Legal RuleML Tutorial
Use Case - LegalRuleML for Legal Reasoning in Patent Law

IES Fact Screening and Transformation Project (FSTP)

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RuleML 2013, 11-13. July 2013, Seattle, USA

Innovation Expert System
Fact Screening and Transformation Project

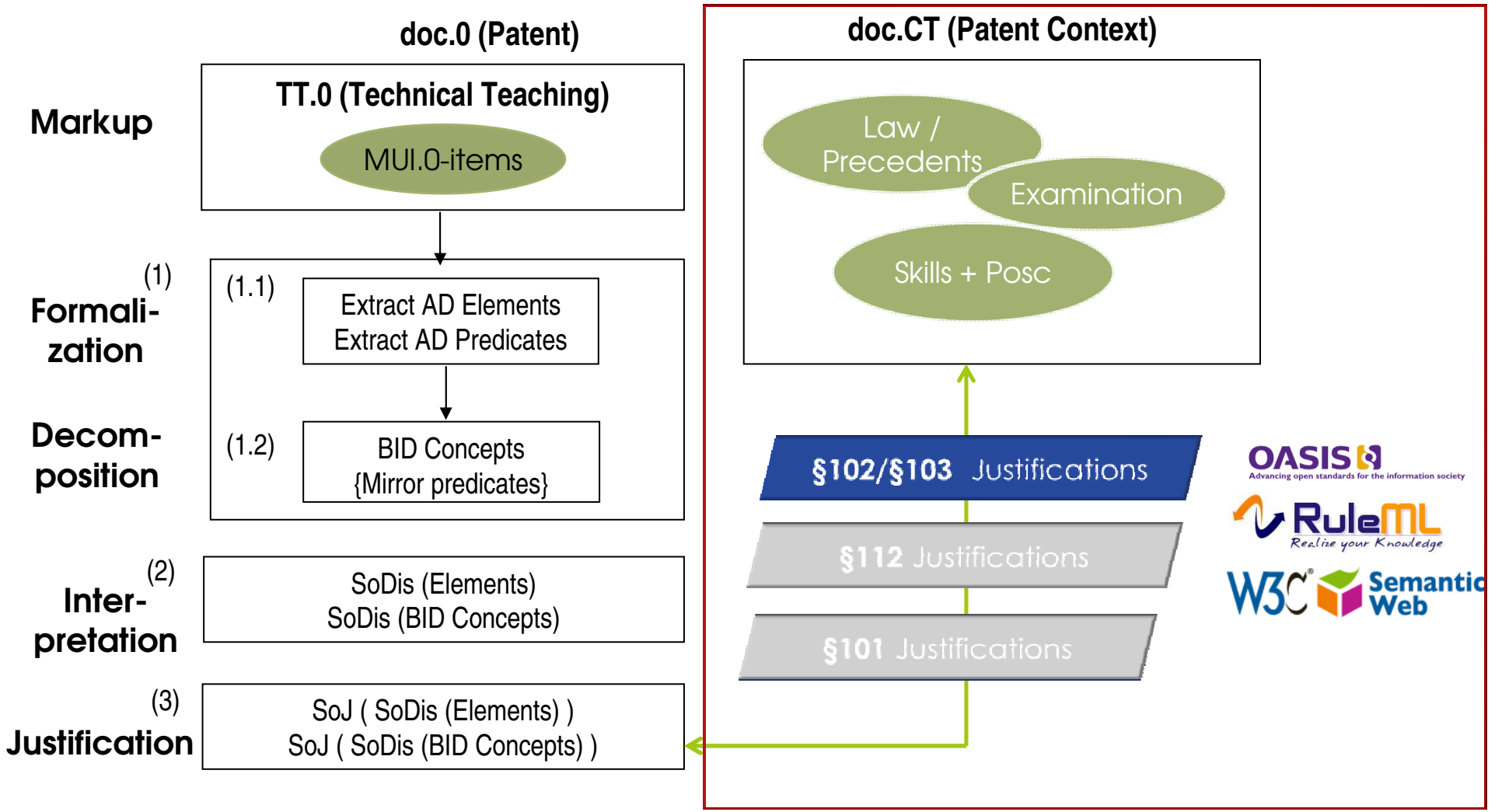
Objectives

►Transforming technical facts into all available formal technical indications, to **quantify the innovation's "creativity"** (creative thoughts) over prior art.

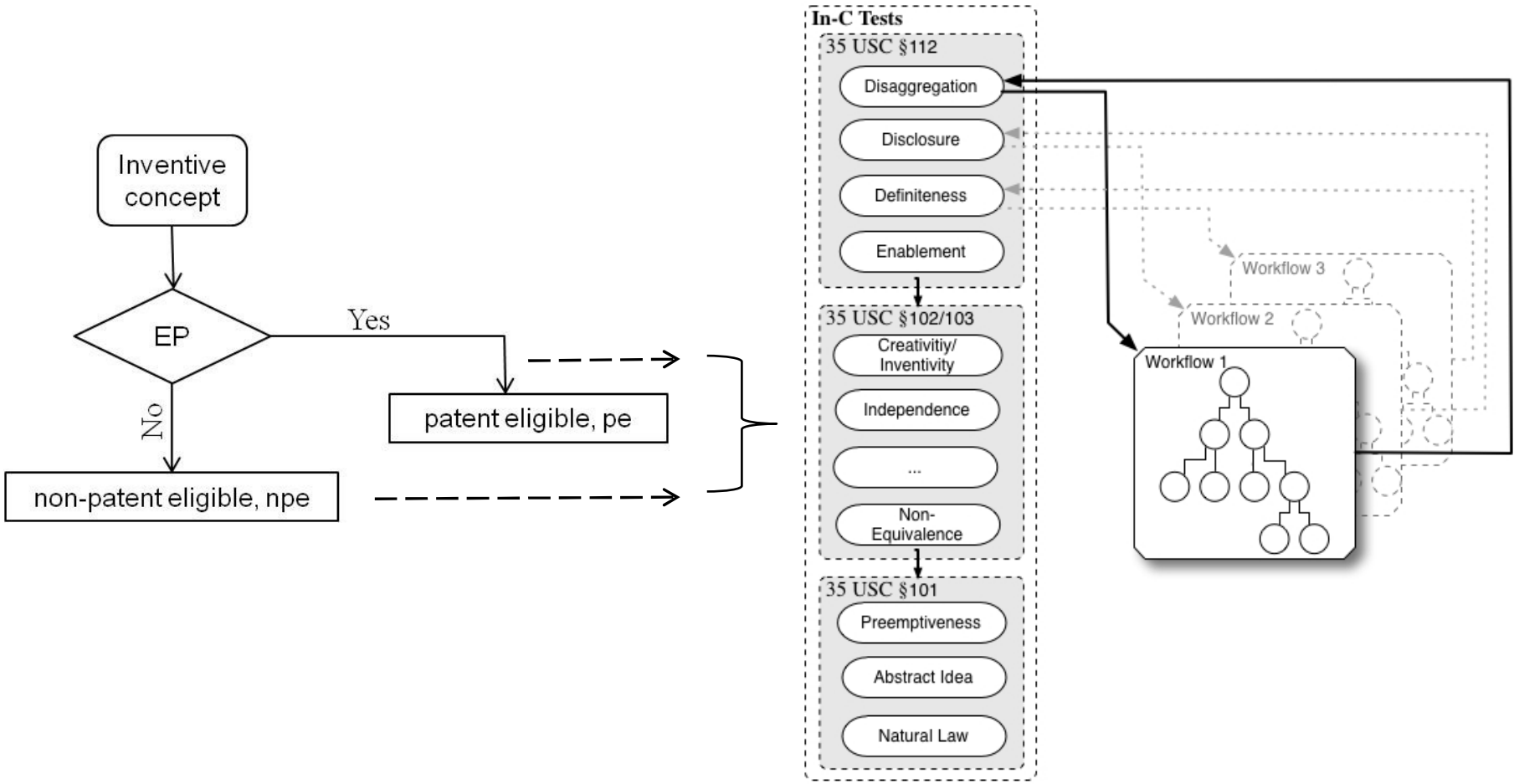
►Building (semantic) interrelations between the identified technical facts to its **external contexts (law/precedents/skill/…).**

►**Answering queries concerning** these technical indications and their dependencies on its fundamental disclosures and concerning compliance with respect to the applicable patent law system

Overall View



Example: Inventive Concept Tests



Example: 35 U.S.C. §112, 6th paragraph

"An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

MPEP 2181 Identifies A Three Prong Test To Be Applied:

(A) the claim limitations **must use** the phrase "**means for**" or "**step for**;"
(B) the "means for" or "step for" **must be modified** by **functional language**; and
(C) the phrase "**means for**" or "**step for**" **must not be modified** by sufficient structure, material or acts for achieving the specified function.

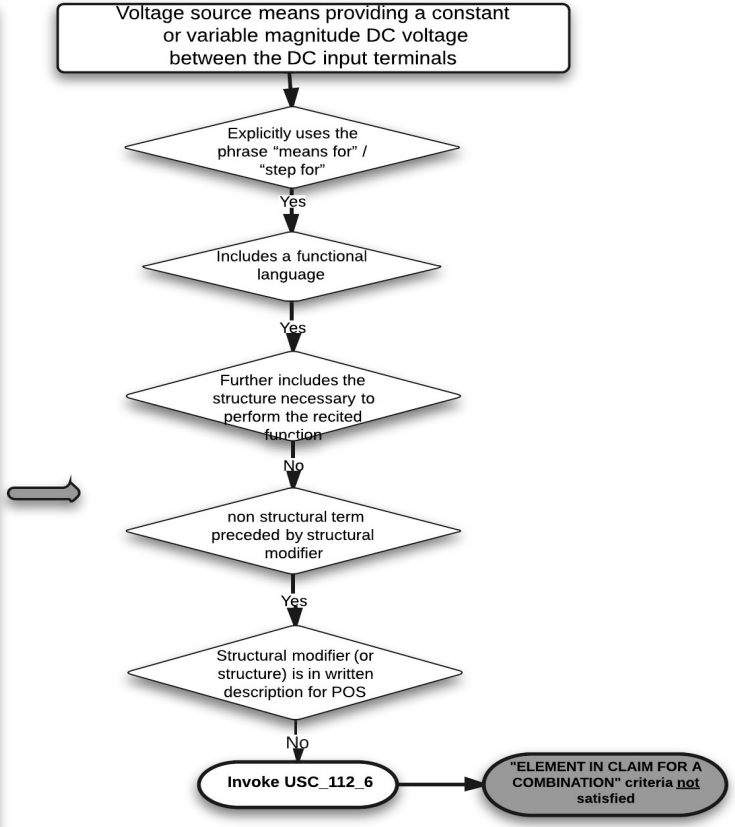
Landmark Decisions - Example

Lighting Ballast Control LLC v. Philips Electronics (CAFC : January 02, 2013).

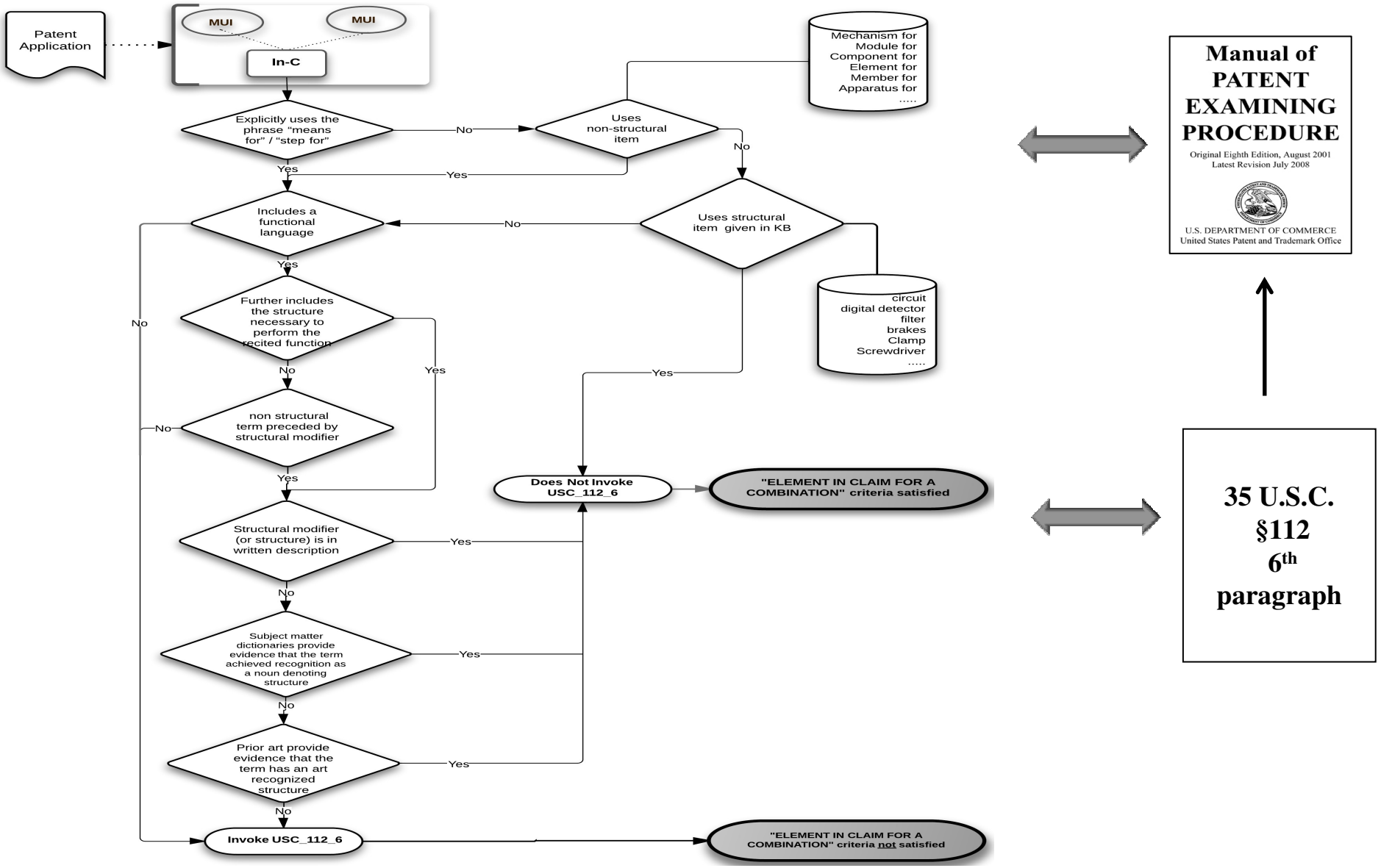
Decision re-explained the norms within the 6th Para of § 112 (35 U.S.C Patent Law).

Lighting Ballast Control LLC v. Philips Electronics North America Corp & Universal Lighting Technologies (Fed. Cir. January 02, 2013)

The patented technology relates to control and protection circuits for electronic lighting ballasts commonly used in fluorescent lighting. The district court construed the term "voltage source means" as a means-plus-function limitation under 35 U.S.C. § 112, ¶ 6. .....Means-plus-function limitations are governed by 35 U.S.C. § 112, ¶ 6..... The presumption triggered by use of the word "means" may be rebutted if the claim itself recites sufficient structure for performing the function. .....By contrast, when a term only indicates what the recited means "does, not what it is structurally," the claim is properly construed under § 112, ¶ 6..... For example, **Biomedino, LLC v. Waters Techs. Corp., 490 F.3d 946, 949 (Fed. Cir. 2007)**, we construed the phrase "control means for automatically operating said valving." 490 F.3d at 949. We held that the term "control" ..... Lighting Ballast points to case law in which this Court declined to apply means-plus-function claiming in view of expert testimony and other extrinsic evidence showing that certain claimed elements implied sufficient structure. In those cases, however, ..at means-plus-function claiming did not apply because the claim limitations at issue did not include the word "means." See **MIT v. Abacus Software, 462 F.3d 1344, 1353 (Fed. Cir. 2006) .....Greenberg v. Ethicon Endo-Surgery, Inc., 91 F.3d 1580, 1583 (Fed. Cir. 1996)** (construing the term "detent mechanism"; "means" did not appear in the claim.). In this case, we start with the presumption that means-plus function claiming does .....he claim limitation includes the word "means." ULT failed to ..... evidence to overcome that presumption.

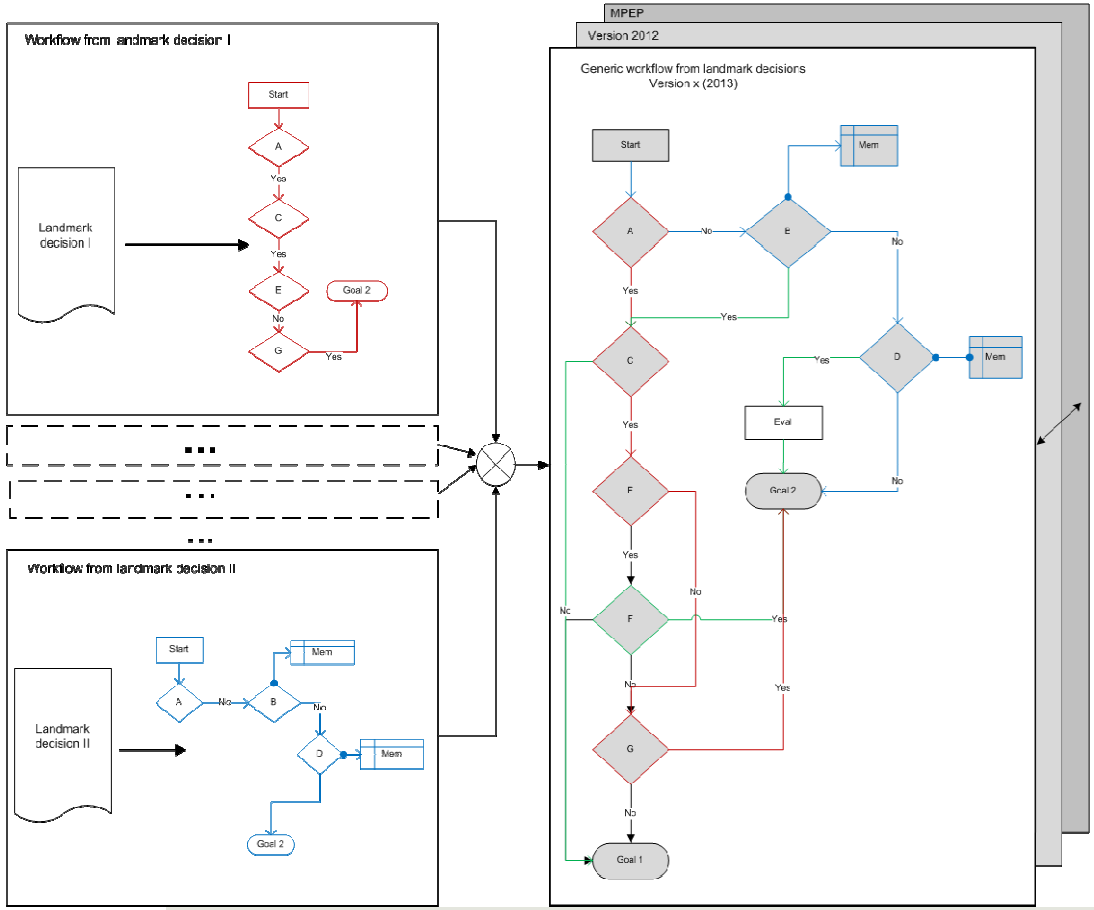


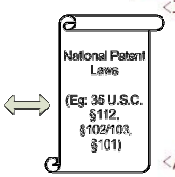
Example : Lighting Ballast Control v. Philips Electronics (CAFC : January 02, 2013).



Knowledge Representation

Patent law and precedents (or portions) are represented as workflow models, which are then modeled using LegalRuleML and Reaction RuleML

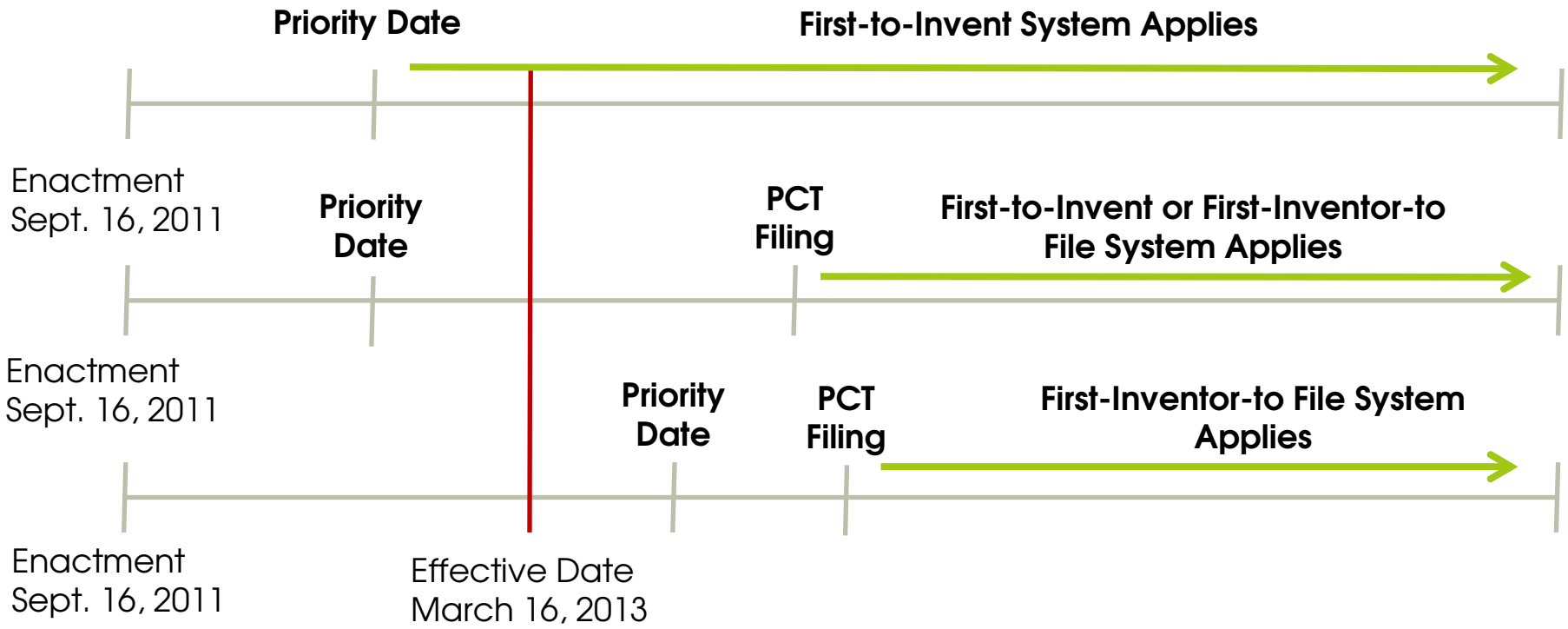




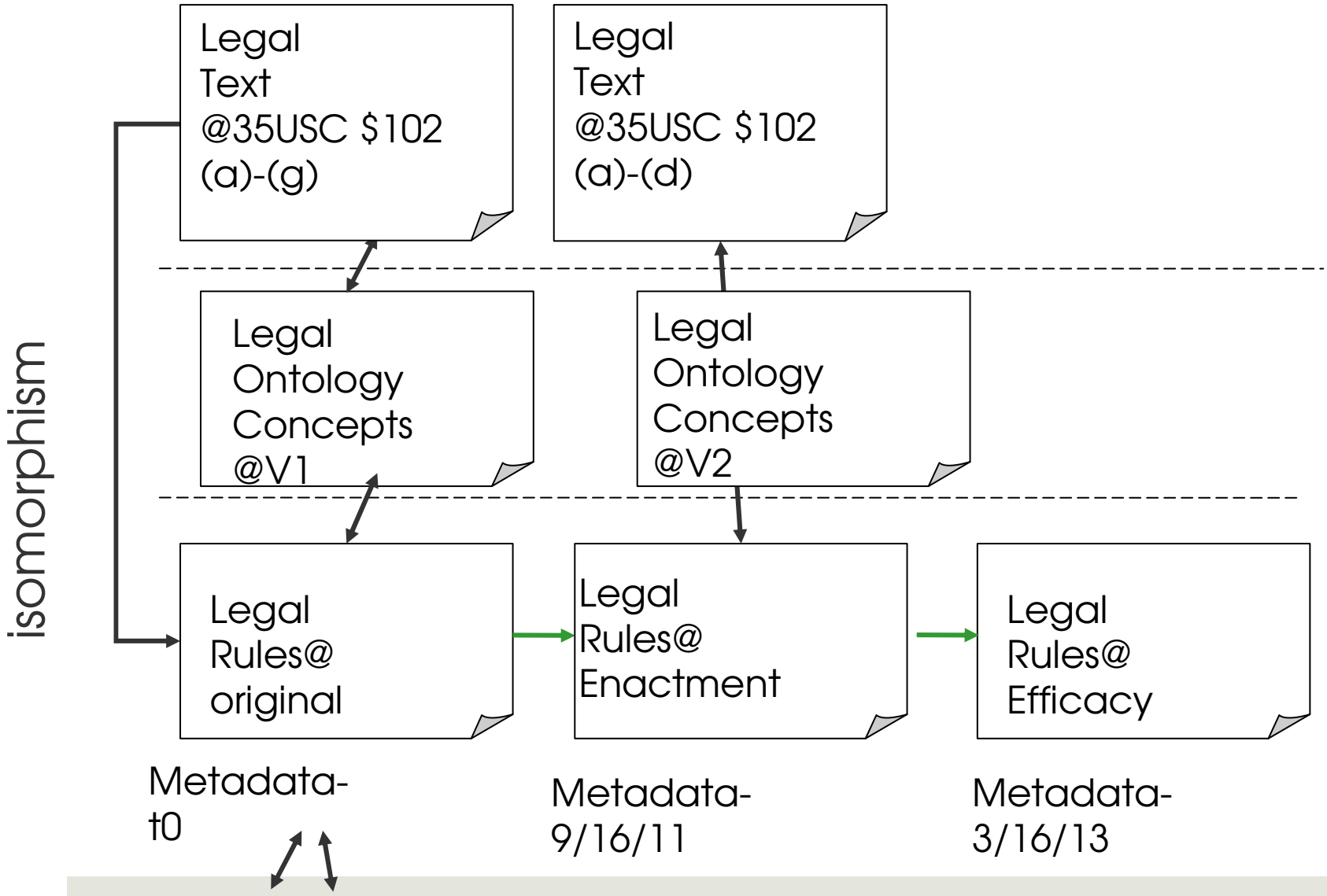

```
<lrml:LegalRuleML>

    <!-- Referencing the textual provisions-->
    <lrml:LegalSource> ... </lrml:LegalSource>

    <!-- Capturing the ex-ternal temporal dimensions of the rules are
represented -->
    <lrml:TimeInstants> ...</lrml:TimeInstants>
    <lrml:TemporalCharacteristics> ...</lrml:TemporalCharacteristics>

    <!-- Agent and the authority of the rules for provenance-->
    <lrml:Agents> ... </lrml:Agents>
    <lrml:Authorities> ... </lrml:Authorities>

    <!-- Associates property values to rules and also adds metadata such as
jurisdiction, role, and strength-->
    <lrml:Context>
        <lrml:appliesRole>
            <lrml:appliesStrength>
                <lrml:appliesAuthority> ...</lrml:appliesAuthority>
                <lrml:appliesJurisdiction> ... </lrml:appliesJurisdiction>
            </lrml:appliesStrength>
        </lrml:appliesRole>
    </lrml:Context>

    <!-- Rules (constitutive and prescriptive) are modelled-->
    <lrml:Statements>
        <Rule>
            ..
            <!-- ReactionRuleML-->
            ..
        </Rule>
    </lrml:Statements>

</lrml:LegalRuleML>
```

Example: New AIA: First-Inventor-to-File

- With the America Invents Act (AIA) 35 U.S.C §102(a)-(g) is replaced by new 35 U.S.C. $102 (a)-(d): change of First-to-Invent to a First-Inventor-to-File system
  - Effective date 16th of March 2013



Example: Temporal Management in Legal RuleML



Example: Time information in Legal RuleML

```
<lrml:TimeInstants>
        <ruleml:Time key="#t2">
                <ruleml:Data xsi:type="xs:date">2011-09-16</ruleml:Data>
        </ruleml:Time>
        <ruleml:Time key="#t1">
                <ruleml:Data xsi:type="xs:date">2013-03-16</ruleml:Data>
        </ruleml:Time>
</lrml:TimeInstants>
<lrml:TemporalCharacteristics key="tblock1">
 <lrml:TemporalCharacteristic key="e2">
        <lrml:forRuleStatus iri="&lrmlv;#Efficacious"/>
        <lrml:hasStatusDevelopment iri="&lrmlv;#Starts"/>
        <lrml:atTimeInstant keyref="#t2"/>
 </lrml:TemporalCharacteristic>
        …
<lrml:RuleContext key="ruleInfo1" hasCreationDate="#tc1">
 <lrml:appliesTemporalCharacteristics keyref="#tblock1"/>
        …
```

LIST OF TIME INSTANTS

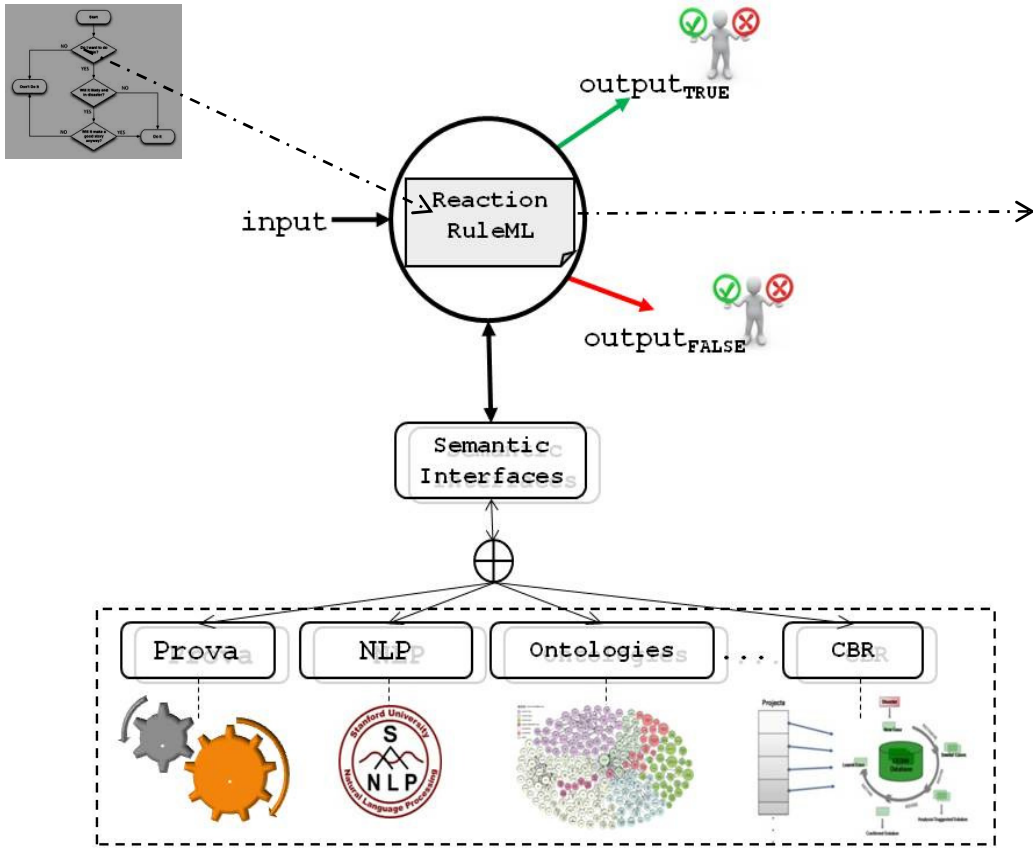
Type of event connected with an ontology

Interval or Instant

Temporal info

Knowledge Representation *contd...*

Each **decision point** in the workflow are modeled using ReactionRuleML (+ semantic interfaces)



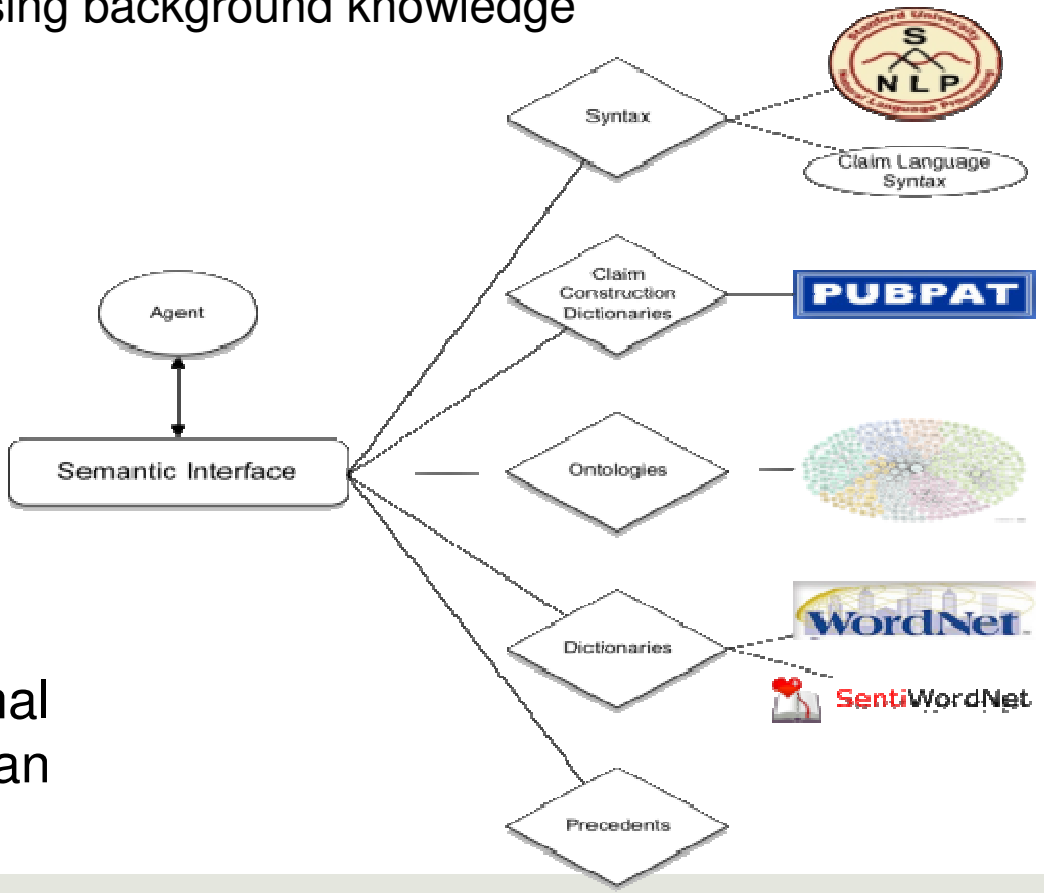

```
<Rule>

<!-- rule info and life cycle management, modularization -->
    <!-- (semantic) metadata of the rule -->
    <meta> ... </meta>
    <!-- scope of the rule e.g. a rule module -->
    <scope> ...</scope>

<!-- rule interface description -->
    <!--  intended semantic profiles -->
    <evaluation> ... </evaluation>
    <!-- rule interface signature and modes -->
    <signature> ... </signature>

<!-- rule implementation -->
    <!-- e.g. qualifying rule declarations, e.g.priorities, validity, -->
        <qualification> ... </qualification>
    <!-- quantifying rule declarations,e.g. variable bindings -->
        <quantification> ... </quantification>
    <!-- event part -->
        <on> ... </on>
    <!-- condition part -->
        <if> ... </if>
    <!--(logical) conclusion part -->
        <then> ... </then>
    <!--  action part -->
        <do> ... </do>
    <!-- postcondition after action,e.g. to check effects of execution -->
        <after> ... </after>
    <!-- (logical) else conclusion -->
        <else> ... </else>
    <!--alternative/else action,e.g. for default, exception handling -->
        <elsedo> ... </elsedo>

</Rule>
```

Semantic Interface

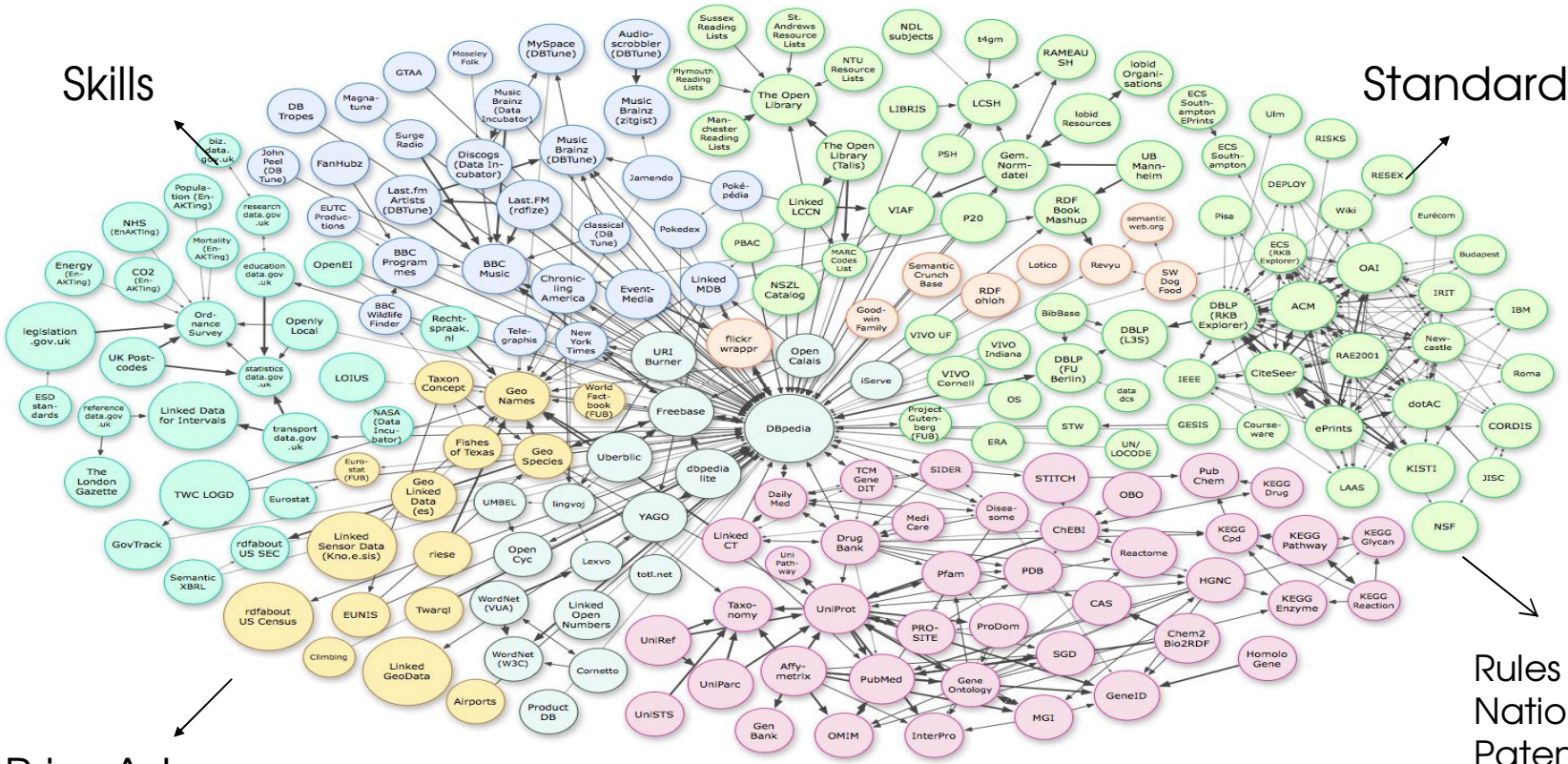
- Different semantic data sources supporting:
  - Processing of NLP-Tests considering the specifically juristic language
  - Annotation of syntactic structures with a semantic meaning
  - Matching of structures using background knowledge

- Semantic enrichment of justifications with legal background knowledge

- Transformation of the formal representation into a human understandable format



Semantic Linked Open Data Cloud



Interlinked semantic background knowledge on the Web used for the patents' external contexts

About: United States patent case law

An Entity of Type : Concept, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

Property	Value
rdf:type	skos:Concept
rdfs:label	United States patent case law
skos:broader	category:United_States_patent_law category:Patent_case_law category:United_States_intellectual_property_case_law
skos:prefLabel	United States patent case law
http://www.w3.org/ns/prov#wasDerivedFrom	http://en.wikipedia.org/wiki/Category:United_States_patent_case_law?oldid=107082467
is dcterms:subject of	dbpedia:Honeywell_v._Sperry_Rand dbpedia:Ariad_v._Lilly dbpedia:List_of_United_States_patent_law_cases dbpedia:Bauer_&_Cie._v._O'Donnell dbpedia:Graver_Tank_&_Manufacturing_Co._v._Linde_Air_Products_Co. dbpedia:Diamond_v._Chakrabarty dbpedia:Merck_KGaA_v._Integra_Lifesciences_I,_Ltd. dbpedia:Warner-Jenkinson_Company,_Inc._v._Hilton_Davis_Chemical_Co. dbpedia:In_re_Bilski dbpedia:Ex_Parte_Lundgren dbpedia:Rambus_Inc._v._Nvidia dbpedia:Funk_Brothers_Seed_Co._v._Kalo_Inoculant_Co. dbpedia:United_States_v._General_Electric_Co. dbpedia:Arizona_Cartridge_Remanufacturers_Association_Inc._v._Lexmark_International_Inc. dbpedia:City_of_Elizabeth_v._American_Nicholson_Pavement_Co. dbpedia:Ex_parte_Gutta

About: http://dbpedia.org/resource/Phillips_v._AWH_Corp.

An Entity of Type : Thing, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

Phillips v. AWH Corp. , 415 F.3d 1303 (Fed. Cir. 2005), was a case decided by the Federal Circuit that clarified the hierarchy of evidentiary sources usable for claim construction in patent law.

Property	Value
dbpedia-owl:abstract	Phillips v. AWH Corp. , 415 F.3d 1303 (Fed. Cir. 2005), was a case decided by the Federal Circuit that clarified the hierarchy of evidentiary sources usable for claim construction in patent law.
dbpedia-owl:thumbnail	http://upload.wikimedia.org/wikipedia/commons/thumb/5/59/US-CourtOfAppeals-FederalCircuit-Seal.svg/200px-US-CourtOfAppeals-FederalCircuit-Seal.svg.png
dbpedia-owl:wikiPageExternalLink	http://caselaw.findlaw.com/us-federal-circuit/1398650.html
dbpprop:citations	172800.0
dbpprop:concurrence/dissent	Lourie
dbpprop:court	United States Court of Appeals for the Federal Circuit
dbpprop:courtseal	200 (xsd:integer)
dbpprop:decidedate	--07-12
dbpprop:decideyear	2005 (xsd:integer)
dbpprop:dissent	Mayer
dbpprop:fullname	Edward H. Phillips v. AWH Corporation, Hopeman Brothers, Inc., and Lofton Corporation
dbpprop:hasPhotoCollection	http://www4.wiwiss.fu-berlin.de/flickrwrappr/photos/Phillips_v._AWH_Corp.
dbpprop:holding	The most important source in the evidentiary hierarchy of claim construction is the ordinary meaning of the language of the claims themselves and other intrinsic sources like the prosecution history. Extrinsic evidence like dictionaries and expert testimony are of secondary importance.
dbpprop:joinconcurrence/dissent	Newman
dbpprop:joindissent	Newman
dbpprop:joinmajority	Michel, Clevenger, Rader, Schall, Gajarsa, Linn, Dyk, and Prost
dbpprop:judges	En banc Court: Chief Judge Paul Redmond Michel; Circuit Judges Pauline Newman, Haldane Robert Mayer, Alan David Lourie, Raymond C. Clevenger, Randall Ray Rader, Alvin Anthony Schall, William Curtis Bryson, Arthur J. Gajarsa, Richard Linn, Timothy B. Dyk, and Sharon Prost
dbpprop:litigants	Phillips v. AWH Corp.
dbpprop:majority	Bryson
dbpprop:wikiPageUsesTemplate	dbpedia:Template:Infobox_COA_case
dcterms:subject	category:2005_in_United_States_case_law category:United_States_Court_of_Appeals_for_the_Federal_Circuit_cases category:United_States_patent_case_law
rdfs:comment	Phillips v. AWH Corp. , 415 F.3d 1303 (Fed. Cir. 2005), was a case decided by the Federal Circuit that clarified the hierarchy of evidentiary sources usable for claim construction in patent law.

Example: RuleML Typed Logic

- Types can be assigned to to terms using the type attribute

```
<Var type="dbpedia:Machine_(patent)">Invention</Var>

<Var type="dbpedia:Composition_of_matter">Invention</Var>
```

About: Composition of matter

An Entity of Type : Thing, from Named Graph : http://live.dbpedia.org, within Data Space : live.dbpedia.org

About: Machine (patent)

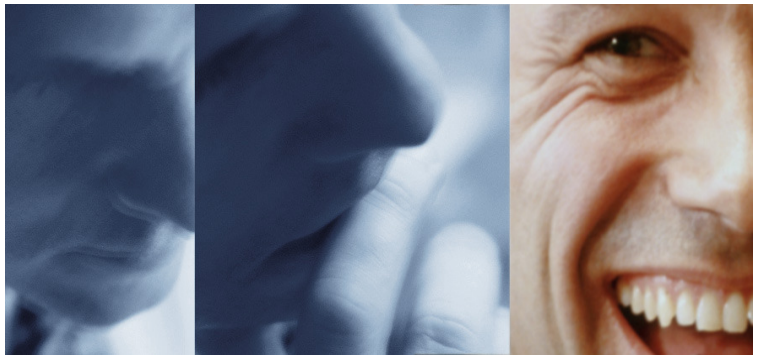
An Entity of Type : Thing, from Named Graph : http://dbpedia.org, within Data Space : dbpedia.org

In United States patent law, a machine is one of the four principal categories of things that may be patented. The other three are a process (also termed a method), an article of manufacture (also termed a manufacture), and a composition of matter. In United States patent law, that same terminology has been in use since the first patent act in 1790 (with the exception that processes were formerly termed "arts"). In In re Nuitjen, 500 F.3d 1346 (Fed. Cir.

Property	Value
dbpedia-owl:abstract	In United States patent law, a machine is one of the four principal categories of things that may be patented. The other three are a process (also termed a method), an article of manufacture (also termed a manufacture), and a composition of matter. In United States patent law, that same terminology has been in use since the first patent act in 1790 (with the exception that processes were formerly termed "arts"). In In re Nuitjen, 500 F.3d 1346 (Fed. Cir. 2007), the United States Court of Appeals for the Federal Circuit said: The Supreme Court has defined the term "machine" as "a concrete thing, consisting of parts, or of certain devices and combination of devices. " Burr v. Duryee, 68 U.S. (1 Wall.) 531, 570 (1863). This "includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. " Corning v. Burden, 56 U.S. 252, 267 (1854). To this it might be added that the parts must interact (usually dynamically) with one another, for otherwise they might be parts of an article of manufacture. It has been consider grounds for rejecting or invalidating a machine claim as being directed to a "mere aggregation" if the parts were merely associated with one another without interacting functionally. An illustration of a mere aggregation wou be the "combination" of a bathtub and a pencil sharpener. More recently, the "mere aggregation" ground of invalidity for a machine claim has been subsumed under obviousness. Examples of machines are steam engines, sewing machines, and TV sets. Electronic circuits have usually been considered machines, although they may lack moving parts.
dbpprop:hasPhotoCollection	http://www4.wiwiss.fu-berlin.de/flickrwrappr/photos/Machine_(patent)
dcterms:subject	category:United_States_patent_law
rdfs:comment	In United States patent law, a machine is one of the four principal categories of things that may be patented. The other three are a process (also termed a method), an article of manufacture (also termed a manufacture), and a composition of matter. In United States patent law, that same terminology has been in use since the first patent act in 1790 (with the exception that processes were formerly termed "arts"). In In re Nuitjen, 500 F.3d 1346 (Fed. Cir.
rdfs:label	Machine (patent)
owl:sameAs	freebase:Machine (patent)
http://www.w3.org/ns/prov#wasDerivedFrom	http://en.wikipedia.org/wiki/Machine_(patent)?oldid=451386500
foaf:isPrimaryTopicOf	http://en.wikipedia.org/wiki/Machine_(patent)
is dbpedia-owl:wikiPageDisambiguates of	dbpedia:Machine_(disambiguation)
is dbpedia-owl:wikiPageRedirects of	dbpedia:Mere_aggregation
is foaf:primaryTopic of	http://en.wikipedia.org/wiki/Machine_(patent)

Summary

- **Legal representation format** for legal reasoning.
  - To support a semi-automated legal **decision support system**
  - A platform-independent rule standardization in **LegalRuleML** and **Reaction RuleML** XML
    - Support for **reusability**, **life cycle management** of the knowledge
  - Transformations into executable representation language and **automated execution** (Prova rule engine http://prova.ws + ontology reasoner)
- Basis for legal argumentations / justifications



Questions?

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http://www.inf.fu-berlin.de/groups/ag-csw/