A Time-aware Ontology for Legal Resources

Abstract
This paper presents a new approach to associating metadata to legal documents by exploiting a fully developed information ontology of legal resources that takes time into account. Our information ontology is technically an application of the FRBROO model to organization of legal documents. Our contribution clarifies not only the diachronic evolution of the legal resources in time, but it also puts the theoretical grounding for the modeling of the relationships between the different entities participating to the legislative process workflow (e.g. bills, amendments). Our model is also applicable to all artefacts of the publishing process. Moreover the time dimension can be used to support successful interconnections between different legal resources (e.g. between normative acts and case-law) that need precise point-in-time referencing.

Introduction
Document models based on the IFLA Functional Requirements for Bibliographic Records (IFLA, 1998) are used within several existing projects in computer support of activities in the legal and legislative domains (Lima, 2007) such as the Akoma Ntoso (Vitali, 2007), LexML Brasil, CEN Metalex (Vitali et al., 2007) and Norme in Rete (Archi et al., 2000) projects. Yet, they are mostly oriented to bibliographic organization of documents without a real modeling of the peculiar characteristics of the legal domain. Also, all of them refer to the current official version of the FRBR model, called FRBR\textsubscript{ER}. Recently the FRBR model has undergone major revisions and a new version using an object-oriented approach is being developed.

Several legal ontologies exist concerning the legal resources but are mostly aimed at modeling the content, like LKIF-core (Breuker et al., 2007), or the issues connected to the legal language, like LOIS (Peters et al., 2007). Yet, we are currently missing an ontology to represent legal resources themselves, especially considering the information perspective and the time dimension. We consider this a preliminary step to a full modeling of legal knowledge.

From FRBR\textsubscript{ER} to FRBR\textsubscript{OO}
Initially described as entity-relationship model to the organization of bibliographical records, FRBR is being revised by three working groups. One of these groups is working on the harmonization of FRBR concepts with the CIDOC CRM ontology (ICOM 2004). This integration process between the main reference models of library and museum communities, started in 2003 and not yet finalized, has been a “good opportunity to correct some semantic inconsistencies or inaccuracies in the formulation of FRBR” (Bekiari, Doerr & Le Bœuf, 2008, p. 9). This harmonization effort also introduces the dimension of time in the FRBR model, which is essential to the museum community as well as to the legal domain.

According to Smiraglia (2003) the concept of work became central for retrieval leaving the role as secondary entity in the first catalogues, which focused on the inventory function (where item as central), having now a more important role in modern catalogues after noticing that users of a information retrieval system are interested in the content and
not in a specific manifestation. Even before the publication of the FRBR\textsubscript{ER} model, some research argued about the need of the creation of an entity which grouped works derived from another work. For example, Yee (1995) and Svenonius (2000) defended the creation of the entity “Superwork”. Other researchers, which defended the essence of the same idea, nominated this entity “Bibliographic Family” (Smiraglia & Leazer, 1999), “Textual Identity Network” (Leazer & Furner, 1999) and “Instantiation Network” (Smiraglia, 2002).

The new FRBR\textsubscript{OO} crystallized the results of researches and proposals regarding the Work, the most abstract concept of the FRBR\textsubscript{ER}, creating the new class “F15 Complex Work” which allows the grouping of Works according to some criteria. The “F14 Individual Work” class has been defined to model the associated concepts with a specific group of signs (F22 Self Contained Expression). The new model defines seven other classes related to the entity Work (F1 Work, F16 Container Work, F17 Aggregation Work, F18 Serial Work, F19 Publication Work, F20 Performance Work, F21 Recording Work). Apparently complex, this new more detailed modeling allows us to represent each aspect which in FRBR\textsubscript{ER} were under the umbrella of a single entity (the Work Entity) making the model easier to use.

**FRBR\textsubscript{OO} and Legal resources**

In order to apply the new FRBR\textsubscript{OO} model to legal resources, we give the following operational definitions of the main legal concepts:

- **Norm** — A rule of conduct issued by a competent authority and prescribing or regulating behaviour among individuals and within society. Its form of expression may be the written or the spoken word, but it may also be visual or be based on usage and custom.

- **Normative provision** — Any group of words or piece of writing expressing a norm or series of norms.

- **Normative document or act** — An officially published legislative written document through which a competent authority brings a norm into being.

- **Legal system** — A set of norms belonging by some criterion to a single system and related to one another in different ways, as by hierarchy (one norm having a higher or lower standing than another), generality (more specific or more general), time (issued before or after another norm), and modification (one norm modifying the other norm or getting modified by it).

- **Normative system** — The same legal system viewed from the outside is dynamic: it changes over time and can be represented in its evolution as a series of snapshots or film-stills in succession. The sequence in the time of legal systems so captured we will call the normative system. (Palmirani, 2005)

Figure 1 shows the “F27 Work Conception” and “F28 Expression Creation” events that create an original document (F4 Manifestation Singleton), as well as the “F32 Carrier Production” event that forms a “F19 Publication Work” which, in turn, produces various items. Normally the “Act 1 Text” and “Act 1 Published Text” instance has the same content (set of signs), but sometimes it is necessary to publish official communications with rectifications.

Table 1 relates classes and instances which can be identified in a signed official normative document.

A specific edition of an official gazette contains various entities which coexist. On a first analysis it is possible to perceive the publication per se which is the result of an industrial process and generates a number of issues according to a determined production plan. If we abstract the publication, it is possible to perceive the entities related to the shown legal resources. Table 2 relates classes and instances which can be identified on a page of an official publication.
During the life cycle of a legal norm various events can affect its content in relation to its form as well as to its subject matter. For example, the normative expression of a norm could be affected by actions of integration, modification or repealing. In the moment of an event of a norm modification, a derived work is created and it is represented by a new instance of “F14 Individual Work” class with the respective instance of “F22 Self Contained Expression” class. It is important to point out that the creation of a modified norm (derived) occurs in the “in force” date of the modifying norm. These dynamics are illustrated by Figure 2 which shows what happens when a norm (“Act 1”) is modified by another norm (“Act 8”).
The concepts of Normative and Legal Systems are implemented in our model using instances of class “F15 Complex Work”. The set of legal resources which exist on a determinate date make a Legal System. The set of Legal Systems make a Normative System. This systematization is illustrated in Figure 3 which shows the elements of the previous example (Figure 3) grouped into Legal and Normative Systems.
The publication of a normative text can be accompanied by complementary information in sections normally named “Annex”. This kind of relationship can happen in a recursive way, that is, an annex can have other annexes. Using the Ontology of Universals (Guarino 1999) terminology, an annex is considered a Role and not a Type. As Roles have a limited organizational relevance, to represent an annex it is necessary to analyze the annex content. In the case that this entity has its own identity criteria such as regulations or international treaties, the annex is classified as “independent annex”. In the other case, when the entity presents complementary information and which are dependent of the main part, such as tables, we classified it as “dependent annex”.

When an independent annex exists, an instance of class “F15 Complex Work” should be used as a way of grouping instances of “F14 Individual Work” which exist to each component (main part and annexes). In the case of dependent annexes, the property “R5 has component (is component of)” is used between “F22 Self Contained Expression” instances and there is no need, in this case, to define additional instances at Work level. Figure 4 illustrates the two situations described above.

**Figure 4. Norm and Annexes**

![Diagram](image)

(a) Independent Annex  
(b) Dependent Annex

When a norm is published in different languages, in cases such as legal translations or simultaneous publications in multiple languages, even though each text has the same value on a legal perspective, the legal resources are modeled with distinct instances of class “F14 Individual Work” and the respective instances of “F22 Self Contained Expression”.

As class “F22 Self Contained Expression” does not have the property which associates its group of signs to a specific language it is necessary to associate the entity represented in “F22 Self Contained Expression” instance with one “E33 Linguistic Object” instance and respective “E56 Language” instance. This is possible because FRBRoo is considered, using the terminology of Masolo et al. (2003), a multiplicative ontology, allowing colocalized entities.

Figure 5 represents the modeling to norms published in different languages with the same legal validity.
Conclusion
The proposed model describes the evolution of legal resources in time and could model the relationships between the entities participating to the legislative process workflow (e.g. bills, amendments). Moreover the time dimension successfully expresses the interconnections between different legal resources that need precise point-in-time referencing (e.g. between normative acts and case-law). Our model correctly describes all actual artefacts of the publishing process, such as legislative gazettes and other publications, including re-publications and errata.

This paper shows a model of the information objects of the legal domain and in particular focuses on the evolution of legal resources in time, defines the relationship of normative and legal systems concepts, and provides explicit support for modeling annexes and norms published in more than one official language.

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References


