CRONOLEX: A System for a Dynamic Representation of Laws

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Abstract. In this paper we present the architecture of a system that is being designed for the efficient recovery of Spanish laws based on the metadata structured in XML to allow the definition of a consolidated database to recover the state of a legal norm in a certain date.

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1. Introduction

The system which we are developing, is a system to manage all the life cycle of a legal norm from the drafting of the norm to the use of the norm by users.

For the system development one of the main tasks was to design a flexible XML structure to be able to represent all the types of legal documents that exist in Spain. The XML structure was captured in a DTD.

The most important property of this XML structure is that all necessary metadata, to indicate the derogations, substitutions, cancellations and integrations that other legal norms have made on the original norm throughout the time, is saved together with the text of the original norm.

The greatest data, of this metadata, are the references to the modifying norm (either complete norm or the article or the specific statement), the date of the update and the section of the norm that is updated.

Onces the XML structure was defined, we developed five modules to resolve the problem of making a consolidated database to recover the state of a legal norm in a certain date.

The modules are:

– Consolidation module
– Search module
– Edition module
– Web module
− Database module

The consolidation module is the most important module because when we consult the state of a legal norm in a certain date is the one in charge of processing the norm and the metadata and, with all this data, it creates a new consolidated version of the norm in the consulting date.

The great benefit of the metadata and this module is that it is not necessary to keep the different versions of the norm throughout the time (because of the changes that other norms make), but the consolidated state of the norm in a certain date is automatically generated.

The consolidation module with the other four modules allows us to manage all the life cycle of a legal norm and to obtain the wished result.

2. Why we use XML?

The advantages that XML offers for document and data management and exchange of information are very well known.

Among the advantages of XML for the legal document marked one it is possible to emphasize:

− **To add the metadata**: The main benefit of XML, for the legal document marked one, is that it keeps by the text that represents the legal document, the necessary metadata to give meaning to that text, therefore the computer can process this document.

− **Hypertextual capacity**: It allows to integrate the connections of the references in the own text, both the internal ones to the document and the external ones to other documents. This capacity is extremely important by the explicit relations that a legal text has.

− **Search facility**: It is possible to integrate easily a search motor that it allows to make functions of precise searches and “semantic” searches functions understanding by “semantic” searches by the meaning of the content of the legal document.
3. Our XML structure

Once we have chosen XML, the first task was to develop a XML structure sufficiently flexible to be able to define all types of legal norms in the Spanish legislation.

This XML structure we have captured in a DTD which has two great parts:

1. The metadata of the norm.
2. The text of the norm.

3.1. The metadata of the norm

The metadata of the norm is contained in the tag:

\[
\text{<Metadata> ... </Metadata>}
\]

This tag saves information which is not part of the text of the norm but it is information to identify and describe the legal norm and to indicate all the derogations, substitutions, cancellations and integrations that other legal norms have made on the original norm throughout the time.

It is the part that is updated when other norm modifies (revokes, replaces, cancels or includes) to the norm.

It’s composed of:

- **Urn**: Global identifier of the legal norm.
  An example of this is “urn:um:COU954/2002”
  The structure of the URN is composed of one prefix of the University of Murcia (um), the abbreviation of the classification of the norm, the number of the norm and the year of the publication of the norm.

- **Publication date**: Date when the norm is published in a gazette.

- **Take effect date**: Date when the norm begins to have effect. It can have several for different parts from the norm.

- **Approbation date**: Date when the norm was approved.

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1 Uniform Resource Names (URNs) are intended to serve as persistent, location-independent resource identifiers and are designed to make easy to map other namespaces (that share the properties of URNs) into URN-space. Therefore, the URN syntax provides a meaning to encode character data in a form that can be sent in existing protocols, transcribed on most keyboards, etc.
- Gazette: where the norm was published.
- Unofficial name: Colloquial name of the norm
- Source of the norm.
- Rank: Legal classification that the norm has.
- Number: Number of the norm.
- Links tags: Links that the norm has with other norms, or with parts of the other norms.
- Derogations tags: Derogations that the norm has suffered by other norms since its publication to nowadays.
- Cancellations tags: Cancellations or annulations that the norm has had, for example by judicial sentences
- Integrations tags: Parts included (passages of text) by other norms.
- Substitutions tags: It represents changes that other norms have made to fragments of text of the norm, throughout the time

The links, derogations, cancellations, integrations and substitutions tags have attributes to indicate the date of the change, the part of the norm that is updated, and the identifier of the modifier norm and these are the tags that help to create the correct norm in a certain date.

By example here we can observe the metadata of "Council Decision of 28th February of 2000" in September of 2006:

```xml
<MetaInformacion>
  <urn>urn:um:COU185/2000</urn>
  <FechaAprobacion date='000228'/>
  <FechaPublicacion date='20000228'/>
  <FechaVigencia desde='20000228' id='v1'/>
  <Boletin date='20000228' numero='111' tipo='BOE'/>
  <Alias>COUNCIL DECISION</Alias>
  <Modificacion id='m1' fecha='20021203' parteModificada='@1.1.2' xlink:href='urn:um:COU954/2002@1.1.1'/>
  <Modificacion id='m2' fecha='20021203' parteModificada='@3.1.3' xlink:href='urn:um:COU954/2002@1.1.2'/>
</MetaInformacion>
```
<Modificacion id="m3" fecha="20040101"
parteModificada="@1.1.2"
xlink:href="urn:um:COU161/2004@1.1.1"/>
<Modificacion id="m4" fecha="20040101"
parteModificada="@3.1.3"
xlink:href="urn:um:COU161/2004@1.1.2"/>
<Rango>Council</Rango>
<Numero>185</Numero>
<IdOrden>EC</IdOrden>
</MetaInformacion>

3.2. The text of the norm

This is the part that saves the text of the norm in a hierarchical form.
The tags that compose this part are:

- **Head:** It is the first tag that saves the text of the norm, saves the
  head of the legal norm.

- **Introduction:** Tag where the introduction of the legal norm is struc-
  tured (also called preamble). It is composed by the “Exhibitions of
  Reasons” or by a single introduction text.

- **Articulate:** Tag which represents the articles of the norm. These
  can be structured in:

  - *Book*
    - *Chapter*
    - *Section*
    - *Subsection*
    - *Article*
    - *Paragraph*
    - *Statement*

  Only the tags “article”, “paragraph” and “statement” are obligatory,
  the other tags are to represent in a hierarchical way the legal norm.

  Each one of these tags has an identifier and has attributes to indicate
  its take effect date, if it is derogated or it is modified by other legal norm,
  or if it is cancel by a judicial sentence.

- **Resolutions:** Part that represents the resolutions that a legal norm
  may have. There are four types:
• Additional
• Temporary
• Derogation
• Final

− **End**: Final part of the legal norm, it includes the signature and the date.

− **Attachés**: This part represents any text which is included at the end of the norm.

4. **System Architecture**

The system is composed by four modules

4.1. **Module of Law Consolidation**

It is the one in charge of recovering the state of a legal document in a certain date.

The module processes the document XML (that represents the legal norm) and at the same time it creates a new document XML with the state of the legal document at that date.

Its operation is that it processes the metadata of the document, then it verifies if there have been modifications of the legal norm from the date of publication to date that we want to look for.

Besides the original norm, all later norms that substitute, integrate, derogate or cancel the norm are processed, from its take effect date to the concrete date.

At the end of the process we have got a new document XML with the changes that other legal documents (or judicial orders) have made to him.

This new XML document is “a virtual” document (it is not kept in the database), i.e., versions of documents are not created as some of the European projects do (as it happens in the “Norma Project” of Italy).

4.2. **XML Database Module**

This module is the one in charge of keeping all the XML documents that represent the legal norms.

We used a native XML database (XINDICE) because:
1. You needn’t transform the document XML in other structure of data.

2. It is not centered on the data, i.e. it does not store atomic data, but it stores documents XML.

4.3. **Module for documents edition**

This module is the one in charge of transforming the original legal norm into the document XML with the necessary structure.

We can resume this process in this graphic:

![Process of Transformation Diagram](image)

*Figure 1.*

The legal norm is transformed according to the made DTD and the result is one XML document. When the norm is transformed in XML, it is saved in the database and at the moment the system can use it. Also in this moment, the metadata of the legal norms that the norm modifies is updated. The module is developed as an application Web for the manual introduction of the data. It is a series of forms to introduce all the data in the corresponding tags. An open research line, we are working in, is to make this automatic task.

4.4. **Search module of the legal documents**

We have developed a module to make searches on the contained legal norms in the database. These searches can be made by means of different criteria. The most important searches are the ones for the dates that affect the legal norm as approval date or publication date or take effect date. The criteria can be mixed to make more precise searches. With this module any user can find quickly all the legal norms that he needs to resolve a problem.
5. Conclusions and future work

Within this project, the work of a user is facilitated when he needs to recover the state of a norm at a concrete date, since it is acceded automatically to all the norms that modify a concrete one, and thus he doesn’t have to do it manually. Besides saving work, it makes errors being reduced because the system is going to consider all the changes that have affected the legal norm from its publication date to search object date. For future works we have two important research lines

1. The improvement of the created applications, mainly in the automatization of the edition module of the legal texts.

2. To extend the defined system in a more generic one which aims at determining, for a certain case, what norms are applicable and what version of these, understanding by version, the state of that norm in a concrete date.

References


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