AI and Law
Modeling Legal Knowledge

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Overview

- Approach to the Semantic Web for Legal Resources

- Organizing the Semantics of Legal Resources
  - Implementing the IFLA-FRBR model

- Modeling Legal Knowledge in the Semantic Web
  - Semantic Model of Normative Provisions, and related Axioms

The Semantic Web in the Legal Domain

- Improve quality and accessibility of legal information in different legal systems and languages;

- Promote interoperability among applications and legal information systems;

- Provide high quality integrated services both for policy makers and citizens.
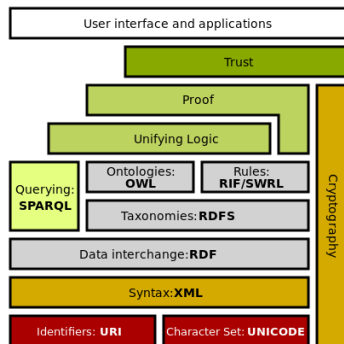
The Semantic Web Layers
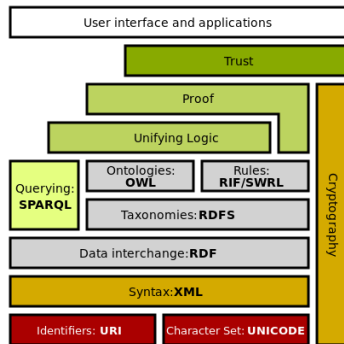
The Semantic Web Layers

- URI: Legal Resources (Sources of Law) identifier
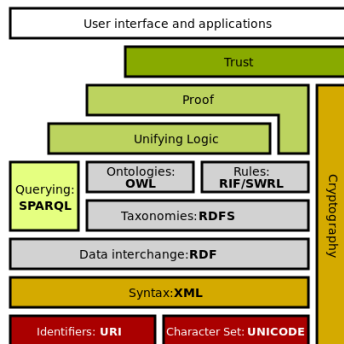
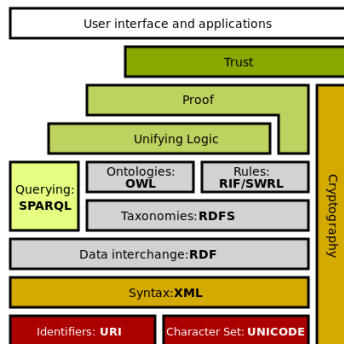# The Semantic Web Layers

- XML: Legal Resources (Sources of Law) structure
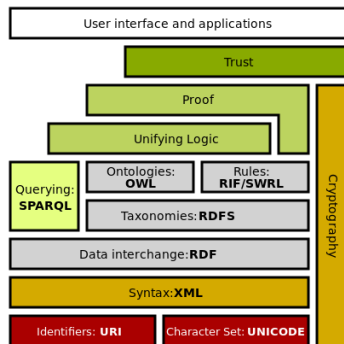- URI: Legal Resources (Sources of Law) identifier

The Semantic Web Layers

- **RDF**: Semantic statements on data
- **XML**: Legal Resources (Sources of Law) structure
- **URI**: Legal Resources (Sources of Law) identifier

The Semantic Web Layers

- RDFS/OWL: (Legal) Knowledge Modeling
- RDF: Semantic statements on data
- XML: Legal Resources (Sources of Law) structure
- URI: Legal Resources (Sources of Law) identifier

User interface and applications

Trust

Proof

Unifying Logic

Querying: **SPARQL** | Ontologies: **OWL** | Rules: **RIF/SWRL**

Taxonomies:**RDFS**

Data interchange:**RDF**

Syntax:**XML**

Identifiers: **URI** | Character Set: **UNICODE**

Cryptography

Sources of Law Indentification

Sources of Law

> Source of law is a wide concept including any document that can be conceived of as the originator of legal rules

In particular:

- normative acts (legislation and regulations)
- administrative acts
- jurisprudential acts (case law)

Shared source of law naming convention and metadata set allow to identify, discover and query legal acts in a distributed environment

Legal Resources Identifier: Desirable Characteristics

- Unique at international level
- Transparent
- Persistent
- Location-independent
- Language neutral
- Based on Open Standards (no vendors lock-in)
- Free adhesion (pure federative approach)

Why Transparent Identifiers?

- Based on formal parameters of citations
- Only rules syntax and formal parameters of identification are needed
- Automatic document hyperlinking
    - Independent from a remote service providing identifiers
- Possibility of implementing a resolver (centralized or distributed)

Sources of Law and IFLA-FRBR model

IFLA: International Federation of Library Associations and Institutions

FRBR: Functional Requirements for Bibliographic Record model:

- Work: a distinct intellectual creation
- Expression: any different version over the time or across languages (original, amended, localized)
- Manifestation: any different realisation of an expression (paper format, digital format, etc.)
- item: any single copy of a manifestation

Any level includes a set of metadata

Metadata used for identification and semantic description
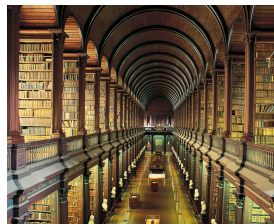
Legal Identifiers based on the FRBR Model

- **LEX** naming convention (URN:LEX and http-based LEX)

- **ECLI, ELI** naming conventions

- **AkomaNtoso** naming convention

LEX Naming Convention

URI naming convention using URN and HTTP-based schemas

Uniform Resource Names (URNs) are
unambiguous and lasting identifiers for legal
resources, independent from:

- availability of the resource
- access modality
- physical location

URIs are used in several Legal XML projects:

- as univocal and persistent identifiers of legal documents
- as tools to represent relationships among them

LEX Identification Metadata (URN syntax)

urn:lex	:	jurisdiction	:	local name

Local name

work	@	expression	$	manifestation

Work level

authority	:	type	:	details	:	annex

urn:lex:uk:ministry.justice:decree:1999-10-07;45:annex.a

Expression level

version	:	language

urn:lex:ch:etat:loi:2006-05-14;22@originel:fr

Manifestation level

format	:	editor	:	components	:	other-features

urn:lex:it:stato:legge:2000-04-03;56$application-pdf;1.7:parlamento.it

LEX Identification Metadata (HTTP-based syntax)

http://<host-name>/lex/<jurisdiction>/<local name>

Local name

<work>/@/<expression>/$/<manifestation>

Work level

<authority>/<type>/<details>/<annex>

http://<host-name>/lex/uk/ministry.justice/decree/1999-10-07;45/annex.a

Expression level

<version>/<language>

http://<host-name>/lex/ch/etat/loi/2006-05-14;22//2008-03-12/fr

Manifestation level

<format>/<editor>/<components>/<other-features>

http://www.senato.it/lex/it/stato/legge/2000-04-03;56/$/application-pdf;1.7/
parlamento.it

Automatic Hyperlinking

Art. 9

The provisions of Directive 77/799/EEC shall apply to the exchange of information under this Directive, provided that the provisions of this Directive do not derogate therefrom. However, Article 8 of Directive 77/799/EEC shall not apply to the information to be provided pursuant to this chapter.

Art. 9

The provisions of Directive 77/799/EEC shall apply to the exchange of information under this Directive, provided that the provisions of this Directive do not derogate therefrom. However, Article 8 of Directive 77/799/EEC shall not apply to the information to be provided pursuant to this chapter.

Document Parsing
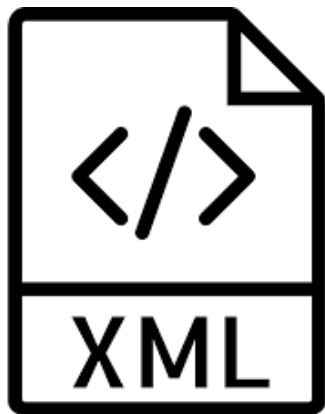
The Structure of the Sources of Law

Legal XML Schemas

- CEN Metalex

- AkomaNtoso

- Formex

- Qualified XHTML

Excerpt of the Structure of Directive 2002/65/EC, represented in CEN Metalex compliant XML

```xml
<article id="art5">
  <paragraph id="art5-par1">
    1. The supplier shall communicate to the consumer all the
    contractual terms and conditions and the information referred
    to in Article 3(1) and Article 4 [...]
  </paragraph>
  <paragraph id="art5-par2">
    2. The supplier shall fulfil his obligation under paragraph 1
    immediately after the conclusion of the contract, if the
    contract has been concluded at the consumer's request using
    a means of distance communication which does not enable
    providing the contractual terms [...]
  </paragraph>
  <paragraph id="art5-par3">
    3. At any time during the contractual relationship the
    consumer is entitled, at his request, to receive the
    contractual terms and conditions on paper. [...]
  </paragraph>
</article>

<article id="art6">
  <paragraph id="art6-par1">
    1. The Member States shall ensure that the consumer shall have
    a period of 14 calendar days to withdraw from the contract
    without penalty and without giving any reason [...]
  </paragraph>[...]
</article>
```
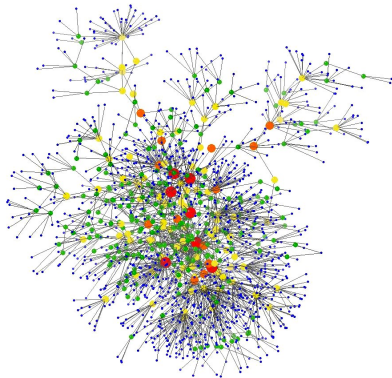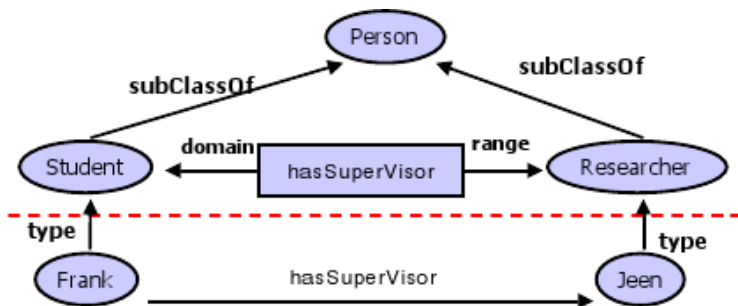
The Semantics of the Sources of Law
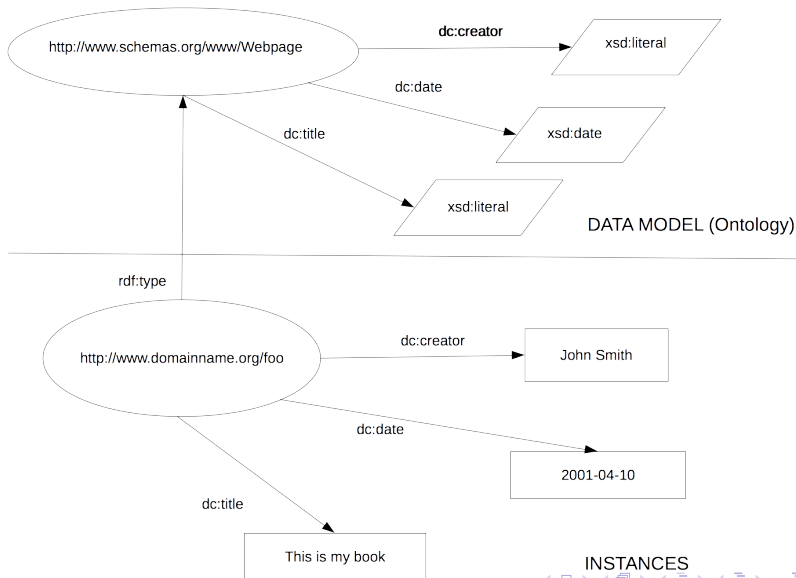
Knowledge Models and Instances

RDFS/OWL (Knowledge Models / Ontologies)

RDF (Instances / Individuals)

Knowledge Models and Instances

DATA MODEL (Ontology)

INSTANCES

Legal Knowledge Modeling and the Semantic Web

Knowledge modeling is essential for implementing the Semantic Web

In the legal domain it provides advanced services

1. Semantic search facilities
2. Consolidation (by amendments description)
3. Analysis of coherence and impact of new texts on the legal systems (contradictory norms, RIA, etc.)
4. Legal Drafting based on semantics

Knowledge modeling as a mean to organize metadata for semantic annotation of the Sources of Law

A Source of Law can be seen as a Bibliographic Resource

Bibliographic Resource in the International Standard Bibliographic Description (ISBD) sense

An entity, tangible or intangible, that comprises intellectual and/or artistic content and is conceived, produced and/or issued as a unit, forming the basis of a single bibliographic description.

Bibliographic Resources can be described by Matadata organized into FRBR model

Distinction between

- Taxonomy of resources
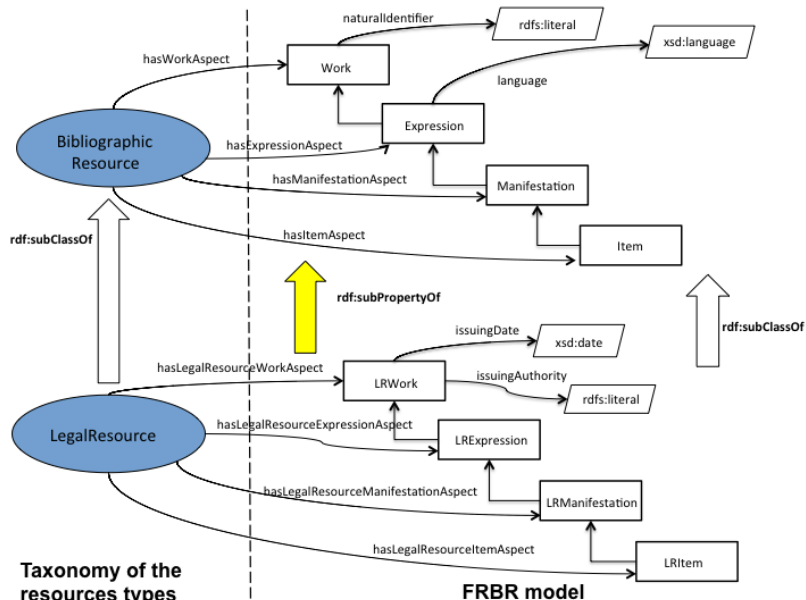- Classes of the FRBR model

$$BibliographicResource = Work + Expression + Manifestation + Item$$

(disjoint union FRBR classes) [Dunrise and Le Boeuf, 2013]

- The relationship between a Resource and its FRBR classes is therefore of part-of / aspect

- Every FRBR level is an aspect of a current resource and collector of the set of metadata at that level

Taxonomy of the resources and FRBR

Taxonomy of the resources types

FRBR model

Resource taxonomy and FRBR model can be viewed as aspects of the same reality in two different perspectives (or logical layers) [Bianchini and Willer, 2014]:

- The web of data perspective
- The bibliographic data perspective

A resource is a set of data identified by a specific URI (web of data perspective)

A class of FRBR is an aspect of a specific resource when viewed as a bibliographic entity (bibliographic data perspective)

Benefits

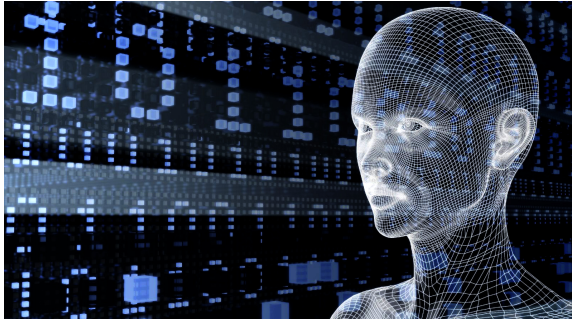- Queries (SPARQL) to access resource metadata are independent from the resource types

  `SELECT ?work WHERE {?r hasWorkAspect ?work}`

- Direct access to the FRBR metadata levels
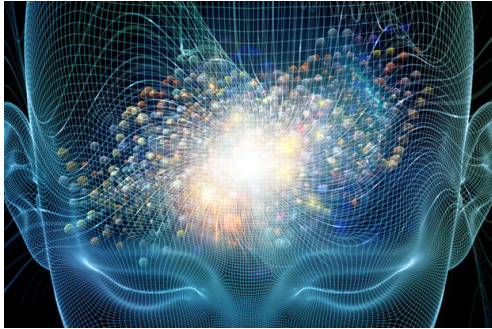
- Metadata organized according to the FRBR taxonomy

Subdivision Modeling
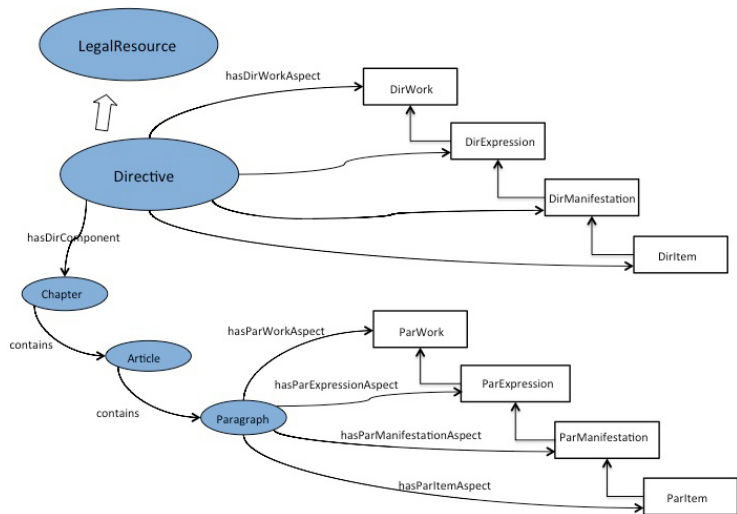
Semantic Web means Smart Data

Smart Data and
Advanced Legal Reasoning

OnLine Contract

Possible Scenario

OnLine Contract

Consumer Protection Law

Possible Scenario

OnLine Contract

Consumer Protection Law

Interest on

- Consumer's rights (ex: *right of withdrawal*)
- Supplier's duties towards the Consumer (*implicit rights of the Consumer*)
- Procedures to fulfill the Consumer's duties and the sanctions in case of not compliance

Possible Scenario

OnLine Contract

Consumer Protection Law

Interest on

- Consumer's rights (ex: *right of withdrawal*)
- Supplier's duties towards the Consumer (*implicit rights of the Consumer*)
- Procedures to fulfill the Consumer's duties and the sanctions in case of not compliance

Retrieval system of norms endowed with reasoning facilities

Profiles of legislative texts

Laws and regulations may be seen as a set of provisions, carried by speech acts [Searle, 1969].

A legislative text can be viewed according to two different *profiles*:

- Formal Profile
  text organization in terms of chapters, articles, paragraphs, etc.
- Semantic Profile
  text organization according to partitions substantial meaning

The Semantic Profile can be represented in terms of normative provisions [Biagioli, 1997][Biagioli, 2009].

Excerpt of EU Directive 2002/65/EC

Art. 5
1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

[...]
Art. 6
1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

[...]

Formal Profile: Set of paragraphs

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

Paragraph

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Paragraph

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

Paragraph

[...]

Art. 6

1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

Paragraph

[...]

Semantic Profile: Set of Provisions

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

Duty (*Supplier*, *Consumer*)

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier*, *Consumer*)

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

Right (*Consumer*, *Supplier*)

[...]

Art. 6

1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

Duty (*Member States*, *Consumer*)

[...]

Semantic sub-profiles: Functional and Thematic profiles

	Functional profile (provision types and attributes)		Thematic profile (attribute contents)
Art. 5			
1. The supplier shall communicate to the consumer [...]			
Duty	hasBearer	=	*Supplier*
	hasAction	=	*Communication*
	hasObject	=	*Contractual Terms*
	hasCounterpart	=	*Consumer*
2. The supplier shall fulfil his obligation [...] using a means of distance communication [...]			
Procedure	hasBearer	=	*Supplier*
	hasAction	=	*Communication*
	hasObject	=	*Contractual Terms*
	hasCounterpart	=	*Consumer*
3. [...] the consumer is entitled, at his request, to receive the contractual terms [..]			
Right	hasBearer	=	*Consumer*
	hasAction	=	*Receipt*
	hasObject	=	*Contractual Terms*
	hasCounterpart	=	*Supplier*
Art. 6			
1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract [...]			
Duty	hasBearer	=	*Member States*
	hasAction	=	*To ensure a period of 14 days*
	hasObject	=	*To withdraw from the contract*
	hasCounterpart	=	*Consumer*

Provision Model in the Legal Semantic Web

Semantic Web

Web of Documents $\longrightarrow$ Web of Data

Legal Semantic Web

Web of Legislative Documents $\longrightarrow$ Web of Normative Provisions

Provision Model contributes to Systematize the Law

A provision-centric view of legislative texts contributes to

1. Transparency

2. Semantic search facilities based on norms

3. Consolidation (by amendments description)

4. Analysis of coherence and impact of new texts on the legal systems (contradictory norms, RIA, etc.)

5. Legal Drafting based on semantics

Provision Model contributes to Systematize the Law

A provision-centric view of legislative texts contributes to

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Advanced retrieval system based on Relations between Provisions

1. **Logical relations**
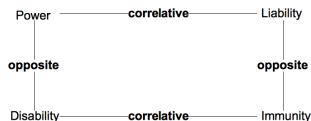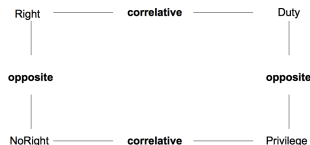   Relations between provisions that are necessary from a logical point of view, as the classical Hohfeldian relations.
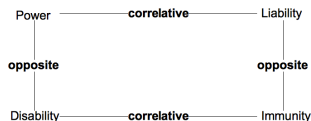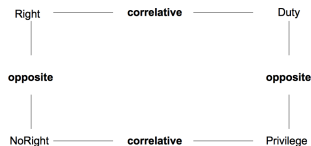
Advanced retrieval system based on Relations between Provisions

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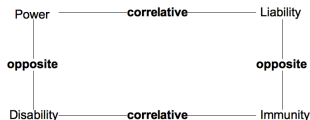

2. **Technical relations**

   Relations not necessary from a logical point of view, but they derive from legislative techniques considerations, as the relations between

Advanced retrieval system based on Relations between Provisions

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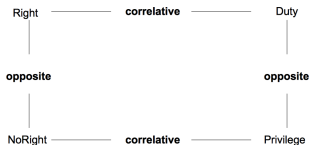

2. **Technical relations**

   Relations not necessary from a logical point of view, but they derive from legislative techniques considerations, as the relations between

   > the Duty of a Bearer to accomplish a specific Action towards a Counterpart ⟷

Advanced retrieval system based on Relations between Provisions

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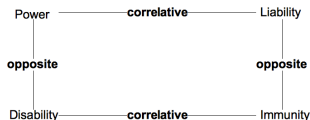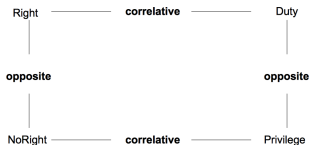

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   > ↪ the Procedure describing how to fulfill such obligation

Advanced retrieval system based on Relations between Provisions

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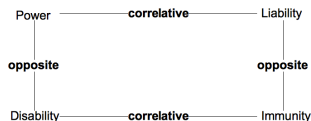
   > the Duty of a Bearer to accomplish a specific Action towards a Counterpart ↩
   > ↪ the Procedure describing how to fulfill such obligation
   > ↪ the Exceptions to it

Advanced retrieval system based on Relations between Provisions

1 Logical relations

Relations between provisions that are necessary from a logical point of view, as the classical Hohfeldian relations.

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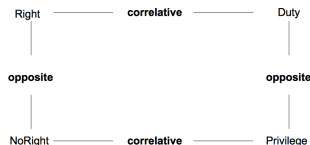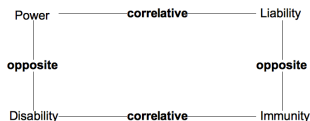
the Duty of a Bearer to accomplish a specific Action towards a Counterpart ↩

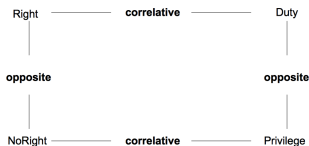↪ the Procedure describing how to fulfill such obligation

↪ the Exceptions to it

↪as well as the Sanction such Bearer may face if he does not fulfill such obligation

Logical Profile of a Legislative Text

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

Duty (*Supplier*, *Consumer*)

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier*, *Consumer*)

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

Right (*Consumer*, *Supplier*)

[...]

Art. 6

1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

Duty (*Member States*, *Consumer*)

[...]

Logical Relations (Hohfeldian relations)

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

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1.   The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

Right (*Consumer*, *Member States*)

[...]

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

Duty   (*Supplier*,   *Communication*, *Contractual terms...*)

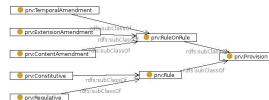2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier*,   *Communication*, *Contractual terms...*)

1. Representing Provision Types and Attributes (Provision Model)

Approach

1. Representing Provision Types and Attributes (Provision Model)

2. Expressing axioms on Provisions Types and Attributes

(MTL1): $(A \to B) \to ((B \to C) \to (A \to C))$
(MTL2): $A \otimes B \to A$
(MTL3): $A \otimes B \to B \otimes A$
(MTL4a): $A \wedge B \to A$
(MTL4b): $A \wedge B \to B \wedge A$
(MTL4c): $A \otimes (A \to B) \to A \wedge B$
(MTL5a): $(A \to (B \to C)) \to (A \otimes B \to C)$
(MTL5b): $(A \otimes B \to C) \to (A \to (B \to C))$
(MTL6): $((A \to B) \to C) \to (((B \to A) \to C) \to C)$
(MTL7): $\bot \to A$

1. Representing Provision Types and Attributes (Provision Model)

2. Expressing axioms on Provisions Types and Attributes

3. Tools
   - RDF(S) and OWL-DL standards
   - Inferences by an OWL-DL reasoner
   - SPARQL as query language

Provision Types

- Rules
  - Constitutive rules: introduce or assign a juridical profiles to the regulated entities;
  - Regulative rules: discipline actions or the substantial and procedural defaults (remedies).

- Rules on Rules (amendments)
  - Content amendments: modify literally the content of a norm, or their meaning without literal changes;
  - Temporal amendments: modify the times of a norm (come-into-force and efficacy time);
  - Extension amendments: extend or reduce the cases on which the norm operates.

Provision Model Top Classes
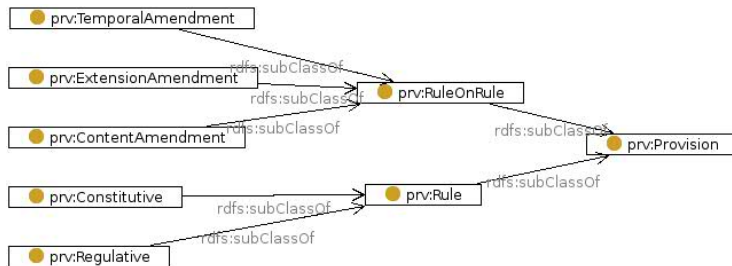
Regulatives provisions
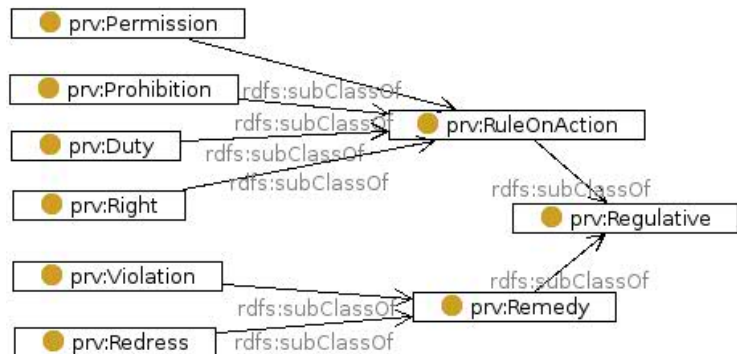
Thematic Profile

- Relations between the concepts described in the legislative texts (regulated fields)
- Provision attributes contents
- They can be expressed by literals or concepts derived from thesauri or domain ontologies

Ex: DALOS "Consumer law" ontology
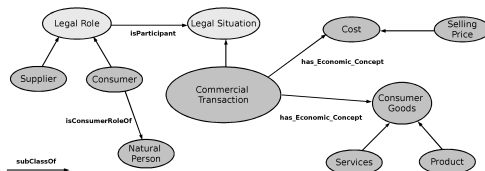
How to represent Logical Relations in the Provision Model

- Relations between Provisions types and Attributes
- Ex: Hohfeldian relations between Duty and Right

Duty(hasBearer='Supplier', hasCounterpart='Consumer')

$\Updownarrow$

Right(hasBearer='Consumer', hasCounterpart='Supplier')

Axioms

Duty $\equiv$ Right

hasBearer $\equiv$ hasCounterpart

How to represent Logical Relations in the Provision Model

- Relations between Provisions types and Attributes
- Ex: Hohfeldian relations between Duty and Right

Duty(hasBearer='Supplier', hasCounterpart='Consumer')

$\Updownarrow$

Right(hasBearer='Consumer', hasCounterpart='Supplier')

Axioms		
Duty ≡ Right	$\Longrightarrow$	Duty(hasBearer='Supplier') ≡ Right(hasBearer='Supplier')
hasBearer ≡ hasCounterpart		Duty(hasBearer='Supplier') ≡ Duty(hasCounterpart='Supplier')

How to represent Logical Relations in the Provision Model

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$$\frac{\text{Axioms}}{\begin{array}{c} \text{Duty} \equiv \text{Right} \\[6pt] \text{hasBearer} \equiv \text{hasCounterpart} \end{array}} \implies$$

Duty(hasBearer='Supplier') ≡ Right(hasBearer='Supplier')

Duty(hasBearer='Supplier') ≡ Duty(hasCounterpart='Supplier')

Extension of the Provision Model: Attributes

Attributes specified with respect to Provision types
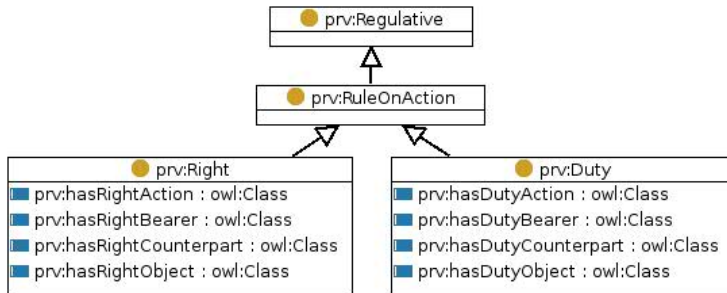
Extension of the Provision Model: Provision Types
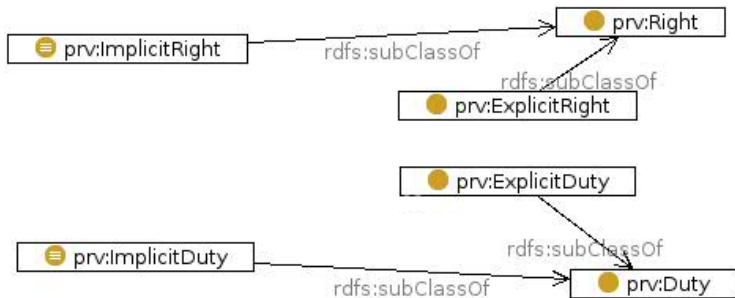
DL Axioms on correlative deontic concepts: Duty/Right
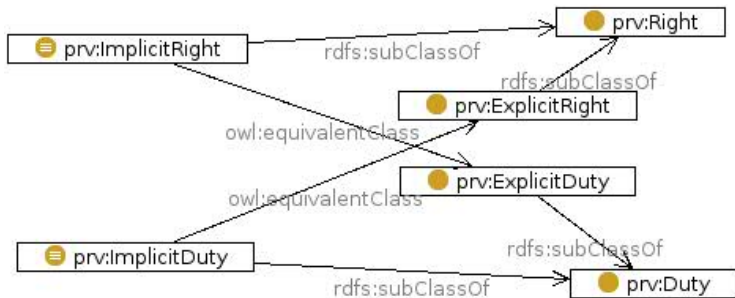
Axioms	[Francesconi, 2014] [Francesconi, 2016]

ImplicitRight ≡ ExplicitDuty
ImplicitDuty ≡ ExplicitRight

Extension of the Provision Model: Provision Attributes
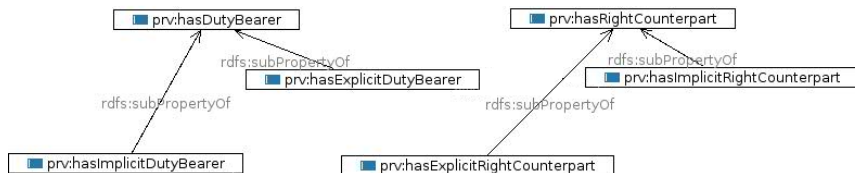
Axioms on Provision Attributes (OWL-DL)
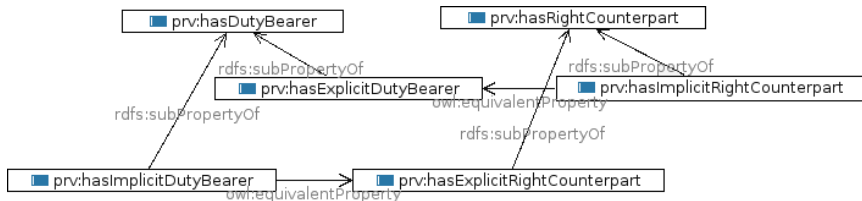
Axioms	[Francesconi, 2014] [Francesconi, 2016]

hasImplicitDutyBearer $\equiv$ hasExplicitRightCounterpart
hasImplicitRightCounterpart $\equiv$ hasExplicitDutyBearer

The same holds for hasRightBearer and hasDutyCounterpart in their explicit and implicit views.

Properties of the Proposed Relational Pattern

The proposed relational pattern aims to introduce

1. **Properties equivalence**
   - direct check on attributes contents (No conditional statement is needed, ex: "if (hasDutyCounterpart == 'Consumer')")

2. **Abstract classes ("Implicit" classes)**
   - different views (Implicit and Explicit) of the same provision;
   - to retrieve provision instances which are not explicitly expressed (ex: provisions where ImplicitRightBearer =="Consumer");

Benefits of the approach

- keep the problem within the OWL-DL complexity (without using SWRL or Rule-ML).

The Inferred Model

- Inference facilities through an OWL reasoner

The Inferred Model

- Inference facilities through an OWL reasoner

- Pellet – Java based OWL-DL reasoner

Thinking clearly.

The Inferred Model

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Thinking clearly.
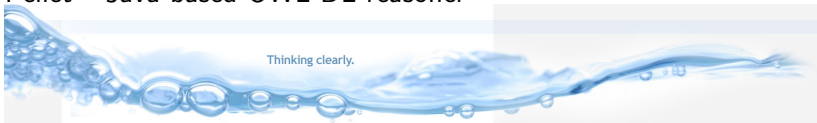
- The result is a Provision Model where inferences are calculated from the asserted axioms

SPARQL queries using the Provision Model and Ontology concepts

```
PREFIX rdf:  <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX prv:  <http://www.ittig.cnr.it/ProvisionModel/1.0#>
PREFIX cl:   <http://www.ittig.cnr.it/ontologies/consumer-law/1.0#>
SELECT ?x
WHERE { ?x prv:hasRightBearer cl:Consumer }
```

Logical relations
1) Hohfeldian inference case-study: Querying the System

SELECT ?x WHERE { ?x prv:hasRightBearer cl:Consumer }

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

ExplicitDuty (*Supplier*, *Consumer*)

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier* , *Consumer*)

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

ExplicitRight (*Consumer*, *Supplier*)

[...]
Art. 6

1. The Member States shall ensure that the consumer shall have a period of 14 calendar days to withdraw from the contract without penalty and without giving any reason [...]

ExplicitDuty (*Mem. States*, *Consumer*)

[...]

SELECT ?x WHERE { ?x prv:hasRightBearer cl:Consumer }

Art. 5

[...]
Art. 6

[...]

SELECT ?x WHERE { ?x prv:hasExplicitRightBearer cl:Consumer }

Art. 5

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

ExplicitRight (*Consumer*, *Supplier*)

[...]
Art. 6

[...]

SELECT ?x WHERE { ?x prv:hasRightBearer cl:Consumer }

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ImplicitRight (*Consumer*, *Mem. States*)

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SELECT ?x WHERE { ?x prv:hasDutyBearer cl:Supplier }

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[...]
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[...]

Logical relations 3) Query result based on the _Inferred Model_

SELECT ?x WHERE { ?x prv:hasDutyBearer cl:Supplier }

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ExplicitDuty (_Supplier_, _Consumer_)

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ImplicitDuty (_Supplier_, _Consumer_)

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Art. 6

[...]

Art.5 of EU Directive 2002/65/EC

Art. 5

1. The supplier shall communicate to the consumer all the contractual terms and conditions and the information referred to in Article 3(1) and Article 4 [...]

Duty (*Supplier, Communication, Contractual terms..., Consumer*)

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier, Communication, Contractual terms..., Consumer*)

3. At any time during the contractual relationship the consumer is entitled, at his request, to receive the contractual terms and conditions on paper. [...]

Right (*Consumer, Reception, Contractual terms..., Supplier*)

[...]

Technical Relations
1) Querying the System by Selected Attribute Values

SELECT ?x WHERE {

    { ?x prv:hasDutyBearer cl:Supplier. ?x prv:hasDutyAction cl:Communication.
      ?x prv:hasDutyObject cl:ContractualTerms. ?x prv:hasDutyCounterpart cl:Consumer}
UNION
    { ?x prv:hasProcedureBearer cl:Supplier. ?x prv:hasProcedureAction cl:Communication.
      ?x prv:hasProcedureObject cl:ContractualTerms. ?x prv:hasProcedureCounterpart cl:Consumer}

}

Art. 5

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ExplicitDuty (*Supplier*, *Communication*, *Contractual terms...*, *Consumer*)

2. The supplier shall fulfil his obligation under paragraph 1 immediately after the conclusion of the contract, if the contract has been concluded at the consumer's request using a means of distance communication which does not enable providing the contractual terms [...]

Procedure (*Supplier*, *Communication*, *Contractual terms...*, *Consumer*)

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ExplicitRight (*Consumer*, *Supplier*)

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    { ?x prv:hasDutyBearer cl:Supplier. ?x prv:hasDutyAction cl:Communication.
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}

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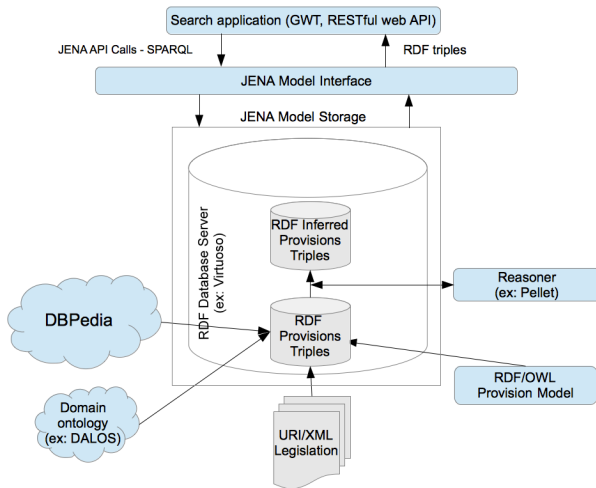
[...]

ProMISE

Provision

Model-based

Inferential legal

Search

Engine

The architecture of ProMISE

Benefits of the approach

Legal Semantic Web approach through the
Provision Model

Advantages

- Pattern for expressing fundamental relations between provisions
- OWL-DL computational tractability (no SWRL, RIF or XML description of rules)

Problems

- Semantic annotation burden
- Knowledge acquisition bottleneck

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