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Semantic Web and Law Sources On-Line

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The Semantic Web: definition

- The most famous definition of Semantic Web:

The Semantic Web is an extension of the current web in which information is given well-defined meaning, better enabling computers and people to work in cooperation."

Tim Berners-Lee, James Hendler, Ora Lassila, The Semantic Web, Scientific American, May 2001

The Semantic Web

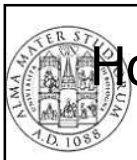
- Information become from "machine readable" to "machine understandable".
- Data can be processed by automated tools as well as by people.
- Programs totally independently are able to share data (interoperability).

A possible Scenario

- Maria, an Italian citizen, is an unemployed woman expecting a baby. She thinks she is entitled to unemployment benefits for this problem, but does not know who to turn to.
- This request has been retreived from the website http://italia.egov.it, from the life event "having a baby." The response to this problem is given by a human operator.
- In a Semantic Web, this same research could be made by a sw agent that connects to an Italian portal on egov and based on life-events.
- A possible Scenario

Semantic Web Architecture

- The most important elements of the Semantic Web are:
  - a system to identify resources on the Web (URI)
  - a common syntax, usable by any applications, that allow to define arbitrary structure for XML Document
  - a language to describe resources, that associate the data with their meaning (RDF)
  - models and rules to compare and deduce information about the resources (ontologies)
  - methodologies for validate the truthful and reliability of information (Web of Trust)

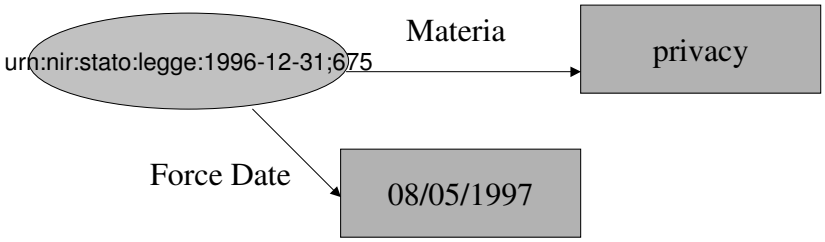


How to indentify resources - URI

- An HTML Document with the text of "Law No 675 of 31 Dec 1996":
  http://www.garanteprivacy.it/garante/navig/jsp/index.jsp?folderpath=Normativa%2FItaliana%2FLa+legge+n.+675
- A Uniform Name for the "Law No 675 of 31 Dec 1996", as NIRs rules:
  urn:nir:stato:legge:1996-12-31;675
- A Concept of Dublin Core:
  http://purl.org/dc/terms/title

Statement about resources

- With RDF we can make statement about resources.
  - es. *Law No 675 of 31 Dec 1996* has topic *privacy* and has Force Date *08/05/1997*



The ontological level

- A common syntax (XML) and a framework to make statement about resources (RDF) aren't enough.
- Different systems can use different words to express the same concept.
- Ontologies are used to achieve this goal.
- Ontologies make it possible to compare the meanings of the terms used for communication among different communities.

What is an ontology?

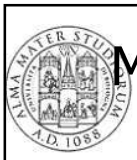
- The term "ontology" is carried over from philosophy (Ontology) to indicate the shared and common knowledge of a domain.
- An ontology (with lower case) is
  - "*an engineering artefact, constituted by a specific vocabulary used to describe a certain reality, plus a set of explicit assumptions regarding the intended meaning of the vocabulary words*" [Guarino, N. 1998 Formal Ontology in Information Systems. Amsterdam, IOS Press].
  - "*a specification of a conceptualization*" [Gruber 95]

Why ontologies?

- Ontologies enable us to specify the properties and interrelations of the concepts making up a domain.
- Ontologies can be used for:
  - Semantic Interoperabilty - database integration, e-commerce, etc.
  - Information Retrieval - query over document sets, natural language processing

How to express an ontology

- Are kind of ontologies (with different levels of accuracy): a glossary, a collection of taxonomies, a thesaurus, a DB/OO scheme, an axiomatized theory.
- To formalize ontologies there are several languages.
- OWL (Ontology Web Language) is the latest proposal of W3C. OWL has more facilities for expressing meaning and semantics than XML, RDF, and RDF-S.



Metadata for the Legal Domain

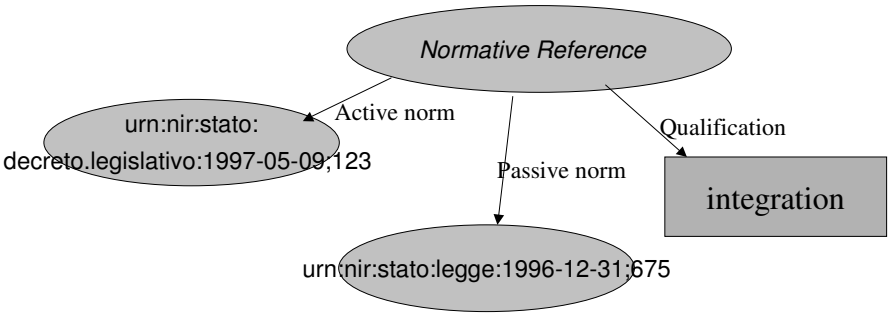
- The researches on the Semantic Web can be applied in Legal Domain to achieve the document sharing and knowledge reuse.
- Processing Normative Act with automatic tools requires to enrich structural data with METADA (force data, publications, topics, ...).
  - NIR DTDs, for example, require an element 'Descrittori', witch carries out information about the act.
- With XML we cannot estabilish a standard behaviour for the elements used, nor can attribuite meanings to this elements.
- Ontologies for Legal Resources allows computers to find and interpret information by identifying the relation among normative acts and formulating statements on the content of norms.

Legal ontologies

- To apply these technologies to the legal domain we need to be able to identify the "building blocks" of legal knowledge.
- Two relevant legal ontologies are:
  - Van Kralingen and Visser's frame-based ontology, which represent legal knowledge as composed of three entities - norms, actions, and concepts - and proceeds on legal-theoretical analyses to define attributes.
  - Valente's functional legal ontology, which describe the constituent elements of a legal system according to the function they serve, that is, regulate the social system

A Legal Reference ontology(1)

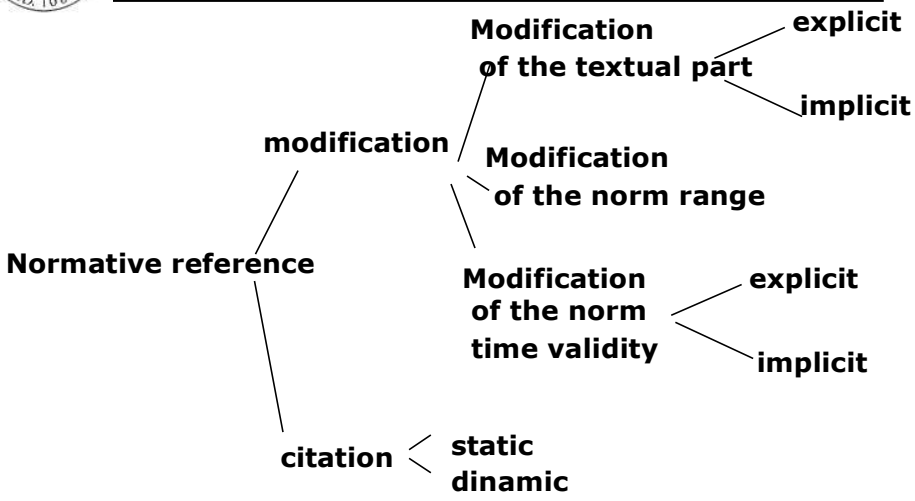
- A normative reference represents a relationship between two norms (active norm and passive norm) and it has a property, called *qualification*, that identify the action performed on the passive norm.



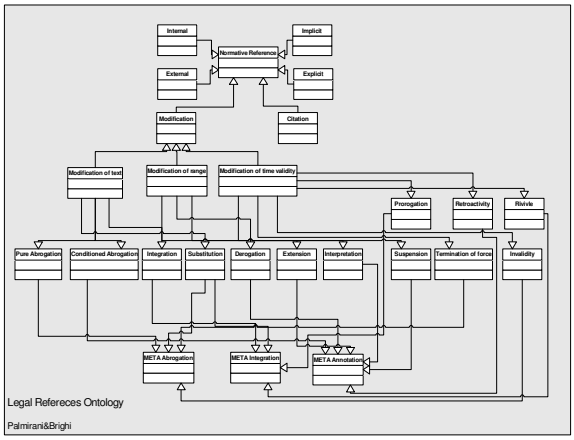
A Legal Reference ontology (2)

- The property *Qualification* of Normative References can be represented by building a specific ontology.
- These information can be used by automatic applications for:
  - write notes into the end-norm text
  - automatically generate a consolidate text
  - place alerts that notify users of any changes to this norms

Qualification of normative references



A Legal Reference ontology UML Diagram



New potential prospects

- Not only qualify the semantic value of the normative references but:
  - Represent Deontic aspects(duty, obligation, permission)
  - Represent Functional aspect of the norms
  - Represent Semantic meaning of the norms

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