's *Two studies on ancient Greek scales* • The 1873 publication of Daniel Wilson's *Caliban: the missing link* by Macmillan *has reproduction* the 2014 publication of Daniel Wilson's *Caliban: the missing link* by Cambridge University press as a facsimile edition			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R27	Manifestation	has alternate	has alternate	Manifestation	M to M
	Definition	This relationship involves *manifestations* that effectively serve as alternatives for each other			
	Scope notes	Typical cases are when a publication, sound recording, video, etc., is issued in more than one format or when it is released simultaneously by different publishers in different countries.			
	Examples	• The LP release of the punk rock band the Soviettes' album titled “LP III” *has alternate* the CD release of the punk rock band the Soviettes' album titled “LP III” • Agatha Christie's *The Sittaford Mystery* published in 1931 in the UK by William Collins & Sons *has alternate* the simultaneous US edition published as *The Murder at Hazelmoor* by Dodd, Mead & Co.			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R28	Agent	is member of	has member	Collective Agent	M to M
	Definition	This a relationship between an *agent* and a *collective agent* that the *agent* joined as a member			
	Scope notes	A *person* may explicitly join an organization or association. A *person* may implicitly become a member of a family by birth, adoption, marriage, etc. A *collective agent* may join another *collective agent* as a member.			
	Examples	• The king of England Henry VIII *is member of* the House of Tudor • Pearl Buck *is member of* Phi Beta Kappa • IFLA *has member* the National Library of China			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R29	Collective Agent	has part	is part of	Collective Agent	M to M

Table 4.4	**Relationships**				
	Definition	This is a relationship between two *collective agents* where one is a component of the other			
	Scope notes				
	Examples	• The IFLA Cataloguing Section *is part of* IFLA			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R30	Collective Agent	precedes	succeeds	Collective Agent	M to M
	Definition	This is a relationship between two *collective agents* where the first was transformed into the second			
	Scope notes				
	Examples	• National Library of Canada *precedes* Library and Archives Canada • National Archives of Canada *precedes* Library and Archives Canada			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R31	Expression	has part	is part of	Expression	M to M
	Definition	This is a relationship between two *expressions* where one is a component of the other			
	Scope notes				
	Examples	• The music notation of Franz Schubert's *Ave Maria* Op. 52, No. 6 *is part of* the music notation of Franz Schubert's *Sieben Gesänge aus Walter Scott's Fräulein vom See* Op. 52			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R32	Manifestation	has part	is part of	Manifestation	M to M
	Definition	This is a relationship between two *manifestations* where one is a component of the other			
	Scope notes				
	Examples	• The Bolchazy-Carducci Publishers publication of *Latin for the new millennium* by Milena Minkova et al. *has part* the Bolchazy-Carducci Publishers publication of volume 5, "Level 2: Student text", ISBN 9780865165632, of *Latin for the new millennium* by Milena Minkova et al.			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R33	Place	has part	is part of	Place	M to M
	Definition	This is a relationship between two *places* where one is a component of the other			
	Scope notes				
	Examples	• California *is part of* USA			

Table 4.4 Relationships					
		• Dolomites *is part of* Alps			
#	**Domain**	**Forwards name**	**Reverse name**	**Range**	**Cardinality**
LRM-R34	Time-span	has part	is part of	Time-span	M to M
	Definition	This is a relationship between two *time-spans* where one is a component of the other			
	Scope notes				
	Examples	• The 1930s *is part of* the 20th century			

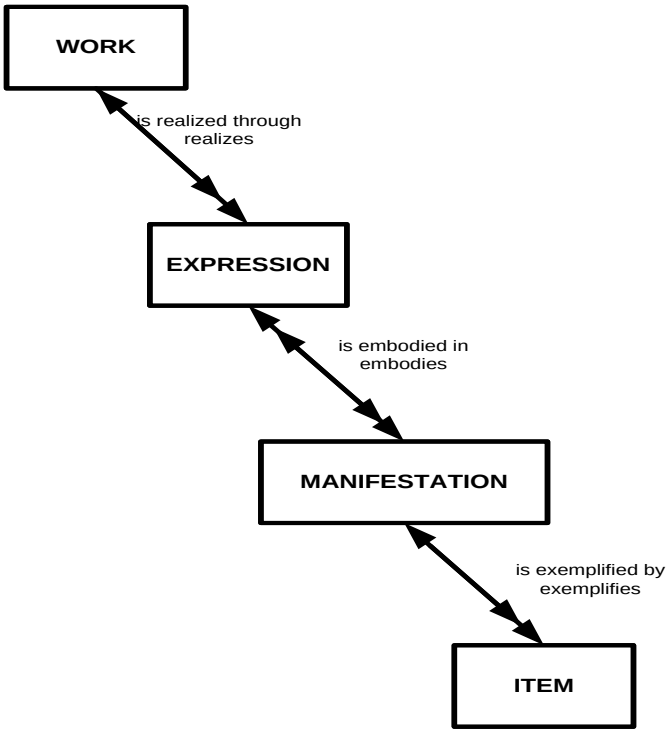
5.1 Entity-Relationship Diagrams

The entities and the significant relationships between them can be summarized in a series of entity-relationship diagrams. Attributes do not appear in these diagrams, each attribute is simply a characteristic associated with the relevant entity.

Conventions used in the entity-relationship diagrams:

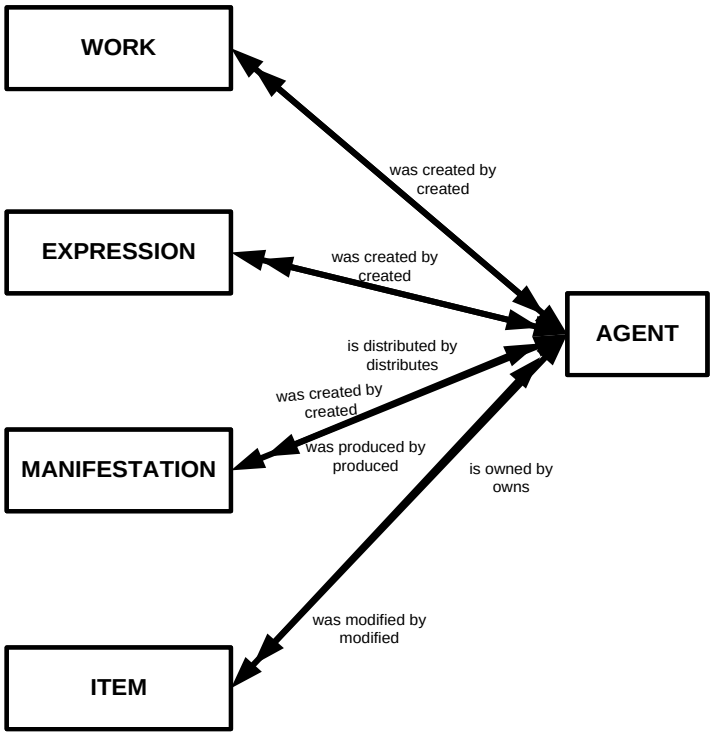
- A rectangle is used for each entity, these serve as nodes which are connected by the relationships. The name of the entity is written in all capitals within the rectangle.
- A line (arrow) represents the relationship (or relationships) which hold between the entities. The brief name (or names) of the relationships are written in lower case by the line (first the forwards name, then the reverse name underneath it).
- When a relationship is recursive (the same entity is both the domain and range), the arrow is shown as a loop at one of the corners of the entity rectangle. The name of the relationship is written within the loop.
- When illustrated, the "IsA" relationship which links subclass entities to their superclass entity, is shown with a dotted line.
- The cardinality of the relationship is indicated by the arrow heads:
  - a single-headed arrow indicates that the cardinality for that entity is "1"
  - a double-headed arrow indicates that the cardinality for that entity is "many"

Figure 5.1 Relationships between Work, Expression, Manifestation, and Item



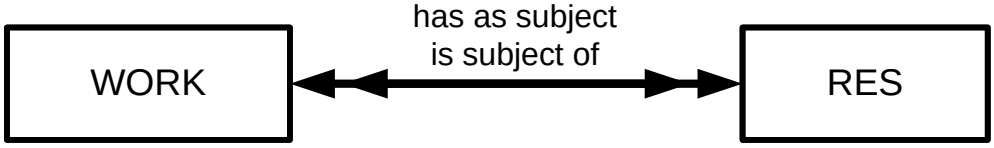
Relationships LRM-R2 to LRM-R4 are shown in figure 5.1. These relationships indicate that a *work* may be realized through one or more than one *expression*; an *expression*, on the other hand, realizes one and only one *work*. An *expression* may be embodied in one or more than one *manifestation*; likewise a *manifestation* may embody one or more than one *expression*. A *manifestation*, in turn, may be exemplified by one or more than one *item*; but an *item* may exemplify one and only one *manifestation*.

Figure 5.2 Responsibility Relationships between Agents and Works, Expressions, Manifestations, and Items



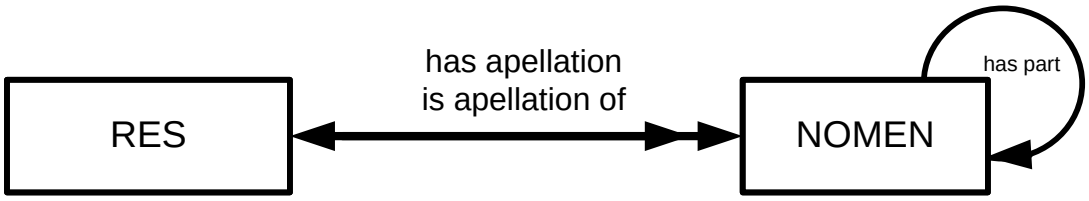
Relationships LRM-R5 to LRM-R11 are shown in figure 5.2. These relationships all hold between the entity *agent* (or by extension either of its subclasses) and *works*, *expressions*, *manifestations*, and *items*. These relationships capture responsibility for the processes of creation, production, distribution or modification. All these relationships are many-to-many, indicating that any number of *agents* may be involved in any number of specific instances of any of these processes.

Figure 5.3 Subject Relationship



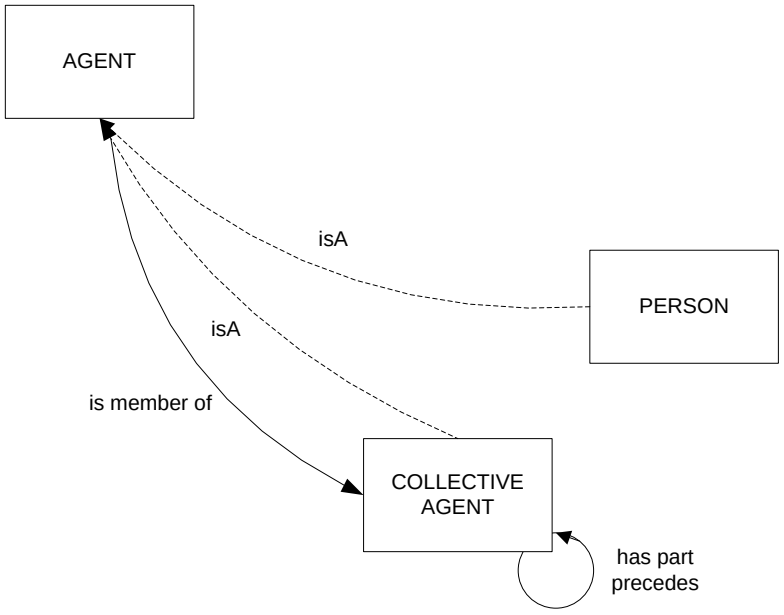
Relationship LRM-R12 is depicted in figure 5.3. This relationship links *works* to the *res* which are the subject of the *works*. Any *res* (and so by extension any other entity, as all entities are subclasses of the entity *res*) may be the subject of one or more *works*; *works* may have one or more *res* as their subject.

Figure 5.4 Appellation Relationship



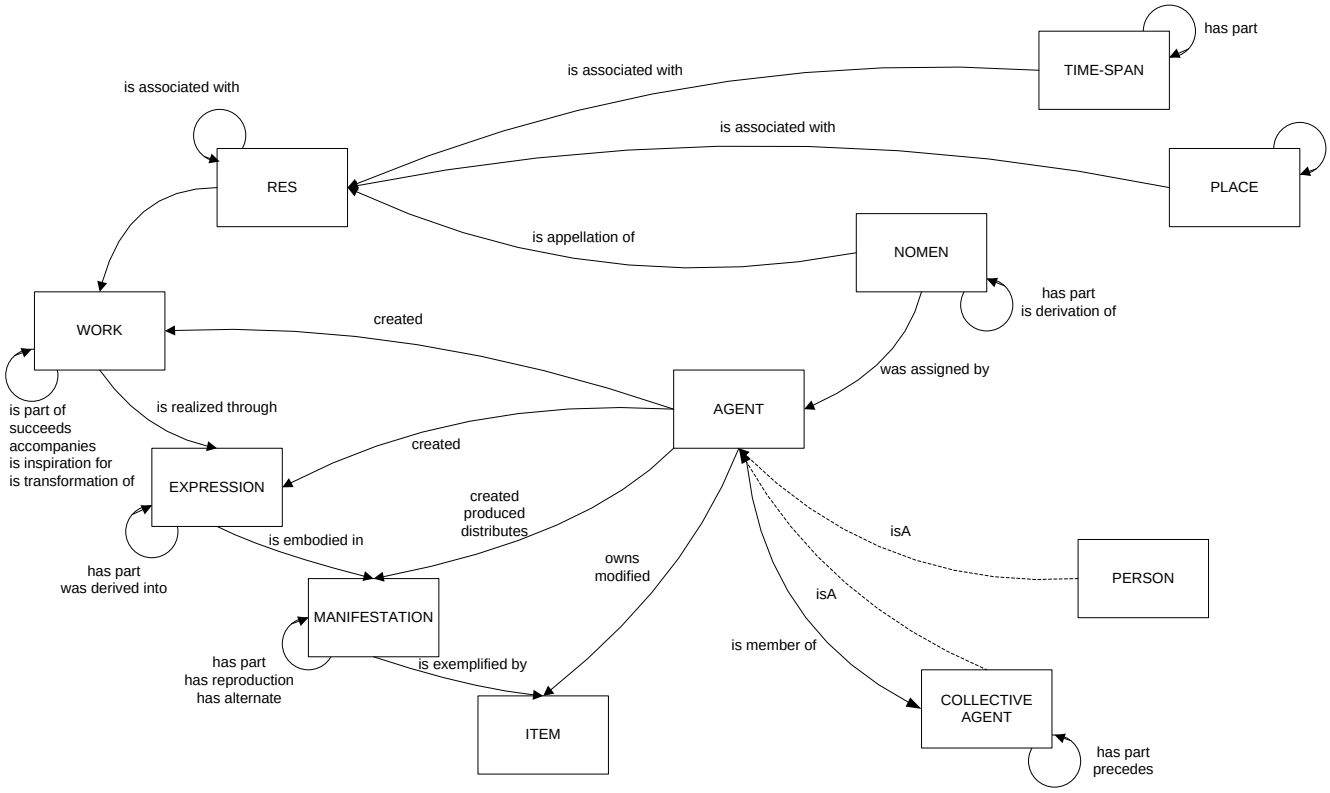
Relationship LRM-R13 is depicted in figure 5.4. This relationship links *res* to their *nomens*. Any *res* (and so by extension any other entity, as all entities are subclasses of the entity *res*) may be known by one or more *nomens*. Each *nomen* is the appellation of a single *res*. Relationship LRM-R18, which says that *nomens* may have parts which are themselves *nomens*, is also illustrated.

Figure 5.5 Agent Relationships



Relationships LRM-R28 to LRM-R30 are shown in figure 5.5. The membership relationship holds between a *collective agent* and any *agent* (*person* or another *collective agent*). A *collective agent* may have one or more members, and an *agent* may be a member of one or more *collective agents*. *Collective agents* may have one or more parts which are themselves *collective agents*, and *collective agents* may precede and succeed each other over time. To these relationships are added the structural "IsA" relationships between the entity *agent* its subclasses *person* and *collective agent*.

Figure 5.6 Overview of Relationships



The final overview diagram, figure 5.6, shows all the relationships depicted in figures 5.1 through 5.5 along with all other relationships defined in the model. Not illustrated is the shortcut relationship LRM-R17, equivalence, which holds between two different *nomens* which are both appellations of the same *res*. To streamline the presentation, the "IsA" relationships that connect all entities to the entity *res* are omitted, and only the forwards names of the relationships from Table 4.4 are given. Unlike the preceding diagrams, the cardinality of relationships is not indicated, rather the single arrow heads correspond to the direction of the relationship whose name is given.

The diagram illustrates that a *res* may be associated with other *res* (LRM-R1), as well as with instances of *place* (LRM-R15) and *time-span* (LRM-R16). The entities *place* and *time-span* may be composed of parts which are themselves respectively *places* (LRM-R33) and *time-spans* (LRM-R34). *Nomens* are assigned by an *agent* (LRM-R14), and may be derived from other *nomens* (LRM-R19) as well as being composed of parts which are themselves *nomens* (LRM-R18).

Works may be related to other *works* in several ways: as component parts, as logical predecessors or successors, by accompanying or complementing each other, serving as inspiration for other *works*, or by being transformed into new *works* (LRM-R20 to LRM-R24). Similarly, *expressions* of a *work* can be derived into new *expressions* (LRM-R25) and may have *expressions* as component parts (LRM-R31); manifestations may be related as reproductions (LRM-R26) or alternates (LRM-R27), and may also have *manifestations* as component parts (LRM-R32).

5.2 Nomens in a Library Context

In a library context, the *nomens* for *persons*, *collective agents* (such as families and corporate bodies), or *places* have been traditionally referred to as names, the *nomens* for *works*, *expressions*, and *manifestations* as titles, the *nomens* for *items* as shelf-marks, while the *nomens* for *res* used in a subject context are variously referred to as terms, descriptors, subject headings, and classification notation.

An identifier is a type of *nomen* that is intended to have persistence and uniqueness within a specific domain of application, such as identifiers for publications of a specific type, or identifiers for *persons*, so that instances of that entity can be specifically identified and referred to unambiguously. Identifiers are generally assigned by authorized assignment agencies according to agreed-upon rules. Instances of assignment agencies include, but are not limited to, registration agencies for ISO identifiers, national governments for identifiers for citizens and residents. The scope of an identifier system may be broad (such as URI) or highly specialized (catalogue numbers for the works of a specific composer).

In library information systems, controlled access points are a type of *nomen* that has traditionally been assigned to be used to provide collocation for *persons*, *collective agents* (that is, families and corporate bodies), *works*, and *expressions*, as well as for additional entities used as objects of the <has as subject> relationship.

Controlled access points are *nomens* constructed according to the relevant rules in the bibliographic system. They can take the form of names, titles, terms, codes, etc., as specified by the relevant construction rules.

In many knowledge organization systems, controlled access points can be designated as one of two subtypes:

a) preferred or authorized access points
b) variant access points.

Preferred or authorized access points uniquely identify an entity and thus also serve as identifiers, while variant access points may or may not be uniquely associated (one-to-one) with a specific entity, depending on the construction rules applied.

5.3 Modelling of Bibliographic Identities

The modelling of bibliographic identities or personas in FRBR-LRM makes use of the *nomen* entity and the *has appellation* relationship. The appellation relationship is one-to-many and holds between any entity and the various *nomens* used for that entity. In particular, *persons* (defined as: an individual human being) generally have multiple *nomens*; the use of each *nomen* may be governed by many factors, including the preference for certain *nomens* in specific contexts. The *Context of use* attribute of a *nomen* is used to record aspects of the context that are deemed relevant in a particular bibliographic environment. The *Context of use* can relate a *nomen* (or *nomens*) as being used by a *person* when publishing literary works, while another cluster of *nomens* may be identified as those used by the same *person* when publishing scientific works. In the model, a bibliographic identity is a cluster of *nomens* used by a *person* in the same bibliographically significant context or contexts. Which types of differences in context of use trigger the recognition, and consequent specific handling, of distinct

bibliographic identities, depend on the cataloguing rules or knowledge organization system. For example, multiple pseudonyms for the same *person* may require multiple controlled access points in the cataloguing rules, but only a single classification number.

Example

A real *person* uses two distinct *nomen* clusters in different contexts of use, each of these clusters includes two *nomens*. As this difference in context of use is significant in the particular cataloguing code, within each cluster the cataloguing rules have designated one nomen as the preferred form, the other as a variant.

Person 1:	Nomen 1: Context (literary), Category (preferred form of access point)
	Nomen 2: Context (literary), Category (variant form of access point)
	Nomen 3: Context (science), Category (preferred form of access point)
	Nomen 4: Context (science), Category (variant form of access point)

In some real-life situations the cataloguer may not know whether one cluster of *nomens* is used by the same *person* as another distinct cluster of *nomens*. This lack of knowledge means that the full set of possible relationships between these *nomens* cannot be recorded, but otherwise does not have any negative consequences for the provision of access to resources.

In any implementation, cataloguing rules need to operationalize the handling of *persons* and their *nomens*. Generally, cataloguing rules make the default assumption that each *nomen* cluster used in a consistent context of use is the appellation of a single *person*, and then make provisions for adding appropriate relationships when this turns out not to be the case. These other cases include the use in different contexts of multiple bibliographic identities by the same *person* (real name and pseudonym or multiple pseudonyms). Conversely, a single *nomen* cluster formulated according to a pattern culturally associated with individual *persons* may actually identify a *collective agent* consisting of multiple *persons* (joint pseudonyms).

5.4 Representative Expressions

In a strict formal sense, within the model all the *expressions* of a *work* are equal as realizations of the *work*. However, research with users indicates that they recognize that *works* have original or "canonical" *expressions*, those that can be said to best represent the initial intention of the creators of that *work*. Other *expressions* can, if the full history of the *work* is known, be seen as taking shape from a network of derivations or transformations starting from this original *expression*. For many purposes, users seek out these canonical *expressions* and are particularly interested in *manifestations* of these *expressions*. Users may also perceive certain characteristics of the "canonical" *expression* as pertaining to, or being inherent in, the *work* itself, making these characteristics useful as a means of describing and identifying the *work*.

In many situations the "canonical" *expression* is easily identified in the first or original *expression* of the *work*, which is in turn embodied in the first *manifestation* of the *work*. Other situations are not as

clear-cut. Textual works initially issued simultaneously in two or more languages, none of which is identified as the original language (such as government documents of multilingual countries or publications of multinational organizations) could either be considered to have multiple "original" *expressions*, or either not to have "an original" *expression* at all. In some cases the derivation history of the *expressions* of a *work* is sufficiently complex that the *expression* considered most "canonical" or significant is not actually the original *expression*. For example, the *expression* of Tolkien's *The Lord of the rings* that is now deemed to be "canonical" is in the form of a trilogy; but Tolkien's original intention was to produce a single narrative, it was his publisher who obliged him to slice the novel into three distinct parts, and who decided what the titles of those three parts should be.

The significance of the "canonical" *expressions* of *works*, those *expressions* that best **represent** a *work*, is fundamental to library practice for the identification of *works*. Starting with an *item* that is considered to fully exemplify the *manifestation* to which it belongs (that is, a complete *item* that can be seen to bear the *manifestation* characteristics intended by the manufacturing process), the cataloguer assesses the *manifestation* as to whether it fully represents the *expression* to which it belongs, and finally assesses the *expression* as to its degree of representativity for the *work* itself. Only when satisfied that the *expression* meets the requirement of being a suitable representative of the *work*, are the characteristics of this *expression* used in describing the *work*, such as in the assignment of a *work* title based on the title of the representative *expression*. This process of identification of *works* by repeated abstraction is a significant feature of library practice.

In the model, the *expression* attribute *Representativity* records the status of a given *expression* as to whether it is considered to be a representative or "canonical" *expression* of the *work* or not. This attribute is defined as a yes/no flag on the *expression* level. It is expected that only one *expression* of each *work* will carry a "yes" value for this attribute in a particular database at a given time. The model does not prescribe the criteria that must be applied in making the determination of representativity; this is operationalized by the relevant cataloguing practice. Whether an *expression* is the original *expression* of the *work* will often be a component of this decision-making process, as will solutions for those cases where there is no clear original or the cataloguer does not have enough information to know. These operational criteria may involve judgement of the appropriateness of an *expression* for the user population, such as arbitrarily selecting among several equally "original" *expressions*, the one that is in the language of the catalogue.

For the *expression* flagged as representative, the values of several other attributes defined for *expressions* (intended audience, language, key, medium of performance, scale, etc.) are viewed as significant for the corresponding *work*. In the listing of attributes of the *expression* in section 4.2 the attributes linked to the representative *expression* in this way are indicated with an asterisk (*). The values of these *expression* attributes can be notionally "transferred" to the *work* and used in *work* identification, although strictly speaking these attributes concern *expression* characteristics and not *work* characteristics. This implies that there is no contradiction in having *expressions* of the *work* that are **not** representative that hold different values for these attributes.

Example

Work: was created by: Louise Penny
has title (work): Still life
has language: English
category of work: Novel

Expression 1:
Representative? Yes
has language: English
has title: Still life
was created by: Louise Penny

Expression 2:
Representative? No
has language: French
has title: Nature morte
was created by (translator): Michel Saint-Germain

5.5 Modelling of Aggregates

An *aggregate* is defined as a *manifestation embodying multiple distinct expressions*. Three distinct types of aggregates exist:

Aggregate Collections of Expressions
Collections are sets of multiple independently created expressions which are 'published' together in a single manifestation. Collections include selections, anthologies, monographic series, serials and other similar groups of resources. Examples include journals (aggregates of articles), multiple novels published together in a single volume, books with independently written chapters, CDs (aggregates of individual songs), and various collected/selected works. A distinctive characteristic of collections is that the individual works are usually similar in type and/or genre such as a collection of novels by a particular author, songs by a particular artist, or an anthology of a genre of poetry. However, in other cases, they also may be what appears to be a random collection of expressions.

Aggregates Resulting from Augmentation
Aggregates resulting from augmentation are distinct from collections in that they typically consist of a single independent work that has been supplemented with one or more dependent works. Such aggregates occur when an expression is supplemented with additional material that is not integral to the original work and does not significantly change the original expression. Forewords, introductions, illustrations, notes, etc. are examples of augmenting works. The augmenting material may or may not be considered significant enough to warrant distinct bibliographic identification.

Aggregates of Parallel Expressions
Manifestations may embody multiple, parallel expressions of the same work. A single manifestation containing expressions of the work in multiple languages is a common form of this type of aggregate. They are commonly used to publish manuals and government documents for multilingual environments. Parallel expressions are also common on the Web where users are provided access to

equivalent material in their choice of languages. Other examples include publishing a text in its original language with a translation.

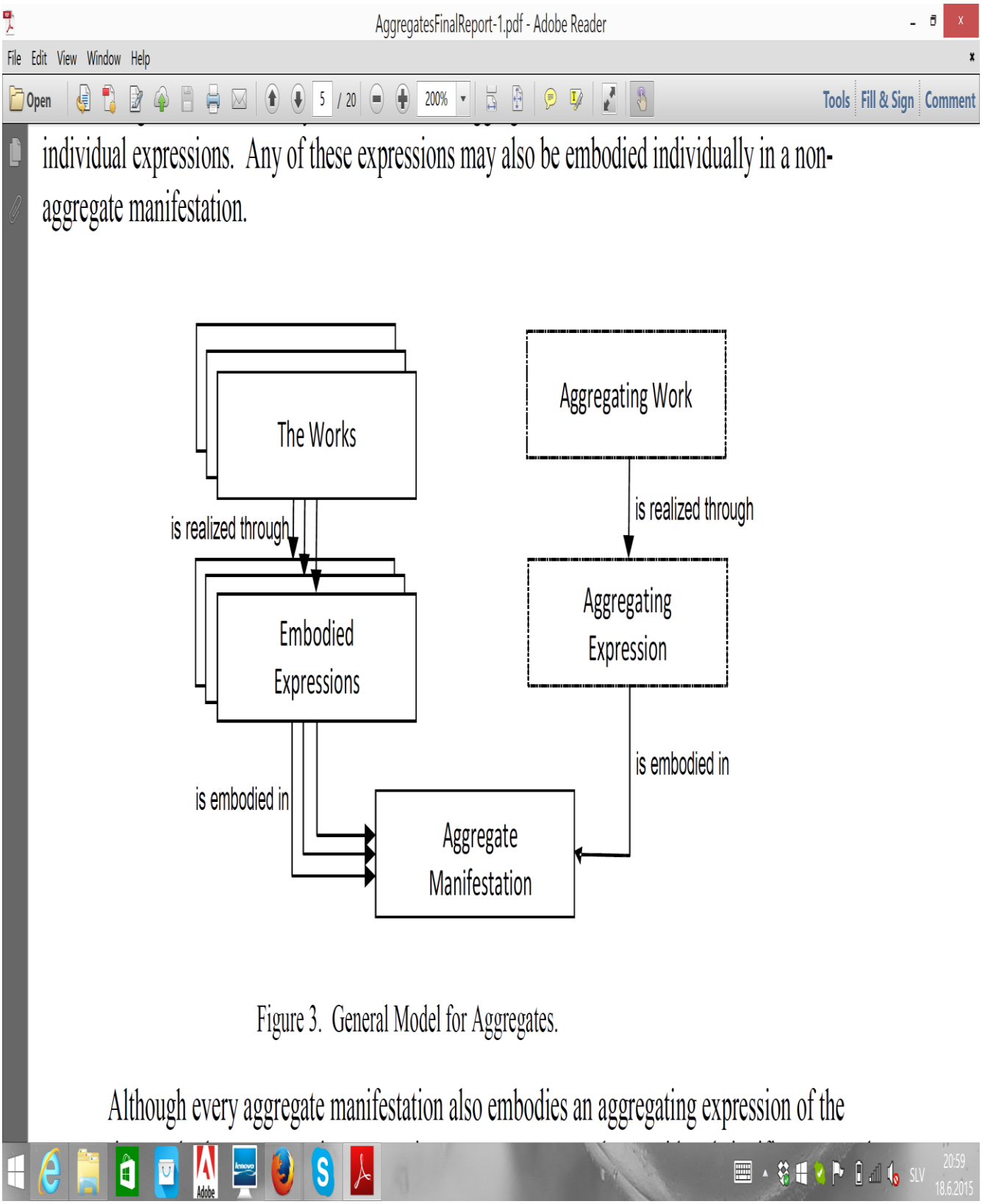
Modelling Aggregates

Manifestations may contain multiple expressions as indicated by the many-to-many relationship between expressions and manifestations. This is the only many-to-many relationship among the WEMI entities. A manifestation can embody multiple expressions and an expression can be embodied in multiple manifestations. By contrast, an expression can only realize a single work and an item can only exemplify a single manifestation.

Modelling an aggregate simply as an embodiment of discrete expressions may fail to recognize the creative effort of the aggregator or editor. The process of aggregating the expressions is itself an intellectual or artistic effort and therefore meets the criteria for a work. In the process of creating the aggregate manifestation, the aggregator creates an *aggregating work*. This type of work has also been referred to as the glue, binding, or the mortar that transforms a set of individual expressions into an aggregate. This effort may be relatively minor—two existing novels published together—or it may represent a major effort resulting in an aggregate that is significantly more than a sum of its parts (for example an anthology). An aggregating work is not a discrete section or even necessarily an identifiable part of the resulting manifestation and **does not** contain the aggregated works themselves. The modelling of aggregates as a manifestation embodying multiple expressions is simple and straightforward; works and expressions are treated identically regardless of their form of publication or the physical manifestation in which they are embodied. An expression may be published alone or it may be embodied in a manifestation with other expressions.

Although every aggregate manifestation also embodies an expression of the *aggregating work*, these expressions may, or may not, be considered significant enough to warrant distinct bibliographic identification. The model, however, is flexible, permitting the aggregating work to be described at any time. If the aggregating work was not initially identified, it can be described later, if appropriate.

Figure 5.7 General Model for Aggregates



5.6 Serials

Serials are essentially aggregates, and this at two levels:
- they are aggregates of issues published over time (even though there are serials that happen to have only one issue released);
- each individual issue is an aggregate of articles (even though there are serials that can occasionally have issues consisting of only one article).

The description of serials is particularly difficult to model, because it does not limit itself to a description of the past, but is also intended to allow end-users to make assumptions about what the behaviour of a serial will be in at least the near future. The "thing" described may have changed dramatically in the past, and may do so even more dramatically in the future.

Since the Work entity is defined, in FRBR-LRM, as one "that permits the identification of the commonality of content between and among various *expressions",* a serial can be modelled as a particular case of the Work entity, although the notion of "commonality of content" is not to be understood in the same sense as for monographs. Each issue of a serial contains distinct articles, and it is therefore not possible to claim that the same ideas are common to the various *expressions* embodied in the *manifestations* of all the issues that make up a serial, while it is possible to claim that the same ideas are common to the English text of *Romeo and Juliet* and an Italian translation of it. Rather, the "commonality of content" that defines a serial resides in both the publisher's and the editor's *intention* to convey the feeling to end-users that all individual issues do belong to an identifiable whole, and in the collection of editorial concepts (a title, an overall topic, a recognizable layout, a regular frequency, etc.) that will help to convey that feeling.

Such a constellation of editorial concepts can evolve over time without the serial *work* losing its identity. The same can be said of monographic *works,* for that matter: for example, the concepts expressed in the 6th edition of Darwin's *On the Origin of Species* are not quite the same as those expressed in the first edition of that same *work*.

The original FRBR study, in which, admittedly, seriality was not completely modelled, introduced *The Wall Street Journal* as an example of a serial *work,* and its Eastern and Western editions as two distinct *expressions* of that same *work*. This is now recognized to have been an error. It is far more satisfactory to regard *any* serial as a distinct instance of the *work* entity, and to acknowledge the existence of specific relationships (e.g., "is a sibling local edition of") among instances of the *work* entity. In this high-level model, however, not *all* specific relationships that may hold between serials are listed. Readers who need a more detailed model for serials are invited to either look up a specific conceptual model for serials, such as PRESS$_{OO}$, or declare their own set of specific relationships among serials, according to the overall philosophy of the FRBR-LRM model.

It ensues that any serial *work* can be said to have only one *expression* and only one *manifestation*. But the relationships that hold between serial *works* can serve to draw the borders of additional entities that comprise, say, the paper edition of a journal and its edition on the Web; all linguistic editions of a journal that is published in more than one language as separate editions; all local editions of a journal, etc., according to the needs that have to be met in a given implementation of the model.

6.1 Use Cases Illustrating the User Tasks

Each of the five generic user tasks defined in sections 3.2 and 3.3 is a generalization of many specific tasks likely to be carried out by users of library data and library databases. The use cases presented in this section illustrate a range of these specific tasks. The use cases make the link between the users' activity and the model by framing the user's information seeking in terms of the entities, attributes and relationships defined in the model. These use cases are illustrative of the range of user queries and show how the elements of the model are used to fulfill the user tasks. The use cases given here are by no means exhaustive; many variants or combinations would normally be encountered in a real-life situation.

Table 6.1 Use Cases for User Tasks

Task	Use Cases
Find	To find all *manifestations* of *expressions* of a *work* - by searching using a title associated with the *work* or one of its *manifestations* To find all *expressions* of a *work* that - are written in a given language To find resources that have a relationship to a given *agent* - search using a personal name of a composer to find musical works composed by the *person* - search using a personal name to find *works* or *expressions* including illustrations by that *person* - search using a corporate body name to find reports issued by that *collective agent* To find out, discover or confirm, the extent of coverage of the database - search for a *person* by a *nomen* known to the user to confirm whether the database contains a record for the *person* To find resources having an association with a particular *place* or *time-span* - search using a place name to find *manifestations* published in that *place* - search using a date range and a *place* to find *works* that originated in a *place* during a period of time To find resources embodying *works* that are in a subject relationship to a given *res* (or set of *res*) - search using a *nomen* (for the given *res*) that is used in the *Library of Congress Subject Headings* - search using a *nomen* (for the given *res*) that is established in the *Dewey Decimal Classification* - search using a personal or corporate or place name as established in the authority file

Table 6.1 Use Cases for User Tasks	
Task	**Use Cases**
Identify	To identify, or recognize, among the results of a search - resources that embody a *manifestation* of the *work* sought, even though the title of those *manifestations* differs from the work title as searched by the user - resources that embody a *manifestation* of the *work* sought, even though other *works* by different creators bear a title similar to the work title as searched by the user - a personal name that corresponds to the *person* sought by the user, even though other people are identified by similar names - a personal name that corresponds to the *person* sought by the user, even though other names exist for that *person*, used in the same or in different contexts - a place name that corresponds to the *place* sought by the user, even though the *place* is known by names in more than one language To identify, among the results of a search, those resources intended for a specific audience or purpose - recognize that a resource, although it concerns the subject of interest, is intended for young children and not university students - recognize that a resource, although it embodies a musical work of interest, is a notated *expression* and not recorded sound To identify - a subject term that corresponds to the *res* sought, even though the term searched by the user has homonyms in natural language - a classification number that corresponds to the *res* sought
Select	To select, from among the resources identified, *manifestations* of the *work* or *works* sought that - include the most relevant additional content (such as, including original and translated *expressions* of a play in the same *manifestation*) - include a secondary contribution by a particular *agent* (such as, translation by a particular translator, critical notes or introduction by a particular scholar) - are in the most convenient physical format for the user's present purpose (such as, easy to carry pocket book for leisure reading, compact water-resistant city map for travel) - are in a medium that can be used by the user (such as, an audio book, in braille or in large print, DVD or blu-ray) - are available in the user's location (a copy is present in the user's local library and is not presently borrowed) - are available for the type of use the user intends (such as, a copy that can be used outside of the library exists, public performance rights are associated with a copy of a video so that the user can show it in a classroom setting) To select, from among the resources identified through a subject search, those resources that seem the most relevant - due to the aspects or facets or approach to the subject described - due to the language of the content - due to the intended audience (for example, to select introductory texts for undergraduate

Table 6.1 Use Cases for User Tasks	
Task	**Use Cases**
	use, but instead select popularizations for recreational reading) - due to the date of creation of the content (for example, to select recently written *works* for an information need for state-of-the-art current information, but instead select *works* created in the 1800s (regardless of the date of publication of the *manifestation*) if the information need is to understand how the subject was perceived at that time)
Obtain	To obtain an information resource by: - linking to or downloading an online resource using the link found in the library catalogue - physically borrowing an *item* determined to be available from a local library - receiving an *item* through interlibrary loan from a more distant library or supplier - purchasing an *item* from a vendor or supplier using the citation information verified through the library catalogue or national bibliography To obtain information about an entity itself from the information recorded in authority data - obtain date and location of birth and death of a *person* from the authority data - confirm the country in which a city is located
Explore	To explore relationships in order to understand the structure of a subject domain and its terminology - browse the concepts presented as being narrower than a starting subject To explore the relationships between different entities - follow the derivation relationships between a progenitor *work* and other *works* based on it or adapted from it - browse the *works* and *expressions* associated with a given *agent* and the roles played by that *agent* in their creation or realization To understand the relationships between various *nomens* for an entity - examine the variant names for a topical subject within a subject vocabulary - survey the variant names used by a specific *person* in different contexts of use (such as name used in religion; official name) - view the names used by an international corporate body in different languages - explore correlations between *nomens* for the same entity in different controlled vocabularies (such as finding a classification number that corresponds to a subject heading or term)

FRBR-LRM
Chapter 7 Sources Consulted

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