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IFLA Library Reference Model

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Consolidation Editorial Group
of the IFLA FRBR Review Group
reporting to the IFLA Cataloguing Section

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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 the 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.

Starting in 2003, the FRBR Review Group has held joint meetings with the group within the International Council of Museums (ICOM) Committee on Documentation (CIDOC) responsible for maintaining the museum community's internationally agreed-upon conceptual model, the CIDOC Conceptual Reference Model (CIDOC CRM*).* This joint work resulted in the development of a formulation using the same object-oriented modelling framework as the CIDOC CRM, of the FRBR model and the approval of this model as an official extension of the CIDOC CRM. This reformulation of FRBR, known as $FRBR_{OO}$ (FRBR object-oriented), was first approved in 2009 as version 1.0 which corresponded directly to the original FRBR model. With the subsequent publication of the FRAD and FRSAD models, $FRBR_{OO}$ was expanded to include the entities, attributes and relationships from the FRAD and FRSAD models, starting with $FRBR_{OO}$ version 2.0.

Inevitably the three FR models, although all created in an entity-relationship modelling framework, adopted different points of view and differing solutions for common issues. Even though all three models are needed in a complete bibliographic system, attempting to adopt the 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 definition 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, France and another in 2015 in Cape Town, South Africa.

A World-Wide Review of the FRBR-Library Reference Model was conducted from February 28 to May 1, 2016. The CEG held another meeting on May 19-23, 2016 to consider the responses and update the draft model. The FRBR Review Group considered that draft at a working meeting in 2016 in Columbus, Ohio, USA. At the 2016 meeting, the model was renamed the IFLA Library Reference Model (IFLA LRM).

The resulting model definition was approved by the FRBR Review Group (November 2016), and then made available to the Standing Committees of the Sections on Cataloguing and Subject Analysis & Access, as well as to the ISBD Review Group, for comment in December 2016. 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 IFLA 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 (CIDOC CRM SIG) who participated in the development of $FRBR_{OO}$ version 2.4 (which was taking place during the same time-frame) raised issues and provided significant reflections.

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Chapter 2 Methodology

2.1 Scope and Objectives

The IFLA Library Reference Model aims to be a high-level conceptual reference model developed within an enhanced 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 IFLA LRM model adopted 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 IFLA LRM model aims to make explicit general principles governing the logical structure of bibliographic information, without making 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 as such is within the scope of the model.

IFLA LRM takes its functional scope from the user tasks (see chapter 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 solely 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, data elements that are viewed as specialized or are specific to certain types of resources, are generally not represented in the model. Nevertheless, a few significant *expression* attributes specific to resources of certain types (such as the attributes *language*, *cartographic scale*, *key*, *medium of performance*) are included. This shows how the model can accommodate such expansion, as well as being relevant for the illustration of the application of the *work* attribute *representative expression attribute*. 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 IFLA LRM is a high-level conceptual model and as such is intended as a guide or basis on which to formulate cataloguing rules and implement bibliographic systems. 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 the cardinality constraints), and the attachment of those attributes implemented, needs to be respected.

Although the structural relationships between the entities *work*, *expression*, *manifestation*, and *item* are core to the model, the attributes and the other relationships declared in the model are not required for implementation. Should some attributes or relationships be omitted as unneeded in a particular application, the resulting system can still be considered an implementation of IFLA LRM. It is possible for a compatible implementation to omit one of the entities declared in IFLA LRM. For example, the entity *item* may be unneeded in a national bibliography that does not provide any *item*-level information. In that case, none of the attributes defined for the *item* entity, and none of the relationships involving the *item* entity, can be implemented. Similarly, if the existence of a given *work* is reflected in a given catalogue just because the library which produces that catalogue holds copies of studies about that *work*, but no copy of any edition of that *work*, there is no need to implement the structural relationships from *work* to *item* for that instance of the entity *work*.

IFLA LRM provides a number of mechanisms that permit the expansions that are likely to be needed in any actual implementation. The definition of a *category* attribute for the entity *res* permits implementations to create, for any of the entities, those subclasses 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 refinements. 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 IFLA LRM are intended to be compatible with the operationalization of the model through a variety of cataloguing codes. One case is the *work* attribute *representative expression attribute*, which records the values of those *expression* attributes considered essential in characterizing the *work*, 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 criteria that delimit instances of the *work* entity are not governed by the model. As a result, the model does not prescribe the level of adaptation required so that a given *expression* based on an existing *expression* should be regarded as just another *expression* of the same *work*, rather than as an *expression* of a distinct *work*. However, for the practical purpose of illustrating the model, examples are used which reflect generally accepted existing practice as to where these boundaries lie. For example, all translations of a given text are traditionally collocated, in library catalogues, under the same preferred title, which is an indication that in the implicit conceptualization of librarians, all translations are viewed as *expressions* of the same *work*; rights societies have a very different concept of “work”,

and regard each translation as a distinct “work”. At a conceptual level, the model accommodates both approaches equally, and is agnostic as to what “should” be done; but as this document is addressed to the community of librarians, it occasionally introduces the example of translations as *expressions*, since that example is assumed to be easily understood by its intended readers.

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. Maintaining a consistent viewpoint, or making an ontological commitment, requires that, at certain crucial points, only a single option among the conceivable alternatives can be considered compatible with the model. Developing a consistent, consolidated model 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 or had to have at least one relevant attribute 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 superclass 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. Whether an attribute is “monovalued” or “multivalued” (that is, whether the corresponding data element is considered repeatable or non-repeatable) 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 (Web Ontology Language) regards as “datatype properties”;
- an attribute can be represented as a Uniform Resource Identifier (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 as 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.

IFLA 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 will, for example, make the task of specifying namespaces for use with linked open data applications easier and reduce the potential for ambiguity. 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 consideration an integral part of the initial planning of presentation of the model definition.

The definition of the IFLA LRM model 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 IFLA Library Reference Model was being developed, a parallel process was taking place in the object-oriented definition of FRBR. $FRBR_{OO}$ 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 $FRBR_{OO}$ version 2.4 (approved in 2016). 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 IFLA LRM model. IFLA LRM aims to be a very general high-level model; it includes less detail compared to $FRBR_{OO}$, which seeks to be comparable in terms of generality with CIDOC CRM.

IFLA LRM, as its name indicates, remains a model issuing from the library community for library data. It does not presume to constrain other heritage communities in their conceptualization of the data relevant to their respective communities. Cross-community dialogue in the development of multi-domain ontologies is of great interest, and has potential for improved service to users. Establishing a single, consistent model of the library domain, such as IFLA LRM, provides a favourable and necessary prerequisite for any joint activity to develop any future common model.

IFLA 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 IFLA LRM, an overview of the major differences along with 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 IFLA 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—for example, some of the elements deprecated as being too granular might be implemented in an expansion). A frequent example of a

difference in modelling is the case of many former attributes, which in IFLA 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 IFLA LRM itself. Their main purpose is to assist in the transition of an existing application to IFLA LRM. The mappings are also of interest to anyone following the development over time of the IFLA conceptual models. The transition mappings will not be maintained to reflect any future development of the IFLA LRM model.

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 in Table 3.2 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 use the same data as end-users to 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. Rights metadata is only in scope insofar as it relates to the user's ability to carry out the *obtain* task.

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 user's ability to carry them out. In the description of the tasks, the term "resource" is used very broadly. It includes instances of any of the entities defined in the model, as well as actual library resources. This recognizes that library resources are what is most relevant from the end-user point of view.

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 all 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 allowing browsing without any particular information goal.

Table 3.1 User Tasks Summary	
Find	To bring together information about one or more resources of interest by searching on any relevant criteria
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 be enabled to either accept or reject specific resources
Obtain	To access the content of the resource
Explore	To discover resources using the relationships between them and thus place the resources in a context

3.3 User Tasks Definitions

Table 3.2 Definitions of User Tasks		
Task	**Definition**	**Comment**
Find	To bring together information about one or more resources of interest by searching on any relevant criteria	The *find* task is about searching. The user's goal is to bring together one or more instances of entities as the result of a search. The user may search using an attribute or relationship of an entity, or any combination of attributes and/or relationships. To facilitate this task, the information system seeks 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 instance of the entity described corresponds to the instance sought, or to distinguish between two or more instances 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 be enabled to either accept or reject 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 or limitations may involve aspects of content, intended audience, etc. To facilitate this task, the information system needs to **allow/support relevance judgements** by providing sufficient appropriate information about the resources found to allow the user to make this determination and act on it.
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 library resources selected. 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 and access information required to complete the transaction or any restrictions on access.
Explore	To discover resources using the relationships between them and thus place the resources 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 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.

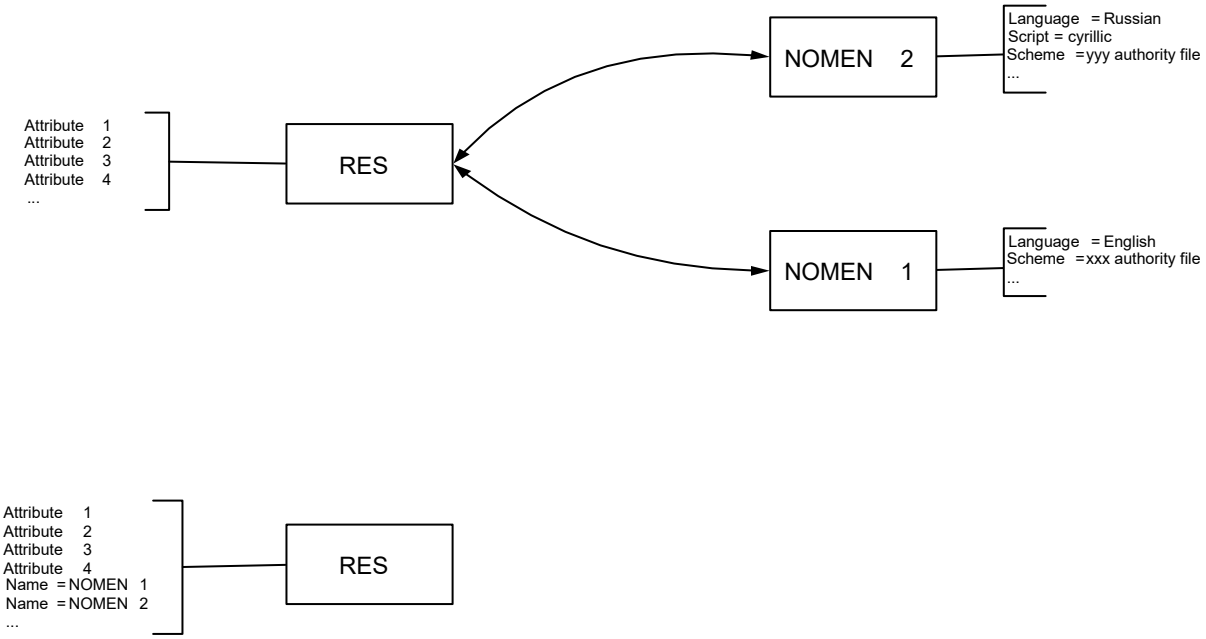
Chapter 4 Model Definition

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

- entities, the classes which are the focus of interest, described in section 4.1;
- attributes, the data which characterizes instances of entities, described in section 4.2;
- relationships, the properties which link instances of entities, described in section 4.3.

In entity-relationship models, the entities define the framework of the model and function as nodes, while relationships connect entities to each other. Attributes depend on entities and provide information about the entities. Figure 4.1 illustrates the functionality of these modelling elements using the options for modelling terms associated with *res*: either as entities or as attributes. The first model (the one adopted in LRM) shows that a single *res* may be related to two distinct instances of a *nomen* entity by appellation relationships, and all the entities have attribute values. The lower model shows the alternative of treating *nomens* as attributes of the *res* entity. In this case, values of the "name" attribute cannot have attributes in turn, and no relationships can be declared between these terms and any other entities in the model.

Figure 4.1 Alternative Entity-Relationship Models for *Nomens*



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. For attributes, the number of the entity for which the attribute is defined is inserted prior to the letter “A” (meaning attribute) and the sequential number of the attribute, the sequential numbering restarts under each entity. 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 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.

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 defined for each entity serve to further define its characteristics.

An entity is an abstract class 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 forms part of the structure of enhanced entity-relationship models and 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 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 something cannot be both an instance of the *person* entity and an instance of the *collective agent* entity. However, something is by nature both an instance of the *collective agent* entity and an instance of the *agent* entity. Similarly, something cannot be both an instance of the *manifestation* entity (an abstract entity which is a set) and an instance of the *item* entity (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 in section 4.1.3. 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, all 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*, a description of the instance of the *res* entity is given in curly braces ({ }), while a term representing an instance of the *nomen* entity is given in single quotes (' '). Additionally, where the distinction is necessary, straight double quotes (" ") indicate a value of the *nomen string* attribute of an instance of the *nomen* entity.

Table 4.2 Entities			
ID	**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 concepts. Everything considered relevant to the bibliographic universe, which is 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 labelled.	
	Examples	• {Homer's Odyssey} [ancient Greek *work*] • {Henry Gray's Anatomy of the human body} [medical *work* written in the 19th century by Henry Gray] • {Codex Sinaiticus} [manuscript containing, among others, the Christian Bible in Greek] • {Henry Gray} [*person*, physician, author of medical *works*] • {Agatha Christie} [*person*, author of detective novels] • {Miss Jane Marple} [character in numerous Agatha Christie novels and stories] • {Lassie} [fictional female dog of the Rough Collie breed, title character in the novel *Lassie come-home* by Eric Knight, first published in 1940, and appearing in numerous film and television spin-offs] • {Pal} [lived June 4, 1940-June 1958, a male dog of the Rough Collie breed who portrayed the character Lassie on film from 1943 to 1954 (several of Pal's male descendants portrayed Lassie in subsequent films and television shows)] • {Lassie} [female Collie crossbreed dog, living in Lyme Regis, UK, who on January 1, 1915 rescued a sailor presumed dead, considered the inspiration for the character Lassie] • {the International Federation of Library Associations and Institutions} [an association] • {the Romanov family} [the Russian imperial family] • {Italian-Canadians} [a group of people who are not a *collective agent*] • {Job} [the Biblical figure] • {Horus} [the ancient Egyptian deity] • {graduates of Queen's University between 1980-1990} [a group of people who are not a *collective agent*] • {anatomy} [a concept] • {the Tibetan script} [writing system used for the Tibetan language • {Eiffel Tower} [a man-made built structure] • {console table created by Giovanni Battista Piranesi in 1769 held by the Rijksmuseum, object number BK-1971-14} [a specific object] • {Paris, France} [a city] • {Atlantis} [a legendary continent] • {Earthsea} [a fictional world, the setting of Ursula K. Le Guin's	

Table 4.2 Entities			
		Earthsea trilogy] • {the 1920s} [a *time-span*] • {the Battle of Hastings} [an event] • {horses} [a species of mammal] • {the racehorse Seabiscuit} [a specific, named animal]	
ID	**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 grouping of *expressions* that are considered functional equivalents or near equivalents. A *work* is a conceptual object, no single material object can be identified as the *work*. 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* is perceived through the identification of the commonality of content between and among various *expressions*. However, similarity of factual or thematic content alone is not enough to group several *expressions* as realizing the same instance of *work*. For example, two textbooks both presenting an introduction to calculus, or two oil paintings of the same view (even if painted by the same artist), would be considered distinct *works* if independent intellectual or artistic effort was involved in their creation. In the case of aggregating *works* and serial *works*, the essence of the *work* is the concept or plan for the selection, assembly and ordering of the *expressions* of other *works* to be embodied in the resulting aggregate *manifestation*. 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 content identified with an instance of *work* can evolve as new *expressions* of it are created. Bibliographic and cultural conventions play a crucial role in determining the exact boundaries between similar instances of *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	

Table 4.2	Entities	
		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 usually 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*} • {Eric Knight's *Lassie come-home*} • {*Lassie come home*} [film, first release 1943] • {Ursula K. Le Guin's *The Earthsea trilogy*} • {Ursula K. Le Guin's *The tombs of Atuan*} [a novel which is part of the *Earthsea trilogy*] • {René Goscinny and Albert Uderzo's *Astérix le Gaulois*} [a collaboratively created *work* in which Goscinny wrote the text and Uderzo created the drawings] • {Johann Sebastian Bach's *The art of the fugue*} • {Wolfgang Amadeus Mozart's *Piano sonata KV 281 in B flat major*} • {Wolfgang Amadeus Mozart's *Rondo KV 494*} • {Johannes Brahms's *String quartet Op. 51 n. 1 in C minor*} • {*IFLA Journal*} • {*IFLA series on bibliographic control*} [a monographic series, an aggregating *work*] • {François Truffault's *Jules et Jim*} • {*Microsoft Excel*} • {The Dewey Decimal Classification (DDC)} • {WebDewey} [software for displaying and searching the DDC, created by Pansoft GmbH] • {The Ordnance Survey's *1:50 000 Landranger series*} • {Auguste Rodin's *The thinker*} • {Raoul Dufy's *Racecourse in Epsom*} • {Barnett Newman's *Voice of fire*} • {*I want to hold your hand*} [a song by John Lennon and Paul McCartney]

Table 4.2 Entities			
ID	**Name**	**Definition**	**Constraints**
LRM-E3	Expression	A distinct combination of signs conveying intellectual or artistic content	Superclass: *res* The entities *work*, *expression*, *manifestation*, *item* are disjoint
	Scope notes	An *expression* is a distinct combination of signs of any form or nature (including visual, aural or gestural signs) intended to convey intellectual or artistic content and identifiable as such. The term "sign" is intended here in the meaning used in semiotics. 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. An *expression* comes into existence simultaneously with the creation of its first *manifestation*, no *expression* can exist without there being (or there having been at some point in the past) at least one *manifestation*. 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., comprehensive databases of early printed texts, complete listings of the states of prints), each variation may be viewed as a different *expression*.	

Table 4.2	Entities		
		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 conventions or instruments that are employed to express a *work* (e.g., translation of a textual *work* 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 variations 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. *(Further discussion of aggregates resulting from augmentation is found in section 5.7, Modelling of Aggregates.)*	
	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*] • Large scale version realized by the fonderie Alexis Rudier in 1904 of Auguste Rodin's *The thinker* [Rodin's first version in 1880 is approximately 70 cm in height; this 1904 version is 180 cm in height] • Dewey Decimal Classification, 23rd edition (DDC23) [English edition] • Classification décimale de Dewey, 23e édition [French translation of DDC23] • Vocal score of Giuseppe Verdi's *Macbeth* • A recording of a specific performance by the Amadeus Quartet and Hephzibah Menuhin on piano of Franz Schubert's *Trout quintet* • The musical notation of John Lennon and Paul McCartney's song *I want to hold your hand*	
ID	**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	Superclass: *res* The entities *work*, *expression*, *manifestation*, *item* are disjoint

Table 4.2	Entities		
		carrier or carriers	
	Scope notes	A *manifestation* results from the capture of one or more *expressions* onto 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 different end-users. Whatever storage media is used, the downloaded files are instances of the same *manifestation* as the online file. Production processes cover the range from formal industrial processes to artisanal or artistic processes. A production process may result in a set of multiple *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 for holograph manuscripts, many artisanal or artistic productions or reproductions for preservation purposes, 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 signalled 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.* On a practical level, the degree to which distinctions between *manifestations* are recorded will depend to some extent on the

Table 4.2	Entities	
		anticipated needs of users and on the differences that the cataloguer can reasonably be expected to recognize. Certain minor variations or differences in packaging may not be considered bibliographically significant and will not warrant the recognition of 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 (damage, wear and tear, the loss of a page, repairs, rebinding into multiple volumes, 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. However, when multiple *items* from different *manifestations* are physically combined or joined (books or pamphlets bound together, audio tapes spliced together, etc.) the result is a new singleton *manifestation.*
	Examples	• *The Odyssey of Homer / translated with an introduction by Richmond Lattimore*, first Harper Colophon edition published in the Perennial library series, in New York by Harper & Row in 1967, ISBN 0-06-090479-8 [*manifestation* containing the complete text of Richmond Lattimore's English translation of the Greek poem] • Homer. *The Odyssey / translated by Robert Fagles*, Penguin Classics, Deluxe edition published in New York by Penguin Books in 1997, ISBN 0-670-82162-4 [*manifestation* containing the complete text of Robert Fagles' English translation of the Greek poem] • *Vieux-Québec / textes de Guy Robert ; gravures d'Albert Rousseau* published in Montréal by Editions du Songe and Iconia in 1982 [*manifestation* of a collaborative *work* consisting of text and engravings] • *Seabiscuit: an American legend / Laura Hillenbrand* published in New York by Random House in 2001, ISBN 978-0-375-50291-0 [*manifestation* of the story of the racehorse Seabiscuit] • *They do it with mirrors / Agatha Christie* published in the UK by William Collins & Sons in 1952 [a *manifestation* of a detective novel] • *Murder with mirrors / Agatha Christie* published in the US by Dodd, Mead & Co. in 1952 [another *manifestation* of the same detective novel, published in a different country with a different title] • *The Oxford book of short stories* / *chosen by V.S. Pritchett* published in New York by Oxford University Press in 1981, ISBN

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		0-19-214116-3 [an aggregate *manifestation* embodying both an aggregating *expression* which is the intellectual work of the compiler, V.S. Pritchett, and the selected *expressions* of 41 short stories by various authors] • *Voice of fire*, acrylic on canvas, painted by Barnett Newman in 1967 [singleton *manifestation*] • *Codex Sinaiticus*, original manuscript [singleton *manifestation*]	
ID	**Name**	**Definition**	**Constraints**
LRM-E5	Item	An object or objects carrying signs 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 characteristics that define the *manifestation* itself. An *item* is in many instances a single physical object, but in other cases an *item* may consist of 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	• The manuscript known as the *Codex Sinaiticus* • The manuscript known as the *Book of Kells* • Bronze cast realized by the fonderie Alexis Rudier in 1904 of Auguste Rodin's *The thinker* held at the Musée Rodin in Paris, France since 1922, ID number S. 1295 • 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 • *Voice of fire*, acrylic on canvas, painted by Barnett Newman in 1967, owned by the National Gallery of Canada since 1989 • Library of Congress Copy 2 of Homer. *The Odyssey / translated by Robert Fagles*, Penguin Classics, Deluxe edition published in New York by Penguin Books in 1997, ISBN 0-670-82162-4 • Peter Jackson's personal copy of *The lord of the rings. The two towers*, Special extended DVD edition, published in 2003, ISBN 0-7806-4404-2 [a 4-disc set with 2 booklets] • The ebook *Pop Culture* by Richard Memeteau, published by Zones in 2014 and distributed by Editis in EPUB2 format, ISBN 978-2-35522-085-2, received by the National Library of France through digital legal deposit on 1st February 2016 to which the legal deposit number DLN-20160201-6 has been assigned. In the catalogue, this *item* is identified with a unique number: LNUM20553886	

Table 4.2 Entities			
ID	**Name**	**Definition**	**Constraints**
LRM-E6	Agent	An entity capable of deliberate actions, of being granted rights, and of being held accountable for its actions	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 entity 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 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 Andersen} • {Queen Victoria} • {the Borromeo family} • {BBC Symphony Orchestra} • {Symposium on Glaucoma}	
ID	**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 (for example, Kermit the Frog), literary (for example, Miss Jane Marple) or purely legendary (for example, the wizard Merlin) are not instances of the entity *person*.	
	Examples	• {Pythagoras} • {Marco Polo} • {Homer} • {Henry Gray} • {Agatha Christie} • {Richmond Lattimore} • {Robert Fagles}	

Table 4.2 Entities			
		• {John I of France, King of France and Navarre} [King from his birth on November 15, 1316 to his death five days later on November 20] • {Johann Sebastian Bach} • {Raoul Dufy} • {the person referred to through the real name 'Charles Dodgson' and the pseudonym 'Lewis Carroll'} [author and mathematician]	
ID	**Name**	**Definition**	**Constraints**
LRM-E8	Collective Agent	A gathering or organization of *persons* bearing a particular name and capable of 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 have the potential of acting 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, governments, and any of their sub-units. 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. Joint pseudonyms or collective pseudonyms are *nomens* that refer to instances of the *collective agent* entity as the *agent* behind the identity consists of two or more *persons* bearing a particular name and acting as a unit, despite having chosen to be identified by a name culturally associated with individual *persons*. *(Further discussion of individual, collective or joint pseudonyms is found in section 5.5, Modelling of Bibliographic Identities.)* 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). These collective actions may be performed by representatives selected by the whole, rather than by all individual members acting together. Groups of *persons* that do not qualify as *agents* (for example, national, religious, cultural or ethnic groups, such as Italian-Canadians, or 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	

Table 4.2	Entities		
		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	• {the International Federation of Library Associations and Institutions} [an association] • {81st World Library and Information Conference, held 15-21 August 2015 in Cape Town, South Africa} [a conference] • {Bibliothèque nationale de France} [the national library of France] • {Friends of the Library} [the "Friends" organization at North Carolina State University] • {Pansoft GmbH} [a company] • {the musical group referred to as 'The Beatles'} • {City of Ottawa} [a municipal government] • {Canada} [the nation, not the physical territory] • {the office of Prime Minister of Canada, held successively by individual incumbents} • {the Franciscan Order} [a monastic order] • {the parish of St. Paul's Cathedral in London, United Kingdom} [an administrative subdivision of a diocese] • {the royal house of the Medici} • {the Bach family of musicians} • {the publishing company referred to as 'Random House'} • {the group of 20th century French mathematicians publishing under the collective pseudonym 'Nicolas Bourbaki', and also known as the 'Association des collaborateurs de Nicolas Bourbaki'} • {the two cousins who used the joint pseudonym 'Ellery Queen' when publishing together in the field of detective fiction, and who were also known separately under the names 'Frederic Dannay' and 'Manfred Bennington Lee'} • {the two women who published together using the joint pseudonym 'Virginia Rosslyn', and who never published under their real names 'Isabelle A. Rivenbark' and 'Claire D. Luna'}	
ID	**Name**	**Definition**	**Constraints**
LRM-E9	Nomen	An association between an entity and a designation that refers to it	Superclass: *res*
	Scope notes	A *nomen* associates whatever appellation (i.e., combination of signs) is used to refer to an instance of any entity found in the bibliographic universe with that entity. Any entity referred to in the universe of discourse is named through at least one *nomen*. An arbitrary combination of signs or symbols cannot be regarded as an appellation or designation until it is associated with something in some	

Table 4.2	Entities	
		context. In that sense, the *nomen* entity can be understood as the reification of a relationship between an instance of *res* and a string. The string itself does not constitute an instance of the *nomen* entity but is modelled as the value of the *nomen string* attribute of an instance of the *nomen* entity. Two instances of the *nomen* entity can have perfectly identical values for their *nomen string* attribute and yet remain distinct, as long as they either refer to distinct instances of the *res* entity, or have distinct values for one or more of their other attributes (while referring to the same instance of the *res* entity). A *nomen* associates a combination of signs with an instance of an entity on the basis of a cultural or linguistic convention: by associating a *nomen string* with a *res*, the *nomen* establishes a meaning that is not inherent in the *nomen string* itself. Depending on context of use, *nomens* having identical values for their *nomen string* attribute can involve instances of different entities in the real world even within the same language (polysemy and homonymy). Conversely, the same instance of an entity can be referred to through any number of *nomens* (synonymy). In the controlled environment of a bibliographic information system, though, synonymy is avoided and the *nomen string* attribute values of *nomens* would generally be disambiguated, so that each *nomen string* is associated with only one instance of the *res* entity within the specific scheme. The identity of a *nomen* is determined by the combination of the *res* it involves, the choice and order of the symbols used within its *nomen string* attribute, and the values of all of its other attributes. Variation in the symbols used (such as transliteration into another script) or variation in their ordering usually results in a different *nomen*, but variation in the visual representation of the symbols present in the *nomen string* attribute value (such as different fonts that may be used to present alpha-numeric or character strings) does not result in a different *nomen string*. *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 string* attribute value may follow predetermined rules. A *nomen string* attribute value may consist of components or parts. In this case, the corresponding *nomen* can be viewed as being derived from two or more pre-existing *nomens*, and this derivation process 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). For example, a new *nomen* for a *person* may be derived by combining a pre-existing *nomen* for that *person* and a *nomen* for the *time-span* of that *person's* lifetime; similarly, a new *nomen* for a *work* may be derived by combining a *nomen* for a *person* who authored that *work,* and a pre-existing *nomen* for that *work*.

Table 4.2	Entities	
	Examples	<u>*Nomens* for a *person*</u>: • 'Agatha Christie' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} • 'Agatha Mary Clarissa Miller' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} • 'Lady Mallowan' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} • 'Mary Westmacott' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} • 'Christie, Agatha, 1890-1976' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} [preferred access point according to RDA for her detective novels and stories] • 'Westmacott, Mary, 1890-1976' as a way of referring to {the *person* Dame Agatha Christie, Lady Mallowan} [preferred access point according to RDA for her romance novels] <u>*Nomens* for an international organization in several languages:</u> • 'United Nations' as a way of referring to {the *collective agent* United Nations} in English • 'Nations Unies' as a way of referring to {the *collective agent* United Nations} in French • 'Nazioni Unite' as a way of referring to {the *collective agent* United Nations} in Italian • 'Vereinigte Nationen' as a way of referring to {the *collective agent* United Nations} in German <u>*Nomens* for a *work*:</u> • 'Christie, Agatha, 1890-1976. Murder with mirrors' as a way of referring to {the *work Murder with mirrors* by Agatha Christie} [preferred access point in the LC/NACO authority file] • 'Christie, Agatha, 1890-1976. They do it with mirrors' as a way of referring to {the *work Murder with mirrors* by Agatha Christie} [variant access point in the LC/NACO authority file] <u>*Nomens* for a musical *work*:</u> • 'Brahms, Johannes, 1883-1897. Quartets, violins (2), viola, cello, no. 1, op. 51, no. 1, C minor' as a way of referring to {Johannes Brahms's *work String Quartet No. 1*} [preferred access point according to RDA in the LC/NACO authority file] • 'Brahms, Johannes, 1883-1897. Quartets, strings, no. 1, op. 51, no. 1, C minor' as a way of referring to {Johannes Brahms's *work String Quartet No. 1*} [variant access point in the LC/NACO authority file] <u>*Nomens* for a musical *work*:</u> • 'Schubert, Franz, 1797-1828. Sonatas, piano, D. 959, A major' as a way of referring to {Franz Schubert's *work Piano Sonata D. 959*} [preferred access point according to RDA in the LC/NACO authority file]

Table 4.2	Entities	
		• 'Schubert, Franz, 1797-1828. Sonates. Piano. D 959. La majeur' as a way of referring to {Franz Schubert's *work Piano Sonata D. 959*} [preferred access point in the BnF authority file] *Nomens* for the one day *time-span* 2015-03-01: • 'March 1, 2015' as a way of referring, in English and within the Gregorian calendar scheme, to the *time-span* that elapsed between zero o'clock on the 1st of March 2015 and midnight on the 1st of March 2015 • '1 marzo 2015' as a way of referring, in Italian and within the Gregorian calendar scheme, to the *time-span* that elapsed between zero o'clock on the 1st of March 2015 and midnight on the 1st of March 2015 • '01/03/2015' as a way of referring, in the DD/MM/YYYY notation convention and within the Gregorian calendar scheme, to the *time-span* that elapsed between zero o'clock on the 1st of March 2015 and midnight on the 1st of March 2015 • '10 adar 5775' as a way of referring, in Romanized Hebrew and within the Hebrew calendar scheme, to the *time-span* that elapsed between zero o'clock on the 1st of March 2015 and midnight on the 1st of March 2015 • '1936 Phalguna 10' as a way of referring, in Romanized Hindi and within the Indian civil calendar scheme, to the *time-span* that elapsed between zero o'clock on the 1st of March 2015 and midnight on the 1st of March 2015 *Nomens* for a subject concept: • 'Music' as a way of referring to music in LCSH [valid term in LCSH] • '780' as a way of referring to music in the DDC [classification number for the topic {music} in DDC] • 'Music' as a way of referring to music in LCGFT [valid genre term in LCGFT] *Nomens* in the form of identifiers: • '978-0-375-50291-0' within the ISBN scheme [ISBN for the *manifestation*: *Seabiscuit: an American legend / Laura Hillenbrand* published in 2001 by Random House] • '0000 0001 2102 2127' within the ISNI scheme [ISNI for the identity {Agatha Christie}] • '0000 0003 6613 0900' within the ISNI scheme [ISNI for the identity {Mary Westmacott}] *Nomens* and the notions of polysemy and homonymy: • 'Lusitania' as a way of referring to the ancient Roman province that corresponds to current Portugal and part of current Spain in the Iberian Peninsula • 'Lusitania' as a way of referring to the British luxury liner that was sunk by a German submarine in the North Atlantic on May 7, 1915

Table 4.2 Entities			
		• 'Verve' as a way of referring to {the record label Verve} • 'Verve' as a way of referring to {the periodical *Verve*} • 'Verve' as a way of referring to {the rock music band Verve} • 'Verve' as a way of referring to {the notion of vivacious eloquence} in the English language • 'Verve' as a way of referring to {the notion of vivacious eloquence} in the French language	
ID	**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. The *place* as an extent of space is distinct from any governing bodies that exercise jurisdiction in that territory. The government responsible for a territory is a *collective agent*. *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)} [area culturally identified as a *place* although the central city has absorbed adjacent towns throughout its history] • {Lutèce} • {Clonmacnoise} [area where the ruins of the destroyed monastery of Clonmacnoise are still to be seen] • {Greenland} • {Italy} • {Africa} • {St. Lawrence River} • {Lake Huron} • {Mars}	
ID	**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	

Table 4.2	Entities	
		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 took place during only a portion of the year. The information available to the cataloguer, or the inherent characteristics of the *time-span* being identified, will be reflected in the degree of precision used in recording of a temporal extent. For example, '14th century' may be sufficiently precise in recording the beginning of the Renaissance, while a decade may be more appropriate when identifying the beginning of a musical style. 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	• {the period of time beginning on 1st January 2015, ending on 31 December 2015, and having a duration of one year} [may be referred to as '2015 A.D.' (using *Anno Domini*) or as '2015 CE' (using 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 million years before present] • {488.3 million years before present} [*time-span* of the beginning of the Ordovician period] • {Ming Dynasty} • {Bronze Age} [a *time-span* although the exact time covered will vary depending on location] • {Age of Enlightenment}

4.2 Attributes

4.2.1 Introduction

Attributes characterize specific instances of an entity. None of the attributes defined in the model are **required** for any given instance of an entity, but 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, but 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. Such attributes are termed multivalued.

The attributes presented 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 included here. However, the listing of an attribute in the model is not intended in any way to imply that these attributes are 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 subclassing 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 Hierarchy Structure for Attributes

Table 4.3 below summarizes in a concise tabular form the attributes defined in the model. Following the entity hierarchy structure (shown in full in Table 4.1 in section 4.1.2), attributes may also feature hierarchy. In particular, the *category* attribute of the entity *res* is sub-typed to provide *category* attributes for certain subclass entities of *res*. These are the only attributes defined at the lower level in the model, and are given in the fourth column of the table. All the other attributes are at the same level and are given in the third column. In an expansion of the model, additional lower-level attributes may be defined. In this table, the third level entity *person* is shown in the same column as the second level entities (the entity *collective agent* is not shown as it does not have any defined attributes). The full definitions of all the attributes are given in Table 4.4 (Attributes) in section 4.2.4.

Table 4.3 Attribute Hierarchy			
Entity Top Level	**Entity Lower Levels**	**Attribute Top Level**	**Attribute Lower Level**
LRM-E1 Res		LRM-E1-A1 Category	
--	LRM-E2 Work	--	LRM-E2-A1 Category
--	LRM-E3 Expression	--	LRM-E3-A1 Category
--	LRM-E4 Manifestation	--	LRM-E4-A1 Category of carrier
--	LRM-E9 Nomen	--	LRM-E9-A1 Category
--	LRM-E10 Place	--	LRM-E10-A1 Category
LRM-E1 Res		LRM-E1-A2 Note	
--	LRM-E2 Work	LRM-E2-A2 Representative expression attribute	
--	LRM-E3 Expression	LRM-E3-A2 Extent	
--	LRM-E3 Expression	LRM-E3-A3 Intended audience	
--	LRM-E3 Expression	LRM-E3-A4 Use rights	
--	LRM-E3 Expression	LRM-E3-A5 Cartographic scale	
--	LRM-E3 Expression	LRM-E3-A6 Language	
--	LRM-E3 Expression	LRM-E3-A7 Key	
--	LRM-E3 Expression	LRM-E3-A8 Medium of performance	
--	LRM-E4 Manifestation	LRM-E4-A2 Extent	
--	LRM-E4 Manifestation	LRM-E4-A3 Intended audience	
--	LRM-E4 Manifestation	LRM-E4-A4 Manifestation statement	
--	LRM-E4 Manifestation	LRM-E4-A5 Access conditions	
--	LRM-E4 Manifestation	LRM-E4-A6 Use rights	
--	LRM-E5 Item	LRM-E5-A1 Location	
--	LRM-E5 Item	LRM-E5-A2 Use rights	
--	LRM-E6 Agent	LRM-E6-A1 Contact information	
--	LRM-E6 Agent	LRM-E6-A2 Field of activity	
--	LRM-E6 Agent	LRM-E6-A3 Language	
--	-- LRM-E7 Person	LRM-E7-A1 Profession / Occupation	
--	LRM-E9 Nomen	LRM-E9-A2 Nomen string	
--	LRM-E9 Nomen	LRM-E9-A3 Scheme	
--	LRM-E9 Nomen	LRM-E9-A4 Intended audience	
--	LRM-E9 Nomen	LRM-E9-A5 Context of use	
--	LRM-E9 Nomen	LRM-E9-A6 Reference source	
--	LRM-E9 Nomen	LRM-E9-A7 Language	
--	LRM-E9 Nomen	LRM-E9-A8 Script	
--	LRM-E9 Nomen	LRM-E9-A9 Script conversion	
--	LRM-E10 Place	LRM-E10-A2 Location	
--	LRM-E11 Time-span	LRM-E11-A1 Beginning	
--	LRM-E11 Time-span	LRM-E11-A2 Ending	

4.2.3 Remarks on the Attributes of the Entity Res

Category attribute: As the *category* attribute is declared for the entity *res*, it automatically can be sub-typed to apply to any entity. Due to the significant use cases for categorization of certain entities, some entity-specific sub-types of the general *category* attribute are declared in the model and given their own attribute numbers. This does not imply that the general *category* attribute cannot be sub-typed under the other entities, if considered useful by an application. *Category* attributes 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 subclasses 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, as 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 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 instead of as a specific structured attribute or relationship.

4.2.4 Attributes Detailed Definition

Each attribute declared in the model is described in Table 4.4 below. 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. Attributes are numbered sequentially within each entity; for example, the attributes of the entity *expression* (numbered LRM-E3 in Table 4.2) are numbered from LRM-E3-A1 to LRM-E1-A8. The order of presentation of attributes within each entity is as follows: the *category* attribute (if specifically declared 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 present, 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.

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 multivalued, although Table 4.4 does not explicitly state which are and which are not. For example, multiple independent categorization schemes may be applied to *works*; however, when categorized with respect to termination intention, the respective definitions dictate that an instance of a *work* cannot be both a monograph and a serial at the same time.

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 for completeness). A majority of the examples are taken from actual databases, or from existing authoritative documentation (such as the *UNIMARC Manual),* using versions in force 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 MARC 21, 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. In the MARC examples, the following display conventions have been adopted: the field tag is shown preceding the indicators and subfield contents; a value of 'blank' in an indicator is shown with the hash mark (#); display spaces are shown both before and after subfield codes.

To distinguish between an instance of the entity *nomen* and the value of the *nomen string* attribute for a given instance of *nomen*, the following notation convention is adopted: single quotes (' ') indicate an instance of the *nomen* entity*,* while straight double quotes (" ") indicate a value of the *nomen string* attribute of an instance of the *nomen* entity.

Table 4.4 Attributes

ID	Entity	Attribute	Definition
LRM-E1-A1	RES	Category	A type to which the *res* belongs
	Scope notes		
	Examples	• object • work • concept • event • family • corporate body	
ID	**Entity**	**Attribute**	**Definition**
LRM-E1-A2	RES	Note	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] • Fourth manned mission in the Apollo program. [part of general *note* on an object, namely the Apollo 10 spacecraft, in the Library of Congress Authorities] • 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*]	

Table 4.4 Attributes			
		• 317 ## $a Inscription on the title page in sixteenth century hand, 'Iohannes Wagge me iure tenet' $5 DB/S-5-KK.555 [*note* on ownership history of an *item* as expressed in a UNIMARC field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E2-A1	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 <u>Categorization as to creative domain:</u> • literature • music • fine arts <u>Categorization as to form / genre:</u> • novel • play • poem • essay • symphony • concerto • sonata • fnk [UNIMARC code for: funk] • sou [UNIMARC code for: soul music] • drawing • painting • photograph	
ID	**Entity**	**Attribute**	**Definition**
LRM-E2-A2	WORK	Representative expression attribute	An attribute which is deemed essential in characterizing the *work* and whose values are taken from a representative or canonical *expression* of the *work*
	Scope notes	Generally, the *representative expression attribute* will be typed and the types chosen will vary depending on the context of use (as given by the cataloguing rules, the nature of catalogue, or the category of *work*). Each of the attributes chosen may itself be multivalued. The values of these attributes are inferred either	

Table 4.4	Attributes		
		from particular *expressions* considered to best represent the *work*, or from characteristics abstracted from a more or less nebulous network of similar *expressions*. There is no requirement to precisely identify an *expression* or *expressions* which serves as source for the values of the *representative expression attributes*, nor does that *expression* need to be recorded in the case where it is identified. *(For additional discussion of the function of this attribute in the model, see section 5.6, Representative Expression Attributes.)*	
	Examples	For textual *works*: • Language: English • Intended audience: children For musical *works*: • Key: B flat minor • Medium of performance: violin For cartographic *works*: • Cartographic scale: 1:10,000 • Projection: Albers equal-area conic projection For moving image *works*: • Aspect ratio: 16:9 • Colourization: hand-colouring For art *works*: • Medium of execution: sculpture	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A1	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, - state of development, - 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	

Table 4.4 Attributes			
		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/contentform/T1009 Categorization as to state of development 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: • vocal score • piano conductor part • etc. Categorization (applicable to content type of notated music) as to musical notation used, expressed in natural language, in English: • graphic notation • neumatic notation • etc.	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A2	EXPRESSION	Extent	A quantification of the extent of the *expression*
	Scope notes	The value of the *extent* attribute consists 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.). The type of extent and the measurement unit may be given implicitly. The level of precision used in recording the quantification of the extent may vary.	
	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 MARC 21 field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A3	EXPRESSION	Intended audience	A class of users for which the *expression* is intended
	Scope notes	The *intended audience* attribute can characterize a given *expression* by indicating groups of end-users for which *expressions* with those features are deemed particularly	

Table 4.4	**Attributes**		
		appropriate: - categorization as to age group, - categorization as to sensory impairment, - categorization as to educational level, - categorization as to occupational group, - etc.	
	Examples	<u>Categorization as to age group:</u> • children • young adults • adults <u>Categorization as to sensory impairment:</u> • users able to read braille • users needing a visual description • users needing closed captioning <u>Categorization as to educational level:</u> • primary • secondary	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A4	EXPRESSION	Use 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**	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A5	EXPRESSION	Cartographic scale	A ratio of distances in a cartographic *expression* to the actual distances they represent
	Scope notes	The *cartographic scale* attribute is specific to *expressions* of cartographic *works*. The *cartographic scale* attribute may apply to horizontal, vertical, angular, and/or other distances represented in the *expression*.	

Table 4.4 Attributes			
	Examples	• Scale 1 : 10,000 [*cartographic scale* expressed in natural language, in English] • 034 1# ‡a a ‡b 100000 [*cartographic scale* expressed in normalized form in a MARC 21 field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A6	EXPRESSION	Language	A language used in the *expression*
	Scope notes	The *language* attribute is specific to *expressions* consisting solely or partially of linguistic signs (either sonic or in notated form). The *language* attribute of the *expression* may include a number of languages, each pertaining to an individual component of the *expression*.	
	Examples	• it [*language* Italian expressed as an ISO 639-1 code] • bre [*language* Breton 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* Zulu expressed as a URI]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A7	EXPRESSION	Key	A pitch structure (musical scale, ecclesiastic mode, raga, maqam, etc.), that characterizes the *expression*
	Scope notes	The *key* attribute is specific to *expressions* of musical *works*. The term “key” is broadly defined to encompass various musical traditions. This attribute is not restricted to Western art music.	
	Examples	• C major [*key* expressed in natural language, in English] • 128 […] $d dm [*key* of D minor 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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E3-A8	EXPRESSION	Medium of performance	A combination of performing tools (voices, instruments, ensembles, etc.) stated, intended, or actually used in the *expression*

Table 4.4	Attributes		
	Scope notes	The *medium of performance* attribute is specific to *expressions* of musical *works*. The value of the *medium of performance* attribute includes 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.).	
	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# ‡a trumpet ‡n 2 ‡a trombone ‡n 2 ‡s 4 [*medium of performance* expressed in a MARC 21 field] • 146 0# $a b $c 01svl#### $c 01kpf#### $i 002a [*medium of performance* of instrumental music, violin and piano, two performers expressed as codes in a UNIMARC field] • http://id.loc.gov/authorities/performanceMediums/mp2013015841 [*medium of performance* of solo vocal ensemble 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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A1	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 (e.g., sheet), - categorization as to physical material employed in manufacturing the carriers (e.g., plastic), - categorization as to the physical material that is applied to the base material of the carriers (e.g., oil paint),	

Table 4.4	Attributes		
		- categorization as to the means used to record notation, sound, or images in the production of a *manifestation* (e.g., analogue), - etc. The carrier for a *manifestation* consisting of 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	<u>Categorization as to general type of carrier, expressed in natural language, in English:</u> • sound cassette • videodisc • microfilm cartridge • transparency <u>Categorization as to physical material employed in manufacturing the carriers:</u> • paper • wood • plastic • metal <u>Categorization as to the physical material that is applied to the base material of the carriers:</u> • oil paint [applied to canvas] • chemical emulsion [applied to a film base] <u>Categorization as to the means used to record notation, sound, or images in the production of a *manifestation*:</u> • analogue • acoustic • electric • digital • optical	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A2	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 consists 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.). The type of extent and the measurement unit may be given	

Table 4.4 Attributes			
		implicitly. The level of precision used in recording the quantification of the extent may vary.	
	Examples	• 300 ## $a 301 p., [8] p. of plates [number of pages, recorded according to AACR2 and expressed in a MARC 21 subfield] • 215 ## $a 1 score (vi, 63 p.) $d 20 cm $a 16 parts $d 32 cm $e 1 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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A3	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* by indicating groups of end-users for which *manifestations* with those features are deemed particularly appropriate: - categorization as to sensory impairment (visual impairment, hearing impairment, etc.), - categorization as to specialized carriers for specific audiences (young children, etc.), - etc.	
	Examples	<u>Categorization as to sensory impairment:</u> • users able to read regular print • users needing large print • users needing easy-to-read fonts for dyslexics <u>Categorization as to specific audiences:</u> • board books for young children • bath books for young children	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A4	MANIFESTATION	Manifestation statement	A statement appearing in exemplars of 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 present in exemplars of 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	

Table 4.4 Attributes			
		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. 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, including reference to a fictitious place of publication ("at Pluto's, at the gates of Hell"), and 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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A5	MANIFESTATION	Access conditions	Information as to how any of the carriers of the *manifestation* are likely to be obtained
	Scope notes	The *access conditions* attribute includes: - System requirements, - Mode of access, - etc.	
	Examples	• 538 ## ‡a System requirements: IBM 360 and 370; 9K bytes of internal memory; OS SVS and OSMVS. [system requirements expressed in a MARC 21 field] • 538 ## ‡a Blu-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 MARC 21 field] • 538 ## ‡a PSP (PlayStation portable); region 1; wi-fi	

Table 4.4 Attributes			
		compatible. [system requirements for a video game expressed in a MARC 21 field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E4-A6	MANIFESTATION	Use rights	A class of use and/or access restrictions to which all carriers of the *manifestation* are assumed to be submitted
	Scope notes	The *use rights* attribute includes: - Terms of availability, - Access restrictions, - etc. The *use rights* may be granted directly by the publisher, or be imposed by the publisher as transmitted via the library's contracted rights or license agreement. This is often the case for rights associated with digital objects.	
	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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E5-A1	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 end-users in obtaining the *item*.	
	Examples	• 252 ## $a DLC $b Manuscript Division $c James Madison Memorial Building, 1st & Independence Ave., S.E., Washington, DC USA $f 4016 [*location* as expressed in a UNIMARC field] • 852 01 $a ViBlbV $b Main Lib $b MRR $k Ref $h HF5531.A1 $i N4273 [*location* as expressed in a MARC 21 field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E5-A2	ITEM	Use rights	A class of use and/or access restrictions to which the *item* is submitted
	Scope notes		
	Examples	• Film restricted to classroom use. [*rights* expressed in natural language, in English] • In-library use only. [*rights* associated with a copy housed in a reference collection, expressed in natural language, in English]	

Table 4.4 Attributes			
ID	**Entity**	**Attribute**	**Definition**
LRM-E6-A1	AGENT	Contact information	Information useful for communicating with or getting in contact with the *agent*
	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 for the *collective agent* IFLA, expressed in natural language, in French]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E6-A2	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*, music, expressed as a Dewey classification number] • journalisme [*field of activity*, journalism, expressed as a RAMEAU term] • art history [*field of activity* expressed as a Getty Art and Architecture Thesaurus (AAT) term]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E6-A3	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 ## $a eng $a fre[…] [*languages* English and French used by Samuel Beckett for the creation of original content, expressed as codes in INTERMARC subfields] • 041 ## […] $t eng $t fre [*languages* English and French used by Samuel Beckett as source languages of translation, expressed as codes in INTERMARC subfields] • http://id.loc.gov/vocabulary/iso639-1/zu [*language* Zulu expressed as a URI]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E7-A1	PERSON	Profession / Occupation	A profession or occupation in which the *person* works or worked
	Scope notes		

Table 4.4 Attributes			
	Examples	• librarian [a *profession* expressed in natural language, in English]	
	COLLECTIVE AGENT	***No attributes restricted to this entity, see* agent *for relevant attributes***	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A1	NOMEN	Category	A type to which the *nomen* belongs
	Scope notes	*Nomens* may be categorized in terms of: - the type of thing named (personal name, *work* title, etc.), - the source in which the *nomen* is attested (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] • personal name [*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* (more specifically, a kind of identifier), expressed in natural language, in English] • pseudonym [*category*, expressed in natural language, in English] • married name [*category*, expressed in natural language, in English]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A2	NOMEN	Nomen string	The combination of signs that forms an appellation associated with an entity through the *nomen*
	Scope notes	The string involved in a *nomen* can be expressed as a notation in any form, such as a combination of signs within a writing system, chemical structure symbols, mathematical notation, or by any other kind of sign, such as sounds, etc. A *nomen* is more than the mere string of signs that constitutes the appellation associated with a thing through the *nomen*. Without any contextualization, the value of the *nomen string* attribute is a mere literal, potentially attached to anything in the world, as	

Table 4.4	Attributes	
		opposed to the *nomen* itself, which as a result of the appellation relationship is attached to one and only one instance of *res*. For example, the *nomen* 'John Smith' is the appellation of one and only one John Smith in the world, while the value of the *nomen string* attribute that reads "John Smith" in the Latin alphabet is the same for all the different things in the world that happen to be named 'John Smith'. *(See also the Scope Notes for the appellation relationship, LRM-R13.)*
	Examples	• the string of Latin alphabetic characters "Agatha Christie" [which may appear in a context where it serves to refer to the *person* {Agatha Christie}] • the string of Latin alphabetic characters "The postman always rings twice" [which may appear, for instance, in a context where it serves to refer to a novel by James M. Cain] • the string of Latin alphabetic characters "IFLA" [which may appear in a context where it serves to refer to the *collective agent* {International Federation of Library Associations and Institutions}, but may also appear as the value of the *nomen string* attribute for a distinct *nomen* that refers to another *collective agent,* the {International Federation of Landscape Architects}] • the string of Latin alphabetic characters "poison", which as a mere string has no language, and which constitutes both the value of the *nomen string* attribute for the English *nomen* 'poison', and the value of the *nomen string* attribute for the French *nomen* 'poison' • the string of alphabetic characters "Gift", which as a mere string has no language, and which constitutes both the value of the *nomen string* attribute for the English *nomen* 'Gift' attached to the concept {gift}, and the value of the *nomen string* attribute for the German *nomen* 'Gift' attached to the concept {poison} • the string of articulated sounds recorded on the web page <http://dictionary.cambridge.org/pronunciation/english/hamlet> for the word 'hamlet' (a common noun) in British pronunciation • the string of articulated sounds recorded on both the web page <http://dictionary.cambridge.org/pronunciation/english/serial> for the word 'serial' in British pronunciation, and the web page <http://dictionary.cambridge.org/pronunciation/english/cereal> for the word 'cereal' in British pronunciation

Table 4.4 Attributes			
		• the string of digits "20150601", which constitutes the value of the *nomen string* attribute of at least two distinct *nomens:* a normalized date (a *nomen* for a *time-span*), and an ISSN (without of its central hyphen) (a *nomen* for a *work*) • the string of digits "300", which constitutes the value of the *nomen string* attribute of at least five distinct *nomens:* a non-normalized date (*nomen* for a *time-span*), a title (*nomen* for a *work*), a Dewey Decimal Classification number (*nomen* for a *res*), a hotel room number (*nomen* for a *res*), a MARC 21 field code (*nomen* for a *res*)	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A3	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 for *medium of performance* expressed as a URI] • http://id.loc.gov/authorities/classification [value encoding scheme for the Library of Congress Classification expressed as a URI] • ISO 8601 [syntax encoding scheme for dates and times]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A4	NOMEN	Intended audience	A class of users for which the *nomen* is considered appropriate or preferred
	Scope notes	Indicating the *intended audience* for a *nomen* can serve as a basis for a mechanism that selects a *nomen* from a cluster of equivalent *nomens*, for use in a particular context. For example, an international multi-lingual authority file can indicate the *intended audience* for each *nomen* by recording the language in which the *nomen* is a preferred form.	
	Examples	• sj [*intended audience* of children, expressed as a code used as a prefix in all Library of Congress children's subject headings] • chi [*intended audience* of Chinese speakers, expressed as	

Table 4.4 Attributes			
		a MARC 21 language code]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A5	NOMEN	Context of use	Information as to the context(s) in which a *nomen* is used by the *agent* who is referred to through it
	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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A6	NOMEN	Reference source	A source in which there is evidence for the use of the *nomen*
	Scope notes	A *reference source* attests to the existence of a linkage between a designation and the instance of the entity *res* that it serves to identify. It may clarify the validity and scope of the *nomen*. 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 MARC 21 field; the *reference source* is a publication about the *collective agent* identified through the *nomen* 'Marx Brothers'] • 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 MARC 21 field; the *reference source* is a publication by the *person* identified through the *nomen* 'Coyle, Karen'] • 810 ## $a Les clowns et la tradition clownesque / P. R. Lévy, 1991 [*reference source* expressed in a UNIMARC field; the *reference source* is a publication about the *res* identified by the *nomen* 'Clowns'] • 810 ## $a Oxford dictionary of national biography	

Table 4.4 Attributes			
		[*reference source* expressed in a UNIMARC field; the *reference source* is a biographical dictionary] • 810 ## $a LCSH, 1988-03 [*reference source* expressed in a UNIMARC field; the *reference source* is another *scheme*, distinct from the *scheme* in which the *nomen* appears]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A7	NOMEN	Language	The language in which the *nomen* is attested
	Scope notes	The *language* attribute may be viewed as recording a *scheme* of a particular type (that is, a natural human language) in which a *nomen* may be considered valid. Viewed in this way, the *language* attribute may be implemented as a sub-type of the *scheme* attribute.	
	Examples	• http://id.loc.gov/vocabulary/iso639-1/zu [*language* Zulu expressed as a URI]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A8	NOMEN	Script	The script in which the *nomen* is notated
	Scope notes	The *script* attribute allows the identification of the writing system used to provide a notation for the *nomen*. The writing system consists of the full range of the conventions used. Writing systems may be alphabetic, syllabic, ideographic, etc., or some combination of these. The *script* does not, however, include aspects such as the choice of font or other incidental display characteristics (for example, point size, colour) which do not encode any features which result in differences in the interpretation of the written symbols.	
	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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E9-A9	NOMEN	Script conversion	The rule, system, or standard that was used to create a *nomen* that is derived on the basis of another, distinct *nomen* notated in another, distinct script
	Scope notes	A *script conversion* attribute value may refer to: - transliterations, - script conversions that cannot be reversed, - etc.	

Table 4.4 Attributes			
	Examples	• ISO 9 [*script conversion* from Cyrillic alphabet to Latin alphabet] • Wade-Giles [*script conversion* from Chinese script to Latin alphabet]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E10-A1	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]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E10-A2	PLACE	Location	A delimitation of the physical territory of the *place*
	Scope notes	The level of precision used can vary according to the context.	
	Examples	• 123 ## $d E1444300 $e E1482200 $f S0403900 $g S0433900 [*location* expressed as codes in a UNIMARC field]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E11-A1	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 used can vary according to the context.	
	Examples	• 19850412T101530 [*beginning* expressed according to the ISO 8601 standard] • 488.3 million years before present [*beginning* of the Ordovician period, a geological period]	
ID	**Entity**	**Attribute**	**Definition**
LRM-E11-A2	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 used can vary according to the context.	
	Examples	• 19860513T112536 [*ending* expressed according to the ISO 8601 standard] • 443.7 million years before present [*ending* of the Ordovician period, a geological period]	

4.2.5 Index to Attributes

Table 4.5 below is an index to the attributes defined in Table 4.4 (Attributes) in section 4.2.4. In Table 4.5 the attributes are sorted alphabetically by the name of the attribute. In the cases where the same name appears for attributes of different entities, the secondary sort is by the entity ID.

Table 4.5 Index by Attribute Name

Attribute Name	Attribute ID	Entity ID	Entity
Access conditions	LRM-E4-A5	LRM-E4	Manifestation
Beginning	LRM-E11-A1	LRM-E11	Time-span
Cartographic scale	LRM-E3-A5	LRM-E3	Expression
Category	LRM-E1-A1	LRM-E1	Res
Category	LRM-E2-A1	LRM-E2	Work
Category	LRM-E3-A1	LRM-E3	Expression
Category	LRM-E9-A1	LRM-E9	Nomen
Category	LRM-E10-A1	LRM-E10	Place
Category of carrier	LRM-E4-A1	LRM-E4	Manifestation
Contact information	LRM-E6-A1	LRM-E6	Agent
Context of use	LRM-E9-A5	LRM-E9	Nomen
Ending	LRM-E11-A2	LRM-E11	Time-span
Extent	LRM-E3-A2	LRM-E3	Expression
Extent	LRM-E4-A2	LRM-E4	Manifestation
Field of activity	LRM-E6-A2	LRM-E6	Agent
Intended audience	LRM-E3-A3	LRM-E3	Expression
Intended audience	LRM-E4-A3	LRM-E4	Manifestation
Intended audience	LRM-E9-A4	LRM-E9	Nomen
Key	LRM-E3-A7	LRM-E3	Expression
Language	LRM-E3-A6	LRM-E3	Expression
Language	LRM-E6-A3	LRM-E6	Agent
Language	LRM-E9-A7	LRM-E9	Nomen
Location	LRM-E5-A1	LRM-E5	Item
Location	LRM-E10-A2	LRM-E10	Place
Manifestation statement	LRM-E4-A4	LRM-E4	Manifestation
Medium of performance	LRM-E3-A8	LRM-E3	Expression

Table 4.5 Index by Attribute Name			
Attribute Name	**Attribute ID**	**Entity ID**	**Entity**
Nomen string	LRM-E9-A2	LRM-E9	Nomen
Note	LRM-E1-A2	LRM-E1	Res
Profession / Occupation	LRM-E7-A1	LRM-E7	Person
Reference source	LRM-E9-A6	LRM-E9	Nomen
Representative expression attribute	LRM-E2-A2	LRM-E2	Work
Scheme	LRM-E9-A3	LRM-E9	Nomen
Script	LRM-E9-A8	LRM-E9	Nomen
Script conversion	LRM-E9-A9	LRM-E9	Nomen
Use rights	LRM-E3-A4	LRM-E3	Expression
Use rights	LRM-E4-A6	LRM-E4	Manifestation
Use rights	LRM-E5-A2	LRM-E5	Item

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 IFLA 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 refinements.

The first relationship in Table 4.7 in section 4.3.3 (*res* 'is associated with' *res*) is the top-level, general relationship. All other relationships declared in the model are specific refinements 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 refinements 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 refinements of the top relationship.

The relationships between *works, expressions, manifestations,* and *items* are the core of the model. Implementing other relationships is encouraged, since they enable exploration and discovery and are very important for end-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". For example, the link between a *work* and a term used to represent its subject is provided by a two-step path which also accounts for the role of the entity *res*.

(LRM-R12) WORK 'has as subject' RES +
(LRM-R13) RES 'has appellation' NOMEN

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-R15) 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 structure (the "IsA" hierarchy) can also be used in a path to restrict the domain or range entities in a relationship. The pair of statements:

(IsA) PERSON IsA AGENT +
(LRM-R5i) AGENT 'created' WORK

imply the shortcut relationship:

PERSON 'created' WORK

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

Multi-step paths can make use of both the "IsA" hierarchy and the relationships declared in the model. This is the case in the path linking a *work* to a *nomen* associated by one *agent* (such as a bibliographic agency) with the *agent* responsible for creating the *work*.

(LRM-R5) WORK ‘was created by’ AGENT1 +
(IsA) AGENT1 IsA RES +
(LRM-R13) RES ‘has appellation’ NOMEN +
(LRM-R14i) NOMEN ‘was assigned by’ AGENT2

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

Only the entities declared in section 4.1.3 serve as domains or ranges of relationships defined in the model. The entity *person* does not appear explicitly in any of the relationships defined. All refinements of relationships that require the entity *person* are created using the entity hierarchy mechanism described above.

4.3.2 Hierarchy Structure for Relationships

Table 4.6 below summarizes in a concise tabular form the relationships defined in the model. Following the entity hierarchy structure (shown in full in Table 4.1 in section 4.1.2), relationships may also feature hierarchy. All relationships are refinements of the top level relationship (LRM-R1), which is given in the first row of the first column. All the other relationships defined in the model are at the same level and are given in the second column. In an expansion of the model, additional second level relationships, as well as relationships at still lower hierarchy levels, may be defined. To make the listing more compact, only the relationship names are given, the inverse names are omitted. The inverse names and full definitions of all the relationships are given in Table 4.7 (Relationships) in section 4.3.3.

Table 4.6 Relationship Hierarchy			
Top Level		**Second Level**	
LRM-R1	RES is associated with RES		
--		LRM-R2	WORK is realized through EXPRESSION
--		LRM-R3	EXPRESSION is embodied in MANIFESTATION
--		LRM-R4	MANIFESTATION is exemplified by ITEM
--		LRM-R5	WORK was created by AGENT
--		LRM-R6	EXPRESSION was created by AGENT
--		LRM-R7	MANIFESTATION was created by AGENT
--		LRM-R8	MANIFESTATION was manufactured by AGENT
--		LRM-R9	MANIFESTATION is distributed by AGENT
--		LRM-R10	ITEM is owned by AGENT
--		LRM-R11	ITEM was modified by AGENT
--		LRM-R12	WORK has as subject RES
--		LRM-R13	RES has appellation NOMEN
--		LRM-R14	AGENT assigned NOMEN
--		LRM-R15	NOMEN is equivalent to NOMEN
--		LRM-R16	NOMEN has part NOMEN
--		LRM-R17	NOMEN is derivation of NOMEN
--		LRM-R18	WORK has part WORK
--		LRM-R19	WORK precedes WORK
--		LRM-R20	WORK accompanies / complements WORK
--		LRM-R21	WORK is inspiration for WORK
--		LRM-R22	WORK is a transformation of WORK
--		LRM-R23	EXPRESSION has part EXPRESSION
--		LRM-R24	EXPRESSION is derivation of EXPRESSION
--		LRM-R25	EXPRESSION was aggregated by EXPRESSION
--		LRM-R26	MANIFESTATION has part MANIFESTATION
--		LRM-R27	MANIFESTATION has reproduction MANIFESTATION
--		LRM-R28	ITEM has reproduction MANIFESTATION
--		LRM-R29	MANIFESTATION has alternate MANIFESTATION
--		LRM-R30	AGENT is member of COLLECTIVE AGENT
--		LRM-R31	COLLECTIVE AGENT has part COLLECTIVE AGENT
--		LRM-R32	COLLECTIVE AGENT precedes COLLECTIVE AGENT
--		LRM-R33	RES has association with PLACE
--		LRM-R34	PLACE has part PLACE
--		LRM-R35	RES has association with TIME-SPAN
--		LRM-R36	TIME-SPAN has part TIME-SPAN

4.3.3 Relationships Detailed Definition

Each relationship declared in the model is described in Table 4.7 below. Relationships are numbered sequentially from LRM-R1 to LRM-R36. Inverse (reciprocal) relationships can be referred to by the number of the relationship plus the suffix "i".

For each relationship, the columns of the first row in the table present, after the number, the domain (source) entity for the relationship, the name of the relationship, the name of the inverse (or reciprocal) relationship, the range (target) entity for the relationship, and the cardinality. The definition of the relationship, any scope notes, and a selection of examples of instances of that relationship are presented in subsequent table rows.

In the inverse relationships the entity from the **Range** column serves as the domain, the entity from the **Domain** column serves as the range, and the inverse name of the relationship is used. For example, the relationships represented by the second entry of the table should be read as:

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

Relationships are **recursive** when the same entity serves as both domain and range, and are called **symmetric** when the relationship name is the same as the inverse name. 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.

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').

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 (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*.

Table 4.7 Relationships

ID	Domain	Relationship name	Inverse 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 refinements would be defined to carry more precise semantics.			

Table 4.7 Relationships					
	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* • Topic to *work*, *e.g.*: the character Alice *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)			
ID	**Domain**	**Relationship name**	**Inverse 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* which convey the same intellectual or artistic content			
	Scope notes	The logical connection between *work* and *expression*, as reflected in the model through this relationship, 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 found in the editions of *Eine kleine Nachtmusik* from 1989 by Bärenreiter, ISBN 3-370-00301-5, and by VEB Deutscher Verlag für Musik, ISBN 3-370-00301-5, and in the undated edition by Breitkopf & Härtel, plate number 4956			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R3	Expression	is embodied in	embodies	Manifestation	M to M
	Definition	This relationship links an *expression* with a *manifestation* in which the *expression* appears			
	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 specific *expression* or *expressions* of a *work* or *works* 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 Hans Günter Heumann's piano arrangement of Mozart's *Eine kleine Nachtmusik is embodied in* the 1996 publication by Henry Lemoine identified by plate number 26336HL			

Table 4.7 Relationships					
ID	**Domain**	**Relationship name**	**Inverse 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)			
ID	**Domain**	**Relationship name**	**Inverse 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 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 • The musical *work* known as *Communication breakdown was created by* Page, Jones and Bonham (members of the musical group Led Zeppelin)			
ID	**Domain**	**Relationship name**	**Inverse 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 *expression*. The logical connection between an *expression* and a related *agent* serves as the basis both for identifying an *agent* responsible for an			

Table 4.7 Relationships					
		individual *expression* and for ensuring that all *expressions* realized by an *agent* are linked to that *agent.*			
	Examples	• Majda Stanovnik *created* the Slovenian text titled *Medved Pu,* which is a Slovenian translation of A. A. Milne's *Winnie the Pooh* • The Helsinki Philharmonic Orchestra, conducted by Okko Kamu, *created* the performed *expression* of Jean Sibelius's *Finlandia* Op. 26 issued on a recording identified by ISRC FIFIN8800300 • Matthew Cameron *created* the musical notation of the piano arrangement of Mozart's *Eine kleine Nachtmusik* which was originally published in 2006 and first performed by Cyprien Katsaris • The musical group Led Zeppelin *created* the performed *expression* of the musical *work* known as *Communication breakdown* released in 1969 on their self-titled album *Led Zeppelin* on the Atlantic label, catalogue number 588171			
ID	**Domain**	**Relationship name**	**Inverse 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 the *manifestation*			
	Scope notes	For a *manifestation*, the notion of creation broadly includes the publication process for published *manifestations*. The logical connection between a *manifestation* and a related *agent* serves 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 602517965393			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R8	Manifestation	was manufactured by	manufactured	Agent	M to M
	Definition	This relationship links a *manifestation* to an agent responsible for the fabrication, production or manufacture of the *items* of that *manifestation*			
	Scope notes	The *manifestation* may be manufactured or 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 manufactured by* the printing company named Heeter (Canonsburg, Pa.) • The monastery of Lindisfarne *manufactured* the manuscript known			

Table 4.7 Relationships					
		as the *Lindisfarne Gospels*			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R9	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			
ID	**Domain**	**Relationship name**	**Inverse 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 • The National Library of France *owns* the digital *item* of the ebook *Pop Culture* by Richard Memeteau, published by Zones in 2014 and distributed by Editis in EPUB2 format, ISBN 978-2-35522-085-2, received through digital legal deposit on 1st February 2016 to which the legal deposit number DLN-20160201-6 has been assigned. In the catalogue, this *item* is identified with a unique number: LNUM20553886			

Table 4.7 Relationships					
ID	**Domain**	**Relationship name**	**Inverse 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, restoration.			
	Examples	• The autograph manuscript of Jean-Paul Sartre's *La nausée was modified by* bookbinder Monique Mathieu			
ID	**Domain**	**Relationship name**	**Inverse 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 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* • Anne Hart's *The life and times of Miss Jane Marple has as subject* {Miss Jane Marple, a character in numerous Agatha Christie novels and stories} [a *work* of literary criticism]			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R13	Res	has appellation	is appellation of	Nomen	1 to M
	Definition	This relationship links an entity with a sign or combination of signs or symbols through which that entity is referred to within a given scheme or context			
	Scope notes	The consequence of the definition of *nomen* as the association between something and a designation that refers to it, is that each *nomen* is uniquely associated with a single *res* within a given scheme (which can extend from a specific local system to a natural language, through a shared authority file). The resulting cardinality of the appellation relationship is that while a single *res* may have many *nomens*, each *nomen* is the appellation of a single *res*. The fact that two instances of *nomen* may have the same value for their *nomen string* attribute does not modify this cardinality, and does not imply that such instances of *nomen* are actually one and the same instance of *nomen* associated with more than one instance of *res,* even if the scheme in question is a natural language. The *nomen string* "Gift" may be used to refer either to a present or to a poison, according to whether it is the *nomen string* value for a *nomen* within the English language or for a *nomen* in the German language: although the *string nomen* values look the same, we do have here two distinct instances of *nomen* for two distinct instances of *res*.			

Table 4.7 Relationships					
		Although in theory, one instance of *nomen* (a subclass of *res*) could be associated to another instance of *nomen* via the appellation relationship (resulting in a *nomen* for another *nomen*), 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' • {International Federation of Library Associations and Institutions} *has appellation* 'IFLA' [IFLA nomen1] • {International Federation of Landscape Architects} *has appellation* 'IFLA' [IFLA nomen2, a distinct instance of the entity *nomen* from IFLA nomen1]			
ID	**Domain**	**Relationship name**	**Inverse 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 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* '0-553-10953-7' 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			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R15	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 The *nomens* related by this relationship are functionally equivalent in meaning (assigned to the same *res*), but as they retain their own values in			

Table 4.7	Relationships				
		any attributes that are recorded for them, they are not interchangeable as far as usage is concerned. The equivalent *nomens* may differ as to crucial attributes such as *scheme*, *language* or *context of use*. This equivalence relationship relates instances of *nomens*, and not the values of the *nomen string* attributes for these *nomens*. Thus, even though it may seem counter-intuitive, two *nomens* that refer to different *res*, even if recorded with the same literal string, will **not** be equivalent.			
	Examples	• 'USA' *is equivalent to* 'United States of America' • 'Анна Павловна (Матвеевна) Павлова' *is equivalent to* 'Anna Pavlovna (Matveyevna) Pavlova' • 'Bill Clinton' *is equivalent to* 'William Jefferson Clinton' • 'Norma Jeane Mortenson' *is equivalent to* 'Marilyn Monroe' [as *nomens* for the *person*] • 'τὰ βιβλία' *is equivalent to* 'The Bible' • 'Schubert, Franz, 1797-1828. Sonatas, piano, D. 959, A major' *is equivalent to* 'Schubert, Franz, 1797-1828. Sonates. Piano. D 959. La majeur' [the preferred heading according to RDA for an English language cataloguing agency represents the same musical *work* as the preferred heading established for a French language cataloguing agency] • 'Santa Claus' *is equivalent to* 'Saint Nick' • 'Music' *is equivalent to* '780' [the classification number '780' is a valid number in the Dewey Decimal Classification representing the same concept as the term 'Music' assigned in the Library of Congress Subject Headings] • 'Christie, Agatha, 1890-1976' *is equivalent to* '0000 0001 2102 2127' [ISNI for the public identity {Agatha Christie}, distinct from the public identity {Mary Westmacott}] • 'International Federation of Library Associations and Institutions' *is equivalent to* 'IFLA' [IFLA nomen1] • 'International Federation of Landscape Architects' *is equivalent to* 'IFLA' [IFLA nomen2, a distinct instance of the entity *nomen* from IFLA nomen1; IFLA nomen2 is **not** equivalent to IFLA nomen1]			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R16	Nomen	has part	is part of	Nomen	M to M
	Definition	This relationship indicates that one *nomen* is constructed using another *nomen* as a component			
	Scope notes	The whole-part relationship for *nomens* is essential in handling the attributes of components of *nomens* constructed using pre-existing *nomens*, as such attributes as *language* may differ between the parts of a compound *nomen*.			

Table 4.7 Relationships					
	Examples	• 'Shakespeare' *is part of* 'William Shakespeare' • 'Measles' *is part of* 'Measles/epidemiology' • 'Twelfth Night, or What You Will' *has part* 'Twelfth Night' • 'Schubert, Franz, 1797-1828. Sonatas, piano, D. 959, A major' *has part* 'Schubert, Franz, 1797-1828' • 'Italy. Ministero degli affari esteri' *has part* 'Italy' • '1830-1886' *is part of* 'Dickinson, Emily, 1830-1886'			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R17	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 abbreviated 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' • 'Schubert, Franz, 1797-1828. Sonatas, piano, D. 959, A major' *is derivation of* 'Sonata in la maggiore op. postuma, D. 959'			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R18	Work	has part	is part of	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	This applies when the component-to-whole relationship is an inherent aspect of the *works* and holds for all the *expressions* and *manifestations* of the larger *work* and of its component *works*, whether the *expression* or *manifestation* comprises the full larger *work* or just one or more (but not all) of the component *works*. Examples include movements of concertos, poems within poetry cycles, multipart novels, triptychs.			
	Examples	• *A wizard of Earthsea is part of* the *Earthsea trilogy* by Ursula K. Le Guin • Richard Wagner's *Der Ring des Nibelungen has part* Richard Wagner's *Götterdämmerung*			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R19	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 4.7	Relationships				
		As this relationship concerns the logical continuation of the content of the respective *works*, it does not apply to those serial *works* that transform over time (via major title changes, changes in media type, etc.) yet maintain a continuity in their form or numbering schemes. See the work-transformation relationship, LRM-R22, to express the relationship between one aggregating or serial *work* and another that modifies and continues it.			
	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* • *A wizard of Earthsea* precedes *The tombs of Atuan*, which precedes *The farthest shore*, all in the *Earthsea trilogy* by Ursula K. Le Guin			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R20	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 / complements* Leigh Lowe's *Prima Latina: an introduction to Christian Latin. Student book* • Eric Gill's set of illustrations for the *Song of Songs accompanies / complements* the *Song of Songs* in the 1931 publication by the Cranach Press • Wole Soyinka's foreword to the *Universal declaration of human rights accompanies / complements* the *Universal declaration of human rights* in the 1994 publication by African Book Builders • The periodical *Applied economics quarterly. Supplement* (ISSN 1612-2127) *accompanies / complements* the periodical *Applied economics quarterly* (ISSN 1611-6607)			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R21	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*			

Table 4.7 Relationships					
		• The painting *Plan for a City Gate in Kiev* by Viktor Hartmann *is inspiration for* the musical piece *The Great Gate of Kiev* from *Pictures at an Exhibition* by Modest Mussorgsky			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R22	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 scope or editorial policy (as in a serial or aggregating *work*), the genre or literary form (dramatization, novelization), target audience (adaptation for children), or style (paraphrase, imitation, parody) of a 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* • The periodical entitled *Le Patriote de Saône-et-Loire* (ISSN 1959-9935) *was transformed into* the new periodical entitled *Le Démocrate de Saône-et-Loire* (ISSN 1959-9943) after the former was suppressed by censorship in 1850 [a definitive replacement] • The separate periodicals entitled *Animal research* (ISSN 1627-3583), *Animal science* (ISSN 1357-7298), and *Reproduction nutrition development* (ISSN 0926-5287) *were transformed into* the periodical entitled *Animal* (ISSN 1751-7311) [a merger]			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R23	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	This applies when the component-to-whole relationship is an inherent aspect of the *works* and holds for all the *expressions* and *manifestations* of the larger *work* and of its component *works*, whether the *expression* or *manifestation* comprises the full larger *work* or just one or more (but not all) of the component *works.*			
	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 • The audio recording of Dante Alighieri's *La divina commedia* read by Enrico de Negri *has part* the audio recording of Dante Alighieri's *La divina commedia, Inferno* read by Enrico de Negri			

Table 4.7 Relationships					
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R24	Expression	is derivation of	has derivation	Expression	M to 1
	Definition	This relationship indicates that of two *expressions* of the same *work*, the second 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 end-user. The derivation relationship may be refined 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" *is a derivation of* 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 *is a derivation of* 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 French translation of *Wong's essentials of pediatric nursing* published as *Soins infirmiers : pédiatrie* by Chenelière éducation (Montréal, Québec), ©2012, *is a derivation of* the 8th English edition, appearing in the *manifestation* published by Mosby/Elsevier (St. Louis, Missouri), ©2009			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R25	Expression	was aggregated by	aggregated	Expression	M to M
	Definition	This relationship indicates that a specific *expression* of a *work* was chosen as part of the plan of an aggregating *expression*			
	Scope notes	An aggregating *expression* will select multiple specific *expressions* of other *works* so that they can be embodied together in an aggregate *manifestation*. An *expression* may be chosen by multiple aggregating *expressions*. This is a shortcut of the relationships illustrated in figure 5.7, the general model for aggregates. EXPRESSION1 *is embodied in* MANIFESTATION (aggregate) + MANIFESTATION (aggregate) *embodies* (aggregating) EXPRESSION Unlike the whole-part relationship between *expressions*, the *expressions* selected to appear together in the aggregate *manifestation* do not become components of the aggregating *expression*. Furthermore, the relationship between these *expressions* is not an inherent feature of the *works* that these *expressions* realize, and thus is does not hold in other *expressions* of those *works*.			

Table 4.7 Relationships					
	Examples	• The English text of Edgar Allan Poe's "The fall of the House of Usher" *was aggregated by* the aggregating *expression* that produced the aggregate *manifestation* "The Oxford book of short stories" chosen by V.S. Pritchett • The aggregate *expression* that produces the monographic series "IFLA series on bibliographic control" *aggregated* the English text of "ISBD : International standard bibliographic description", consolidated edition 2011 • The aggregate *expression* that produces the monographic series "Povremena izdanja Hrvatskoga knjižničarskog društva. Novi niz" *aggregated* the 2014 Croatian text of "ISBD : International standard bibliographic description", consolidated edition 2011			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R26	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	In some cases the components of a *manifestation* are based on physical considerations relating to the carrier in which the *manifestation* is intended to be issued (for example, a recording is too long to fit on a single disc and is issued in a two-disc boxed set). An alternate *manifestation* on another carrier may not display the same components. However, in the case when the component-to-whole relationship is an inherent aspect of the *works* it holds for all the *expressions* and *manifestations* of the larger *work* and of its component *works*, whether the *expression* or *manifestation* comprises the full larger *work* or just one or more (but not all) of the component *works*.			
	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 978-0-86516-563-2, of *Latin for the new millennium* by Milena Minkova et al.			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R27	Manifestation	has reproduction	is reproduction of	Manifestation	1 to M
	Definition	This is the relationship between two *manifestations* providing the end-user with exactly the same content and where an earlier *manifestation* has provided a source for the creation of a subsequent *manifestation*, such as facsimiles, reproductions, reprints, and reissues			
	Scope notes	Generally, for reprints and reissues no specific *item* of the source *manifestation* is singled out as the source of the reproduction. Furthermore, in these cases, although a particular *item* may have been used as a source of reproduction, this *item* should be considered to represent the source			

Table 4.7 Relationships					
		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 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 • The 2007 reprint edition of Hubert Reeve's *Malicorne: réflexions d'un observateur de la nature* published by Éditions du Seuil as number 179 in the series *Points. Science* (ISBN 978-2-02-096760-0) *is reproduction of* the 1990 edition of Hubert Reeve's *Malicorne: réflexions d'un observateur de la nature* published by Éditions du Seuil in the series *Science ouverte* (ISBN 2-02-012644-3) • The 1990 edition of Hubert Reeve's *Malicorne: réflexions d'un observateur de la nature* published by Éditions du Seuil in the series *Science ouverte* (ISBN 2-02-012644-3) *has reproduction* the 1991 edition published by France loisirs (ISBN 2-7242-6486-X)			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R28	Item	has reproduction	is reproduction of	Manifestation	1 to M
	Definition	This is the relationship between an *item* of one *manifestation* and another *manifestation* providing the end-user with exactly the same content and where a specific *item* has provided a source for the creation of a subsequent *manifestation*			
	Scope notes	In this case, the particular *item* used as a source of reproduction is significant, either by its provenance or due to *item*-specific characteristics such as annotations or ownership markings. 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 Canadian Pacific Railway's *1913 settlers' guide : information concerning Manitoba, Saskatchewan and Alberta*, originally published in Montreal in 1913, *has reproduction* on microfiche issued by the Canadian Institute for Historical Microreproductions in 2000, which was filmed from a copy of the original publication held by the Glenbow Museum Library, Calgary			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R29	Manifestation	has alternate	has alternate	Manifestation	M to M
	Definition	This relationship involves *manifestations* that effectively serve as alternatives for each other			

Table 4.7 Relationships					
	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.			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R30	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 • Prime Ministers of Canada *has member* Pierre Elliot Trudeau			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R31	Collective Agent	has part	is part of	Collective Agent	M to M
	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			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R32	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	A single instance of this relationship can record a simple transformation of a single *collective agent* into a single successor. Multiple instances of this relationship can be used together to capture the more complex mergers and splits that can occur between and among *collective agents*.			

Table 4.7 Relationships					
	Examples	• National Library of Canada *precedes* Library and Archives Canada • National Archives of Canada *precedes* Library and Archives Canada			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R33	Res	has association with	is associated with	Place	M to M
	Definition	This relationship links any entity with a given extent of space			
	Scope notes	In most implementations this relationship would be refined 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 [the city which provides the setting for the narrative]			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R34	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 • Dolomites *is part of* Alps			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R35	Res	has association with	is associated with	Time-span	M to M
	Definition	This relationship links any entity with a temporal extent			
	Scope notes	In most implementations this relationship would be refined to reflect the exact nature of the association, for example, time of *work* conception or creation, time of expression creation (e.g., date/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,			

Table 4.7 Relationships					
		replacing the term 'Happening (Art)' • Emily Dickinson *has association with* the *time-span* from 1830 to 1886 • The recording of the live performance of the song *Communication Breakdown* by Led Zeppelin in Paris at the Olympia on October 10, 1969 *has association with* the *time-span* of October 10, 1969			
ID	**Domain**	**Relationship name**	**Inverse name**	**Range**	**Cardinality**
LRM-R36	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			

4.3.4 Relationships Ordered by Domain

Table 4.8 below is an ordering of the relationships defined in Table 4.7 (Relationships) in section 4.3.3, according to the entity that is the domain of the relationship. All relationships, as well as all inverse relationships for those relationships that are not symmetric, are listed in Table 4.8. The inverse relationships are those for which the ID number of the relationship (**Rel ID** column) includes the "i" suffix. For each relationship given in the table, the relationship name, the inverse name, the entities that are the domain and the range, and all the respective IDs are given in a single row.

In Table 4.8 the relationships are sorted by the entity that is functioning as the domain of the relationship. The entities are sorted, using the **ID of Domain** column, according to the order that follows their presentation in Table 4.2 (Entities) in section 4.1.3. Within the same entity functioning as domain, the relationships are sorted alphabetically by the relationship name column. Finally, in the cases where the same relationship name appears for multiple relationships with the same entity as domain, the secondary sort is by the entity that is the range of the relationship, using the **ID of Range** column.

Table 4.8 Relationships by Entity functioning as the Domain						
Rel ID	**ID of Domain**	**Domain**	**Relationship name**	**Inverse name**	**ID of Range**	**Range**
LRM-R13	LRM-E1	Res	has appellation	is appellation of	LRM-E9	Nomen
LRM-R33	LRM-E1	Res	has association with	is associated with	LRM-E10	Place
LRM-R35	LRM-E1	Res	has association with	is associated with	LRM-E11	Time-span
LRM-R1	LRM-E1	Res	is associated with	is associated with	LRM-E1	Res
LRM-R12i	LRM-E1	Res	is subject of	has as subject	LRM-E2	Work
LRM-R20	LRM-E2	Work	accompanies / complements	is accompanied / complemented by	LRM-E2	Work
LRM-R12	LRM-E2	Work	has as subject	is subject of	LRM-E1	Res
LRM-R18	LRM-E2	Work	has part	is part of	LRM-E2	Work
LRM-R22	LRM-E2	Work	is a transformation of	was transformed into	LRM-E2	Work
LRM-R20i	LRM-E2	Work	is accompanied / complemented by	accompanies / complements	LRM-E2	Work
LRM-R21	LRM-E2	Work	is inspiration for	is inspired by	LRM-E2	Work
LRM-R21i	LRM-E2	Work	is inspired by	is inspiration for	LRM-E2	Work
LRM-R18i	LRM-E2	Work	is part of	has part	LRM-E2	Work
LRM-R2	LRM-E2	Work	is realized through	realizes	LRM-E3	Expression
LRM-R19	LRM-E2	Work	precedes	succeeds	LRM-E2	Work
LRM-R19i	LRM-E2	Work	succeeds	precedes	LRM-E2	Work
LRM-R5	LRM-E2	Work	was created by	created	LRM-E6	Agent
LRM-R22i	LRM-E2	Work	was transformed into	is a transformation of	LRM-E2	Work
LRM-R25i	LRM-E3	Expression	aggregated	was aggregated by	LRM-E3	Expression
LRM-R24i	LRM-E3	Expression	has derivation	is derivation of	LRM-E3	Expression
LRM-R23	LRM-E3	Expression	has part	is part of	LRM-E3	Expression
LRM-R24	LRM-E3	Expression	is derivation of	has derivation	LRM-E3	Expression
LRM-R3	LRM-E3	Expression	is embodied in	embodies	LRM-E4	Manifestation
LRM-R23i	LRM-E3	Expression	is part of	has part	LRM-E3	Expression
LRM-R2i	LRM-E3	Expression	realizes	is realized through	LRM-E2	Work
LRM-R25	LRM-E3	Expression	was aggregated by	aggregated	LRM-E3	Expression
LRM-R6	LRM-E3	Expression	was created by	created	LRM-E6	Agent
LRM-R3i	LRM-E4	Manifestation	embodies	is embodied in	LRM-E3	Expression
LRM-R29	LRM-E4	Manifestation	has alternate	has alternate	LRM-E4	Manifestation
LRM-R26	LRM-E4	Manifestation	has part	is part of	LRM-E4	Manifestation
LRM-R27	LRM-E4	Manifestation	has reproduction	is reproduction of	LRM-E4	Manifestation
LRM-R9	LRM-E4	Manifestation	is distributed by	distributes	LRM-E6	Agent
LRM-R4	LRM-E4	Manifestation	is exemplified by	exemplifies	LRM-E5	Item
LRM-R26i	LRM-E4	Manifestation	is part of	has part	LRM-E4	Manifestation
LRM-R27i	LRM-E4	Manifestation	is reproduction of	has reproduction	LRM-E4	Manifestation
LRM-R28i	LRM-E4	Manifestation	is reproduction of	has reproduction	LRM-E5	Item
LRM-R7	LRM-E4	Manifestation	was created by	created	LRM-E6	Agent
LRM-R8	LRM-E4	Manifestation	was manufactured by	manufactured	LRM-E6	Agent
LRM-R4i	LRM-E5	Item	exemplifies	is exemplified by	LRM-E4	Manifestation

Table 4.8 Relationships by Entity functioning as the Domain						
Rel ID	**ID of Domain**	**Domain**	**Relationship name**	**Inverse name**	**ID of Range**	**Range**
LRM-R28	LRM-E5	Item	has reproduction	is reproduction of	LRM-E4	Manifestation
LRM-R10	LRM-E5	Item	is owned by	owns	LRM-E6	Agent
LRM-R11	LRM-E5	Item	was modified by	modified	LRM-E6	Agent
LRM-R14	LRM-E6	Agent	assigned	was assigned by	LRM-E9	Nomen
LRM-R5i	LRM-E6	Agent	created	was created by	LRM-E2	Work
LRM-R6i	LRM-E6	Agent	created	was created by	LRM-E3	Expression
LRM-R7i	LRM-E6	Agent	created	was created by	LRM-E4	Manifestation
LRM-R9i	LRM-E6	Agent	distributes	is distributed by	LRM-E4	Manifestation
LRM-R30	LRM-E6	Agent	is member of	has member	LRM-E8	Collective Agent
LRM-R8i	LRM-E6	Agent	manufactured	was manufactured by	LRM-E4	Manifestation
LRM-R11i	LRM-E6	Agent	modified	was modified by	LRM-E5	Item
LRM-R10i	LRM-E6	Agent	owns	is owned by	LRM-E5	Item
LRM-R30i	LRM-E8	Collective Agent	has member	is member of	LRM-E6	Agent
LRM-R31	LRM-E8	Collective Agent	has part	is part of	LRM-E8	Collective Agent
LRM-R31i	LRM-E8	Collective Agent	is part of	has part	LRM-E8	Collective Agent
LRM-R32	LRM-E8	Collective Agent	precedes	succeeds	LRM-E8	Collective Agent
LRM-R32i	LRM-E8	Collective Agent	succeeds	precedes	LRM-E8	Collective Agent
LRM-R17i	LRM-E9	Nomen	has derivation	is derivation of	LRM-E9	Nomen
LRM-R16	LRM-E9	Nomen	has part	is part of	LRM-E9	Nomen
LRM-R13i	LRM-E9	Nomen	is appellation of	has appellation	LRM-E1	Res
LRM-R17	LRM-E9	Nomen	is derivation of	has derivation	LRM-E9	Nomen
LRM-R15	LRM-E9	Nomen	is equivalent to	is equivalent to	LRM-E9	Nomen
LRM-R16i	LRM-E9	Nomen	is part of	has part	LRM-E9	Nomen
LRM-R14i	LRM-E9	Nomen	was assigned by	assigned	LRM-E6	Agent
LRM-R34	LRM-E10	Place	has part	is part of	LRM-E10	Place
LRM-R33i	LRM-E10	Place	is associated with	has association with	LRM-E1	Res
LRM-R34i	LRM-E10	Place	is part of	has part	LRM-E10	Place
LRM-R36	LRM-E11	Time-span	has part	is part of	LRM-E11	Time-span
LRM-R35i	LRM-E11	Time-span	is associated with	has association with	LRM-E1	Res
LRM-R36i	LRM-E11	Time-span	is part of	has part	LRM-E11	Time-span

Chapter 5 Model Overview

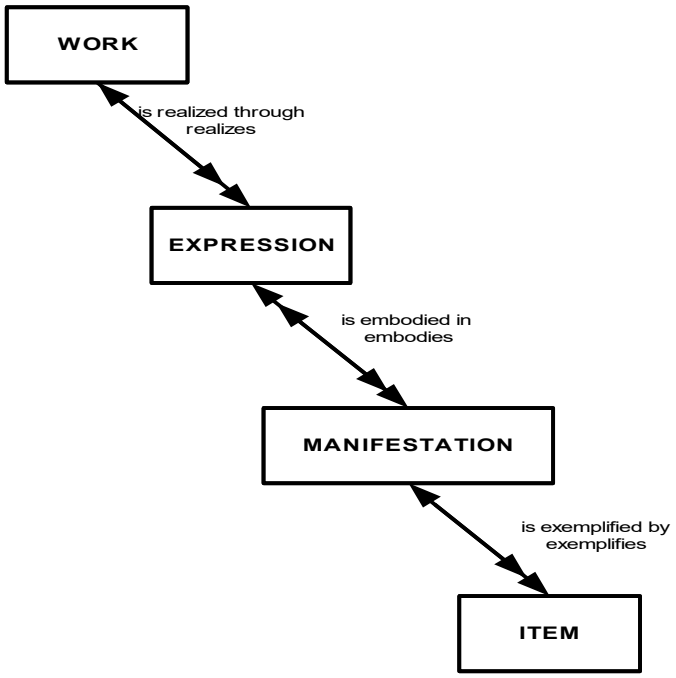
5.1 Entity-Relationship Diagrams

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:

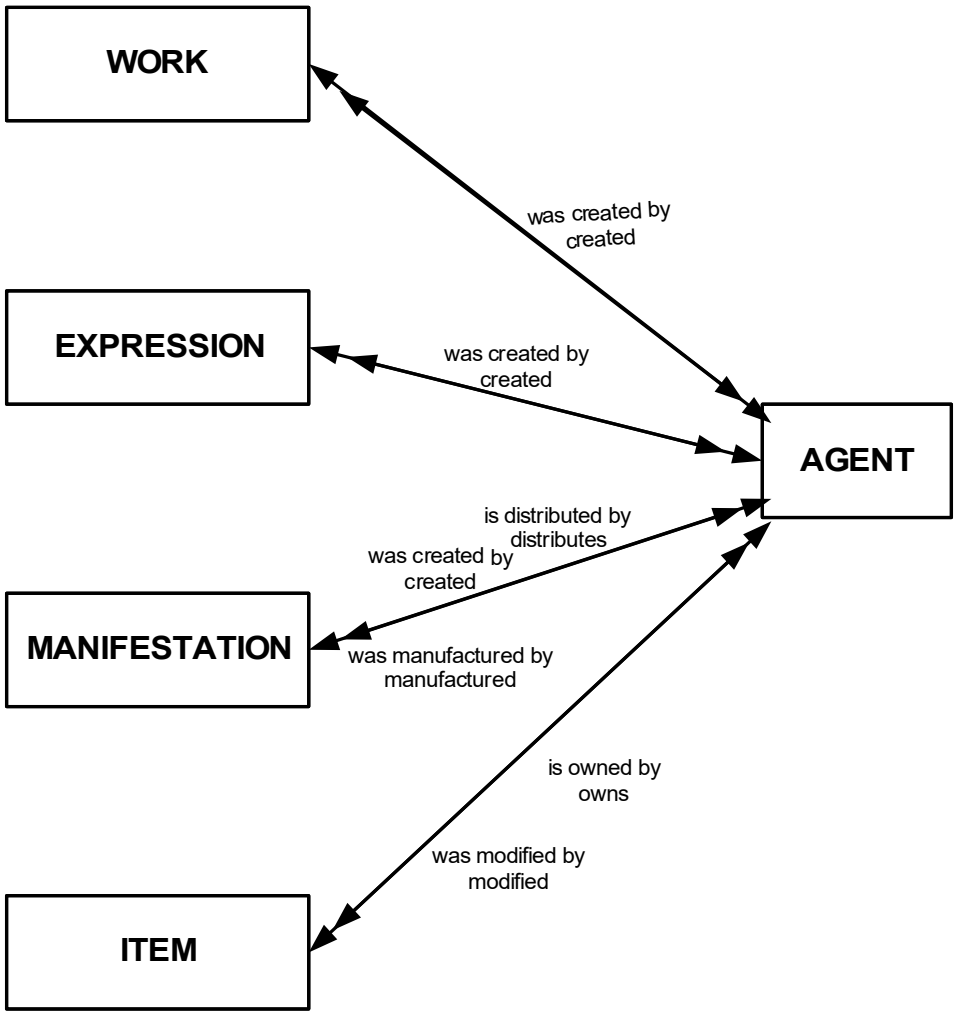
- A rectangle is used for each entity, these serve as nodes which are connected by relationships. The name of the entity is written in all capitals within the rectangle.
- A line (arrow) represents the relationship (or relationships) which hold between the entities. The name (or names) of the relationships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

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



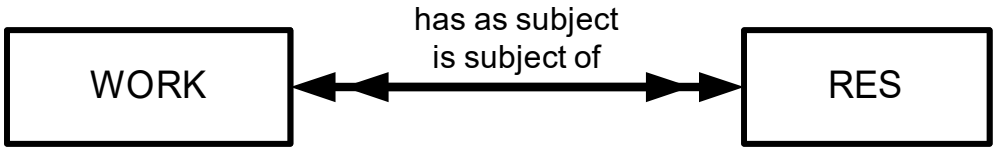
Relationships LRM-R2 to LRM-R4 are shown in figure 5.1. These relationships indicate that a *work* may be realized through one or more than one *expression*; an *expression*, on the other hand, realizes one and only one *work*. An *expression* may be embodied in one or more than one *manifestation*;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



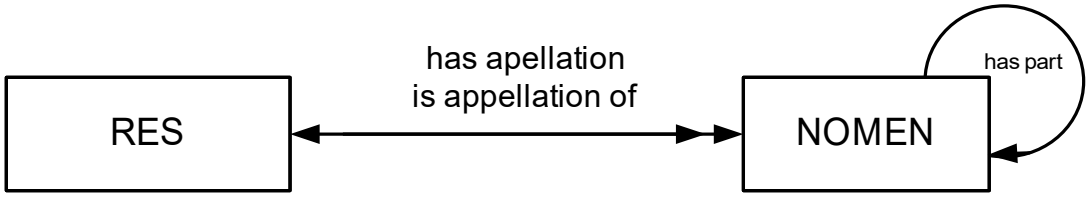
Relationships LRM-R5 to LRM-R11 are shown in figure 5.2. These relationships all hold between the entity *agent* (or by extension either of its subclasses) and *works*, *expressions*, *manifestations*, and *items*. These relationships capture responsibility for the processes of creation, manufacture, distribution, ownership 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



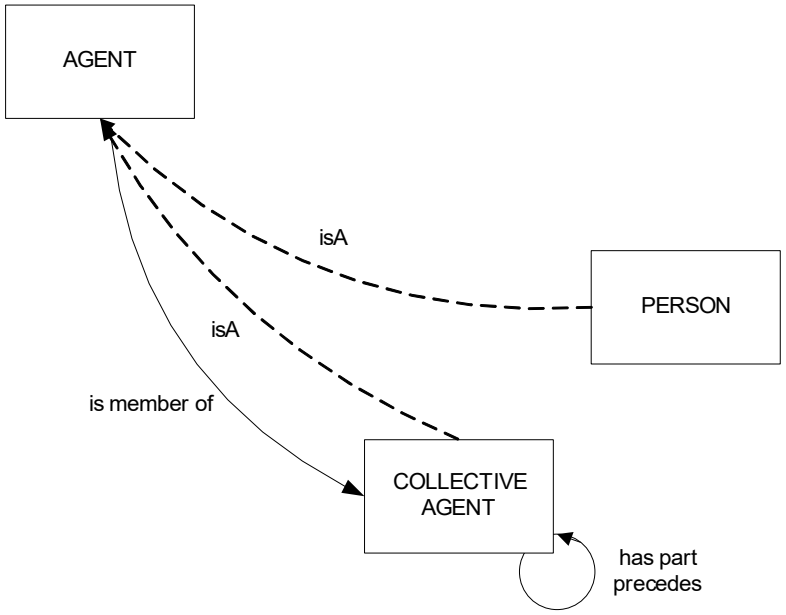
Relationship LRM-R12 is depicted in figure 5.3. This relationship links *works* to the *res* which are the subject of the *works*. Any *res* (and so by extension any other entity, as all entities are subclasses of the entity *res*) may be the subject of one or more *works*; *works* may have one or more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

Figure 5.4 Appellation Relationship



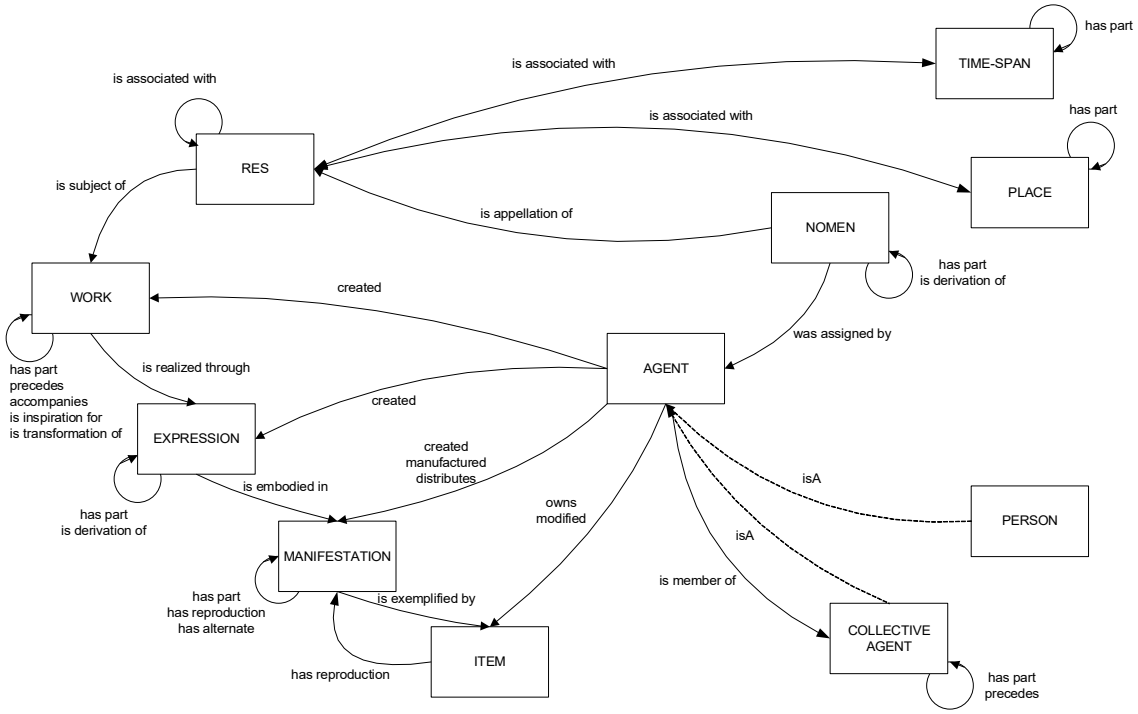
Relationship LRM-R13 is depicted in figure 5.4. This relationship links a *res* to its *nomens*. Any *res* (and so by extension any other entity, as all entities are subclasses of the entity *res*) may be known by one or more *nomens*. Each *nomen* is the appellation of a single *res*. (For the application of this relationship to the modelling of bibliographic identities, see section 5.5.) Relationship LRM-R16, which states that *nomens* may have parts which are themselves *nomens*, is also illustrated.

Figure 5.5 Relationships among Agents



Relationships LRM-R30 to LRM-R32 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 is added an indication of the "IsA" hierarchy between the entity *agent* and 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. The shortcuts are not illustrated. To streamline the presentation, the "IsA" hierarchical structure that connects all entities to the entity *res* is omitted, and only the relationship names that correspond to the direction illustrated 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-R33) and *time-span* (LRM-R35). The entities *place* and *time-span* may be composed of parts which are themselves respectively *places* (LRM-R34) and *time-spans* (LRM-R36). *Nomens* are assigned by an *agent* (LRM-R14), and may be derived from other *nomens* (LRM-R17) as well as being composed of parts which are themselves *nomens* (LRM-R16).

Works may be related to other *works* in several ways: as component parts, as logical predecessors or successors, by accompanying or complementing each other, by serving as inspiration for other *works*, or by being transformed into new *works* (LRM-R18 to LRM-R22). Similarly, *expressions* of a *work* can be derived into new *expressions* (LRM-R24) and may have *expressions* as component parts (LRM-

R23); *manifestations* may be related as reproductions (LRM-R27) or as alternates (LRM-R29), and may also have *manifestations* as component parts (LRM-R26). *Items* may be related to *manifestations* as the source for a reproduction (LRM-R28).

5.2 Constraints between Entities and Alignments

IFLA LRM declares that, other than those entities related by the "IsA" hierarchies, the entities in the model are disjoint. Disjointness is a strong constraint and means that the disjoint entities can have no instance that is simultaneously an instance of more than one of these entities.

Some of the consequences of disjointness are seldom disputed, such as that something cannot be both an instance of the *person* entity and an instance of the *collective agent* entity. It takes a little more thought to realize that something cannot be both an instance of the *manifestation* entity (an abstract entity which is a set) and an instance of the *item* entity (a concrete entity). While only one physical object may exist, it is viewed according to distinct aspects as to whether its *manifestation* nature is being considered, or whether its *item* aspects are in focus.

Further, if someone says that "*Hamlet* is a *work*", and someone else says that "*Hamlet* is an *expression*", it does not imply that *Hamlet* is simultaneously both a *work* and an *expression*, as opponents to the notion of disjointness of the *work*, *expression*, *manifestatio*n, and *item* entities might argue: it simply means that these two persons have distinct aspects of *Hamlet* in mind, but refer to these distinct aspects using *nomens* which have the same *nomen string*. This issue is better solved by examining the relationships that are implemented in actual databases than by eliminating disjointness altogether: it is these relationships that denote, in a very practical way, either a *work* or an *expression*, rather than metaphysical discussions about what *Hamlet* "is" in the absolute.

In practice, if there is a need to align two data sources that hold contradictory views about something that is identified through a given URI, it is possible to extrapolate the existence of implicit, additional entities that can serve as gateways between those contradictory views. For example, if a library catalogue claims that a French translation of *Hamlet* is an *expression*, and a database produced by a rights society claims that the same French translation of *Hamlet*, identified by the same URI, is a *work*, both views can be reconciled by assuming that the "thing" identified by that URI is neither a *work* nor an *expression*, but a "textual creation", that is, the combination of linguistic symbols and concepts, and that the library catalogue only accounts for the linguistic symbols of which that textual creation consists, while the rights society's database only envisions the concepts involved in the translation process. An expansion of the IFLA LRM model, aiming at allowing these two data sources to be merged, could be developed, by declaring an additional entity: *textual creation*, and two additional relationships: *textual creation* has conceptual content *work*, and *textual creation* has symbolic content *expression*.

5.3 Modelling of Online Distribution

Production processes form an intrinsic part of a *manifestation.* In the case of *manifestations* that are intended to be distributed online, such as downloadable files or streaming media, the production process consists of a specification of actions that will take place once triggered by an action by the end-user.

As a result, the production plan will involve aspects that are not fully specified as they are not under the direct control of the producer, such as the specific digital storage media onto which an online file is downloaded by different end-users. Whatever storage media is used, the downloaded files are instances of the same *manifestation* as the online file. This is the case also for printing on demand, where the producer cannot control, for example, the colour of paper that the end-user will use to make the printout.

These processes, strictly speaking, result in variant states in a *manifestation*, and even in very slightly variant *expressions*, when digital rights management software modifies the file as it is being downloaded to the end-user's device.

When it comes to digital publishing, the acquisition process is not so much associated with the production of physical *items*, as with the duplication of the content of the *manifestation* (possibly with alterations, e.g., the addition of a file or metadata stating specific rights and identifying the acquirer of a "digital item" – in that case, strictly speaking, the whole process would be considered to result in the creation of a new, distinct *manifestation*). However, it would be impractical, and not meet user needs, to regard all "digital items" as distinct singleton *manifestations*.

If there is a need, in a given implementation, to identify and describe specific "digital items" as such, an extension to the basic IFLA LRM model could be developed. Such an extension could account for the specific characteristics of digital objects, by defining a *digital item* entity at an intermediate level between the *manifestation* and *item* entities. In such an extension, *item* is entirely a physical entity, while *digital item* is basically a file or a package of files that contains the overall content of a *manifestation* and that may be altered (during the acquisition process or afterwards), by the addition of particular statements of rights and ownership, further annotations, degradations of the octet stream, etc.

5.4 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, 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. What distinguishes an identifier from other *nomens* is that the *nomen string* attribute value of an identifier cannot be identical with the *nomen string* attribute value of any other *nomen,* **within a given system** (of course, other *nomens,* outside that system, may happen to have the same *nomen string* attribute value). 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 sub-types:

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

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

In current library practice, name authority records are generally created for each bibliographically significant cluster of *nomens* that refer to the same instance of an entity, and record both the *nomen string* representing the preferred form of the access point (a *nomen*) and the *nomen strings* corresponding to any variant access points or identifiers (additional *nomens*). Although an authority record controls *nomens*, as a shortcut information about the instance of an entity referred to by the *nomens* is generally recorded in the same authority record along with information about the *nomens*, blurring the distinction between the entities *res* and *nomen*. The modelling of all categories of authority records used in current library practice is quite complex and outside the scope of the model.

5.5 Modelling of Bibliographic Identities

The modelling of bibliographic identities (or personas) in IFLA LRM makes use of the *nomen* entity and the 'has appellation' relationship. The 'has appellation' relationship is one-to-many and holds between instances of any entity and the various *nomens* used for that instance. Instances of all entities have multiple appellation relationships to different *nomens*. The different *nomens* for the same instance of an entity will likely differ in the values held for one or more of the *nomen* attributes (such as, *language*, *script*, *scheme*, etc.).

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 those aspects of this context that are deemed relevant in making the distinction between bibliographic identities that are recognized as distinct in a particular bibliographic environment. The relevant context may be simple to describe explicitly, or it may be inferred from multiple characteristics. In a simple situation, 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 a more complex case, the *context of use* may need to distinguish between *nomens* used by a *person* in writing a series of novels about one imaginary world, and the other *nomens* used by

that *person* when writing another series of novels about a different imaginary world.

In the model, a bibliographic identity is a cluster of *nomens* used by a *person* in the same bibliographically significant context or contexts. Which kinds 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 preferred access points in the cataloguing rules, but only a single classification number.

According to some current cataloguing rules, name authority records are generally created for each distinct bibliographically significant *nomen* cluster or identity, and information about the instance of an entity referred to through the *nomens* is generally also recorded in the authority record. When multiple, distinct *nomen* clusters are known to be related to the same underlying instance of an entity, current practice may permit linking the authority records for those clusters that are in the same authority file.

The bibliographic identities formed by *nomen* clusters are a type of *res*, and have enough persistence to be assigned *nomens*, such as the International Standard Name Identifier (ISNI) which is a *nomen* (of type identifier) assigned to public identities. An ISNI, a preferred access point and several variant access points may all be *nomens* of the same bibliographic identity, and so are equivalent *nomens* for that identity (*res*).

Example

A real *person* uses two distinct *nomen* clusters in different contexts of use, each of these clusters includes three *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* in the form of an access point as the preferred form, and the other access point as a variant. Each cluster may be recorded in a different authority record and the two records may be linked to draw out their relationship to the same *person*.

Person 1:	Nomen 1: Context (detective fiction), Category (preferred form of access point)
	Nomen 2: Context (detective fiction), Category (variant form of access point)
	Nomen 3: Context (detective fiction), Category (identifier of type ISNI)
	Nomen 4: Context (romance novels), Category (preferred form of access point)
	Nomen 5: Context (romance novels), Category (variant form of access point)
	Nomen 6: Context (romance novels), Category (identifier of type ISNI)

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*. Furthermore, the cataloguer may not know (and has no need to know) whether any of these *nomens* is a form of the *person's* real, legal name or not. The lack of fuller knowledge means that the full set of possible relationships between these *nomen* clusters cannot be recorded, but otherwise does not affect the provision of access to resources. In some cases, all the cataloguer may know with certainty is that a *nomen* appears in a *manifestation statement* that attributes responsibility for some aspect of a *work* or *expression.* The wording of the statement may be consistent with the assumption that the *agent* is a *person* or may give another impression. The cataloguer's real-world knowledge will lead to the conclusion that since an *expression* of a *work* exists, then some actual *agent* (or several *agents*) was responsible for its creation, no matter how little

information about those *agents* is available.

In any implementation, cataloguing rules need to operationalize the handling of *persons* and their *nomen* clusters. 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 among the bibliographic identities 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).

5.6 Representative Expression Attributes

In a strict formal sense, within the model all the *expressions* of a *work* are equal as realizations of the *work*. However, research with end-users indicates that they consider certain characteristics as inherent in *works* and that *expressions* that reflect those characteristics can be felt to best represent the intention of the creators of that *work*. The perceived "distance" between a given *expression* and the image of the "ideal" *expression* is often of interest and may be used as a selection criterion for *expressions*. For many purposes, end-users seek out *expressions* that display "original" characteristics and are particularly interested in *manifestations* of these *expressions*.

In many situations the representative or "canonical" characteristics are easily identified as those portrayed in the first or original *expression* of the *work*, which is in turn embodied in the first *manifestation* of the *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 an original *expression*. 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" languages, or either not to have a single "original" language at all. Similarly, musical *works* with alternative instrumentation could be considered to have multiple "original" values for the *medium of performance* attribute. In some cases the derivation history of the *expressions* of a *work* is sufficiently complex that the *expression* features considered "canonical" by current users in identifying the *work* were not actually those present in an original *expression*.

End-users intuitively understand that William Shakespeare's *Hamlet* is linked to the English language and that its literary form is a play. Users will consider that derived *expressions*, such as abridgements or translations, are distinct *expressions* of the *work* that are more distant from the "original" *expression* than full-length English language editions. This judgement is based on cultural knowledge and assumptions about what the early *expressions* of the play were like, even though few end-users have been directly exposed to early *manifestations* of these *expressions*.

Similarly with musical *works*, through cultural knowledge end-users consider Franz Schubert's piano sonata D. 959 in A major to be a *work* for piano in the form of a sonata, without making reference to specific scores or recorded performances. Rather, many scores and recorded performances are viewed as equally reflecting these canonical or representative attributes.

This sort of extrapolation of characteristics significant in identifying a *work* occurs even when all early

expressions and *manifestations* are lost, such as with classical texts originally passed down orally. End-users still consider Homer's *Odyssey* to be linked to the Classical Greek language and that it is a narrative poem, even though the earliest extant versions are considerably later than the original creation, and even though the evidence for Homer as an individual creator has been questioned. Some characteristics can be inferred even for lost *works* with no extant *expressions* or *manifestations*, as long as some other evidence exists.

Since end-users perceive certain characteristics as pertaining to, or being inherent in, the *work* itself, these characteristics are useful as a means of describing and identifying the *work*. 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.

In the model, the *work* attribute *representative expression attribute* records the values of those attributes that are imputed to the *work* level through this mental process. This attribute is defined in the model as a pragmatic way to "park" information under the *work*, and in this way avoid the need to record the information in association with any specific *expression*. When the actual representative *expressions* may not otherwise be needed in the database as no *manifestations* of those *expressions* are represented, this streamlining is particularly convenient.

For any *expression* of the *work*, the values held by the same attributes at the *expression* level permits a rough measure of the "distance" between a given *expression* and *expressions* that would be perceived as representative or "canonical". Many *expressions* of a *work* may, in fact, match the values of the *representative expression attributes* and so form a network or cluster of canonical *expressions*. As the *work* attributes are distinct from the source *expression* attributes, there is no contradiction in having *expressions* of the *work* that hold values for these attributes different from those recorded as *representative expression attributes*.

The model provides the container for these significant attributes by declaring a single, multivalued attribute for the *work*. However, an implementation would need to specify which attributes are considered significant for the identification of *works* and provide appropriate sub-types for the attribute *representative expression attribute*. The sub-types might be defined differently depending on the value of the *category* of *work* attribute. For example, for primarily textual *works*, the *expression* attribute *language* might be chosen. For cartographic *works*, the *expression* attribute *cartographic scale* may be significant, but not *language*. Many *expression* attributes have the potential to be adopted as *representative expression attributes* for some categories of *work.* For example, the attributes *intended audience*, *cartographic scale*, *language*, *key*, *medium of performance*, as defined in the model, could plausibly be used.

To reduce data entry, a cataloguing module can implement "automatic" promotion to *representative expression attribute* for relevant *expression* attributes in the vast majority of cases where new *works* are realized through a single *manifestation* of a single *expression*. This would also frequently (but not always) be the case with art *works*.

The model does not prescribe the criteria that are to be applied in making the determination of representativity for the values of any given *expression* attribute; this is operationalized by the relevant cataloguing practice. Whether a characteristic is displayed by 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 original has not been preserved, or the cataloguer does not have enough information to know. These operational criteria may involve judgement of the appropriateness of certain *expression* characteristics for the end-user population, such as arbitrarily selecting among several equally "original" *expressions*, the one that is in the language of the catalogue.

Example

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

Expression 1 (matches the representative expression attributes):
has language: English
has title: Still life
was created by: Louise Penny

Expression 2 (does not match the representative expression attribute language):
has language: French
has title: Nature morte
was created by (translator): Michel Saint-Germain

5.7 Modelling of Aggregates

An **aggregate** is defined as a *manifestation embodying multiple 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, issues of serials and other similar groups of resources. Examples include journal issues (aggregates of articles), multiple novels published together in a single volume, books with independently written chapters, compilations on 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*, as are full scores with added reduction for piano. 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 official 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, or a DVD containing a motion picture with a choice of spoken languages and subtitle languages.

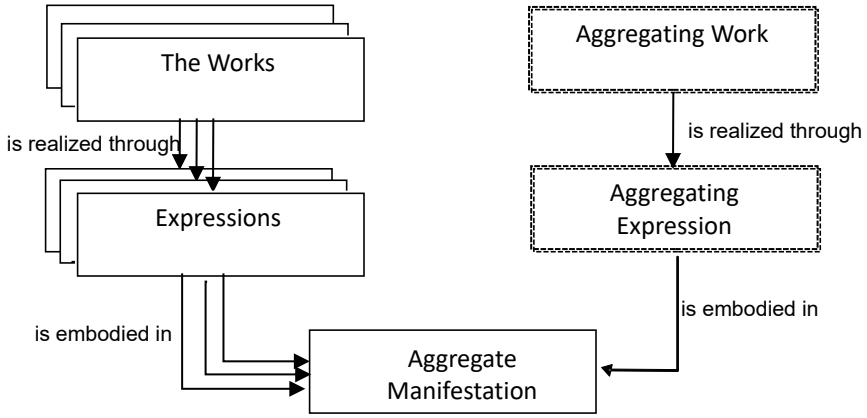
Manifestations may contain multiple *expressions* as indicated by the many-to-many relationship between *expressions* and *manifestations*. This is the only many-to-many relationship among the WEMI entities. A *manifestation* can embody multiple *expressions* and an *expression* can be embodied in multiple *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 this sense the aggregation happens on the *expression* level, because only *expressions* can be combined (or aggregated). In the process of combining the *expressions* and thus, consequently, 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). The essence of the *aggregating work* is the selection and arrangement criteria. It **does not** contain the aggregated *works* themselves and the whole-part relationship is not applicable. An aggregate should not be confused with *works* which were created with parts, such as multipart novels.

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*. This general model is illustrated in figure 5.7.

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. In the same way, a previously undescribed augmentation (for example, a preface) can be described when considered significant, for example when it is republished as an essay.

Figure 5.7 General Model for Aggregates



5.8 Modelling of Serials

Serials are complex constructs that combine whole/part relationships and aggregation relationships:

- they have a whole/part relationship to individual issues published over time (even though there are serials that happen to have only one issue released);
- and each individual issue is an aggregate of articles (even though there are serials that can occasionally have issues consisting of only one article).

Each issue of a serial constitutes an aggregate *manifestation* according to the IFLA LRM definition of aggregate as a *manifestation* embodying multiple *expressions*. This *manifestation* is issued in a sequence of parts over time, and embodies *expressions* of distinct *works*, as well as an *expression* of an aggregating *work* which provides the plan for the aggregation. In the case of a serially-issued sequence of aggregate *manifestations*, the aggregating *work* is termed a serial *work*. In the model, the term serial *work* is restricted to this specific type of aggregating *work;* this usage differs from common library usage in which the terms "serial work" or "serial" are used to refer to the resulting sequence of aggregate *manifestations*.

The description of serial *works* 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 *work* will be, at least in 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 IFLA LRM, as one "that permits the identification of the commonality of content between and among various *expressions*", a serial *work* 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 aggregates 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 *work* 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*.

Consider the case of a serial issued with distinct regional "editions" (for example *The Wall Street journal* which is issued in Eastern and Western editions). The use of the term "edition" gives the impression that this case is analogous with monograph edition statements which frequently indicate two *expressions* of the same *work*. However, for a serial *work*, whose essence is the editorial concepts that guide the production of the issues that comprise the resulting aggregate *manifestation*, the differences between regional editions are sufficient to result in two distinct, albeit related, serial *works*. 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 serial *work* entity. In this high-level model, however, not *all* specific relationships that may hold between serial *works* are listed. Applications which need a more detailed model for serials are invited to either adopt a specific conceptual model for serials, such as $PRESS_{OO}$, or declare their own set of specific relationships among serial *works*, according to the overall philosophy of the IFLA LRM model.

It ensues that any serial *work* can be said to have only one *expression* and only one *manifestation.* All relationships between serials can be modelled as *work*-to-*work* relationships, even in cases where all the issues of a given serial that have been published so far aggregate translations of articles that are themselves aggregated in the issues of another serial: it would be tempting to say that the text of the former serial is a "translation" of the text of the latter, and that both are, therefore, according to the cataloguing rules that currently prevail in the library world, "expressions" of one and the same "work". However, as it is impossible to predict that this relationship will hold in the future, it would be wrong to model these two serials as mere *expressions* of one *work*, and it is ontologically more accurate to regard them as completely distinct *works*. Similarly, when a serial is released in the form of printed issues and another serial is released as PDF files made available online, and when a thorough examination of all the issues of both serials that have been released so far reveals that the content of the PDF files is rigorously identical with the content of the printed issues, it would be tempting to model these two serials as two *manifestations* of one *expression* of one *work*. But once again, it is impossible to affirm that the serial issued on paper will be coextensive in time with the online serial, and that this relationship will hold in the long term.

However, it remains possible to expand the IFLA LRM model by defining 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. An ISSN can therefore be said to identify an individual serial *work*, while an ISSN-L can be said to identify a particular case of such an additional entity when, at the time of cataloguing, a given serial is simultaneously released in printed form and as PDF files.

Chapter 6 Alignment of User Tasks with the Entities, Attributes and Relationships

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 Table 6.1 in this section illustrate a range of these specific tasks. The use cases make the link between the end-users' activity and the model by framing the end-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 *expressions* or *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 *time-span* 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 a 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 instances of an entity - 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 instance of 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 instance of an entity in different controlled vocabularies (such as finding a classification number that corresponds to a subject heading or term)

Chapter 7 Glossary of Modelling Terminology

Attribute	A type of data which characterizes specific instances of an entity
Cardinality	Specification of the number of instances of the domain and range entities that may be connected by the specific relationship
Disjoint	Entirely non-overlapping sets. Disjoint entities can have no instance that is simultaneously an instance of more than one of these entities
Domain	The source entity, or departure point, for a relationship
Enhanced entity-relationship model	Entity-relationship model that incorporates the notion of inheritance of attributes and relationships from an entity to all the entities that are subsumed in it
Entity	An abstract class of conceptual objects, representing the key objects of interest in the model
Instance	A specific exemplar of an entity
Inverse	The logical complement of a relationship, which traverses from the range to the domain
Multivalued	Attributes that can have more than one value for a specific instance of an entity
Path	Traversing two or more relationships in sequence
Property	An attribute or relationship of an entity
Range	The target entity, or arrival point, for a relationship
Reciprocal	*see* Inverse
Recursive	A relationship for which the same entity serves as both domain and range
Reification	Process through which a relationship is modelled as an entity, so that it can in turn have its own attributes and relationships
Relationship	A connection between instances of entities
Shortcut	A single relationship which serves to represent a more developed path consisting of two or more relationships
Subclass	An entity, all of whose instances are also instances of a larger, superordinate entity
Symmetric	A relationship for which the relationship name is the same as the name of the inverse relationship
Universe of discourse	Everything considered relevant in the domain that is being modelled

Chapter 8 Conceptual Models Consulted

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