Some ontological tools to support legal regulatory compliance, with a case study

Aldo GANGEMI*, Alessandra PRISCO**, Maria-Teresa SAGRI***, Geri STEVE*, Daniela TISCORNIA***

*Laboratory for Applied Ontology, ISTC-CNR, Rome Italy
** Università per Stranieri, Perugia, Italy
*** ITTIG-CNR, Florence, Italy

Abstract. The increasing development of legal ontologies seems to offer satisfactory solutions to legal knowledge formalization, which in past experiences lead to a limited exploitation of legal expert systems for practical and commercial use. The paper describes some ontology-based tools that enable legal knowledge formalization. *Jurwordnet* is an extension to the legal domain of the Italian version of EuroWordNet. It is a content description model for legal information and a lexical resource for accessing multilingual and heterogeneous information sources. Its concepts are organised according to a "Core Legal Ontology" (*CLO*), based on *DOLCE+*, an extension of the DOLCE foundational ontology. Jurwordnet and CLO are also used to represent the assessment of legal regulatory compliance across different legal systems or between norms and cases. An example is discussed concerning compliance between EC directives and national legislations.

1.Introduction

The 80's experiences in the field of legal knowledge formalisation were mainly dedicated (especially in continental civil-law countries) to the choice of the best paradigm of representation (declarative versus deductive approach, rule-based, logic-based), while in the 90's most of the AI&Law community turned its attention to the features of legal reasoning and of the dialectic dimension of law (deontic modalities, defeasible reasoning, argument construction). Investigation on the type of entities of legal knowledge has been understated though. As a consequence, legal expert systems never came out of the level of prototypical applications, since they were lacking a solid methodology for knowledge modelling: formalising legislative knowledge was a subjective process, time- (and cost-) consuming, relatively unreliable from the user perspective, and not easily re-usable by different applications.
An ontology-based approach offers a solid support in the formalization process, as it permits the explicitation of the underling assumptions, and the formal definition of the components of legal knowledge. Accordingly, the tasks carried out in the past are being faced in a new perspective.
In this paper, of the two main streams of interest in the civil law countries: *legal advice* and *norm comparison*, we will consider here only the latter. By the way, compared to the latter, the former requires an investigation of the relation between

individual cases and common sense situations, which involves crucial problems such as value judgement, open-textured concepts, interpretation issues, etc.
The paper analyzes some ontological features of the legal domain. The use of ontology-based models is here examined in the light of norm comparison processes, with particular reference to the assessment of compliance between EU directives and national legislations, which seems to be a promising field of application. Moreover, the need of an accurate definition of the lower levels of the ontology is stressed, in order to support the conceptualization work. On this point, the JurWordnet project, a legal extension of the Italian WordNet database, will provide the lexical basis in the construction of specific domain ontologies.

2.Legal Ontologies as description models for norm comparison

The first intuitive argument for the adoption of ontologies as a description model for comparing norms is that they will provide a common (even if not neutral) language to express them, since only homogeneous entities can be compared. A further practical consideration is that most initiatives in the field of legal standard definition (LeXML, Metalex, NIR) consider legal ontologies strictly connected with the structuring of normative text. The ontology is therefore both a description model and a source of metadata for semantic tagging, providing at the same time a tool for conceptual retrieval and a model of content which maintains references to legal texts.
As illustrated in [15], norm comparison may be conceived in several ways:

- As a diachronic process, norms from the same system and regulating the same domain may be compared in order to detect differences related to changes in time, or specialisations of the situations (amendment, exception, extension.)
- As a synchronic process, norms of different systems, regulating the same situation, can be compared in order to assess differences in national or local policies, in regulated behaviours, in social impacts, etc.

The first process, dealing with the dynamic aspects of legal systems, requires, as pointed out in [6,15], an accurate definition of external and meta-level assumptions, defining criteria of specificity, criteria of ordering, and meta-criteria for resolving conflicting criteria. It is not completely clear, at the present state of research, how the ontology-based approach could offer new contributions to such well-known and long-time debated problem within the AI&Law Community, since a subsumption criterion seems not effective enough in detecting specialty (exceptions) when applied to the legal domain. On the other hand, a promising technique, based on theory reification and detailed axiomatization, is being tested, as briefly presented in section 4 and specially addressed by [6].
The second process assumes social relevance, as the setting up of methodologies for merging different regulations may have actual applications and produce useful results into the globalization process that involves the regulatory environment as well.

The comparison of norms regulating the same situation in different jurisdictions requires the solution of several legal issues, e.g. the completeness of the corpus (how to asses if all the norms relevant for the issue have been taken into account), the detail of granularity, the degree of legal authority of the sources (e.g. the different weight of case-based Law in Common Law vs. Civil Law countries). On the other hand, the relationships between European and national legislations, which we are here proposing as a test candidate, seem to be a relatively simplified field of experimentation, where several of these issues can be partly ignored.
Two possible perspectives of comparison are:

- To check the correspondence between the Directive's policies and the regulative aims of the national lawmakers, underlying the national regulation that implements the Directive
- To compare the national legislations adopting the same Directive in order to evaluate the level of harmonisation actually reached.
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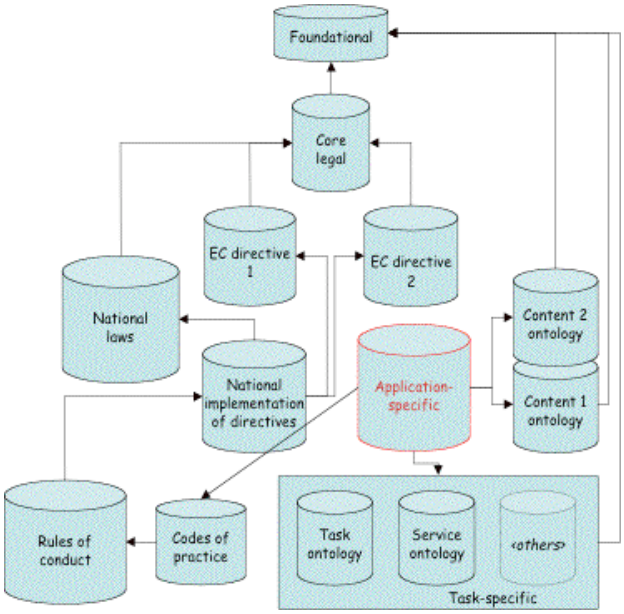

Fig. 1. *An ontology library for EC Directives. Arrow semantics is theory inclusion.*

The two goals need different requirements and assumptions that we do not treat here, as our aim is to explain how a well defined description model, based on solid ontological grounds both at a lexical and conceptual levels, may be of practical utility. As a preliminary remark, the choice of European/national legislation for testing the methodology offers advantages because of:

- The clear identification of normative sources to be compared (every national Act implementing an EC Directive can be clearly and autonomously identified)

- The explicit assertion of the normative goals and social policies in the premises, which provides explicit criteria of analysis
- The standard structure of the text, to which an already consolidated methodology for structuring and tagging legislative acts can be applied.

On the last point, we refer to our experience in the NIR project: as all national projects aimed at providing standard DTDs for structuring legislative texts, the Italian project Norme In Rete (NIR, [1]) has produced classes of metadata, containing information both on the legal issues (authority, date of enactment, identifiers, references, validity) and on the textual components (typology of normative sources, hierarchical organization of the sections). The content metadata include the definition of the normative functions of norms [16] that enable to describe a text as a collection of norms, classified according to their function.
As a first step in the comparison process, text structuring "pre-processes" the normative information, in order to identify the entities involved in the regulation (definition, constitutive norms), to enable the comparison of similar classes of norms (prescription, sanctions, administrative or financial regulations), and to exclude rules dealing with the management and updating of the legal systems (amendments, cross-links), which are relevant only to a national dimension.
In comparing the normative structure of EC and national texts, it is likely to assume that most EC regulations include prescriptive rules directed to the national legislative bodies of the Member States, which should be implemented, at the national level, as prescriptions, constitutive rules, and procedures. In general, the entrenchment of norms from Directives, national laws, codes of practice, etc. can be concpetualized as represented in Fig 1:

- *EC Directives* and *national laws* are represented in separate ontologies, which both inherit the *Core Legal Ontology* and the *Foundational Ontology* used to build the Core
- The ontology of the *content domain* (social world) addressed by the directives is also based on the Foundational Ontology
- The *national implementation* of directives should inherit both from EC directives and from the national laws, without being inconsistent
- *Rules of conduct* and *codes of practice* in the Directive's domain inherit from (and should be consistent with) the national implementation of the Directive
- Any compliant *application ontology* will inherit from all those ontologies, besides the basic *service* and *task* ontologies addressed by the application.

Some of the modules in the architecture will be described in the following:

- The main classes of entities that populate the Core Legal Ontology
- The Legal World interpretation according to the basic assumptions of the DOLCE+ foundational Ontology
- The Jurwordnet lexicon, a "lightweight" ontology that approximates a large set of legal domain ontologies.

In section 5., a case of norm comparison (in a compatibility scenario) is sketched.

3.The Core Legal Ontology and Jurwordnet

The development of the Core Legal Ontology (CLO) takes into account methodologies proper of *foundational* ontologies [2][3], and proposals in the field of legal ontologies [5][25]. CLO organises juridical concepts and relations on the basis of formal (meta) properties defined in the DOLCE[1] foundational ontology [4].
The basic types of entities that populate the domain of Law are assumed to be clearly identifiable and reasonably intersubjective, and, as such, they are pointed out through a minimal set of properties and relations from DOLCE and some of its recent extensions, notably the "Descriptions and Situations" ontology (D&S) [9]. DOLCE extended by D&S will be referred here as "DOLCE+".
The methodological choices, as well as the exploitation of properties suitable for the legal domain, are based upon the approach of legal theory and philosophy of Law. For example, the most common definition of *norm* shared by legal theorists is based on the schema "fact-norm-effect": properties (in some case the existence itself) and events inherent in the entities of the *legal world* depend on norms, whose role is that of describing generic facts (situations), and ascribing to them generic effects (legal qualifications).
As another example, in term of *speech acts* [22] norms are either *declarative* or *directive* acts: constitutive norms (declarative acts) produce a direct modification of reality, while regulative norms (directive acts) do not imply the regulated situation coming into effect. As a (legal) consequence of it, regulative norms can be violated, whereas constitutive norms can only be void.
In CLO, legal world is conceived as a *representation,* or a *description* of the reality, an ideal view of the behaviour of a social group, according to a system of rules that are commonly accepted and acknowledged. The current version of CLO is based on the DOLCE+ distinction between **descriptions** (in this domain *legal* descriptions), which encompass laws, norms, regulations, crime types, etc., and **situations** (*legal facts* or *cases* in this domain), which encompass legal states of affairs, non-legal states of affairs that are relevant to the right, and purely juridical states of affairs. This enables us to use that distinction to represent meta-juridical conceptualisations (*meta-norms*) as well.
From the logical viewpoint, DOLCE+ ontology for descriptions and situations is a first-order representation of logical theories and states of affairs [9].
In practice, a legal description (the *content* of a norm, a regulation, a decision, etc.) is assumed to be the reification $\mathcal{D}_{\mathcal{T}}$ of a (potentially formalized) theory $\mathcal{T}$, while a legal case C_S is assumed to be the reification of a state of affairs S that can satisfy $\mathcal{T}$.
When we use this distinction together with the DOLCE foundational ontology, we get typical mapping functions from the elements of $\mathcal{T}$ into the "components" of $\mathcal{D}_{\mathcal{T}}$, and from the elements of S into the "setting" of C_S. In particular, provided that the three basic categories of DOLCE are *endurant* (including object- or substance-like entities, either physical or not), *perdurant* (including state- or process-like entities), and *region* (including dimensional spaces of attributes such as time, geographical space, color, etc.), and that DOLCE includes several primitive relations, such as *part*, *connection*,

[1] DOLCE stands for "Descriptive Ontology for Linguistic and Cognitive Engineering."

constituency, *inherence* of qualities in entities, *participation* of endurants in perdurants, etc., the mapping results as follows:

- Perdurant entities (e.g. *hearing*, *stabbing*) in a case setting must be *sequenced by* some *legal course of events* (e.g. *murder reconstruction steps*, *procedure to paying taxes*)
- Endurant entities (e.g. *person*, *knife*) in a case setting must *play* some *legal role* (e.g. *citizen*, *witness*, *weapon*)
- Region entities (e.g. *at 3pm*) in a case setting must be *values for* some *legal parameter* (e.g. *murder time*)
- Legal courses, roles, and parameters are all *components* of a legal description
- Legal parameters are *requisites for* roles and courses (e.g. murder time can be a requisite for its reconstruction)
- Legal roles have a *modal target* in a course of events (e.g. citizens *are obliged to* a procedure to paying taxes)

This framework is partly depicted in Fig. 2. For the sake of visual clarity, we show our ontologies in UML class diagrams, assuming a description logic-like semantics [23] for them: *classes* are interpreted as *concepts*, *generalization* is interpreted as *formal subsumption*, *associations* and *attributes* are both interpreted as *relations*.[2] The ontologies mentioned here are available in various languages and formats [http://ontology.ip.rm.cnr.it]. Fig. 2 is an excerpt of DOLCE+. It is being used as a *conceptual template* in several academic and industrial projects because of its flexibility in representing the core concepts and relations in a domain.
Hence, a legal description is composed of legal roles, legal courses of events, and legal parameters on entities that result to be bound to the setting created by a legal case. This enables us to build a complex, *functional* representation of the Law and of its facts.
Since the *satisfaction* relation holding between legal descriptions and cases is the reified counterpart of the semantic *satisfiability* relation, we can specialize it in order to create a *taxonomy* of satisfiability. In fact, various kinds of semantic satisfiability can be envisaged according to the *function* a theory is supposed to describe, for example:

- The way of *executing* an obligation
- The way of *exercizing* a power
- The way of *realizing* a desire
- What is *believed* to be true
- The *suggested* way to act
- What is *expected* to happen
- The way of *preventing* something to happen
- The way of *assessing* the *conformity* of a state of affairs against a rule
- The way of *assessing* the *compatibility* of two norms.

[2] Various semantics have been proposed for UML e.g. [24]. Here we use class diagrams as a diagrammatic interface to the description logic version of DOLCE+.

In section 4., we will show how CLO can be used to formalize two different norms, to assess their compatibility, and to assess the conformity of a state of affairs against the highest regulatory priority.

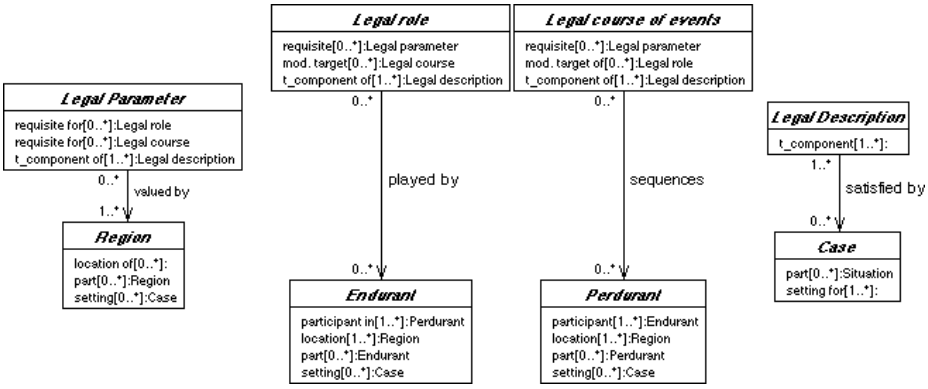

Fig. 2. *A UML class diagram showing a conceptual template for legal descriptions (conceptualisations) and situations (cases)*

Types of entities in the Legal World

CLO and Jurwordnet are populated by legal notions, which are represented according to the abovementioned assumptions. Here we list some of those notions and how they are represented.

Law, in the generic sense of the Latin *ius*, is *composed of* Norms that include social and ethical rules, practices, and conventions. Legal norm is a sub-class of norm, *expressed by* a Normative Text that is *physically represented by* a Document. Norms may even be *satisfied by* purely Juridical Situations, as for norms that describe other norms: (e.g. amendments, law making norms, validity norms.). A legal norm *functionally depends on* Legal Norms and on Collective Acceptance. Among norms, *constitutive* and *regulative* norms are distinguished; *definition* and *power-conferring* rules are sub-classes of constitutive norms. According to their type, norms may have different *parts* and *components*, for example: *Legally constructed institutions* (constitutive norms), *Legal powers* (constitutive norms), *Institutional functions* (constitutive norms), *Institutional powers* (power-conferring norms), *Behaviours* (regulative norms), *Incrimination acts* (incriminating norms).

Modal Descriptions are *proper parts* of regulative norms that contain some *modality target* relation between legal roles (legal agents involved in the norm) and legal courses of events (descriptions of actions to be executed according to the norm). The classification of Modal Descriptions is based on the Hofheld's *Theory of basic conception* and on the *Theory of normative positions* [10]. Recent revisions of legal philosophers and logicians [11][12][13] provided a formal framework and a

computational transposition of it [14]. Following Hofheld's approach, the normative positions are mainly described throughout relations of opposition/correlation between them. In the DOLCE+ ontology, modalized descriptions reify the regulatory theories that a regulated state of affairs must satisfy. Non-reified theories are usually expressed in some deontic or action logic, as in [14], but the reified counterpart enables to talk of partial or incomplete theories, and allows reasoning on them at first-order [9]. Here we present some examples of legal modal descriptions.
Legal Right is a *social advantage* (Bentham), a *free choice* (Hart), or a *protected interest* (MacCormick); it justifies the imposition of duties, the entitlement of claims and privileges, the transfer of powers. In a wide sense, it includes subjective rights. In a strict sense, according to the Hofheldian definition, it is correlative to *Duty* and better expressed by the term 'claim'.
Privilege is correlative to *Non-right*, *Immunity* is correlative to *Disability*. Disability is opposite to *Abstract Power*. Abstract Power/Capacity represents the generic attitude of being entitled of rights/claims, or of specific powers. In civil law systems, the *Capacity to act* is a sub-class of *Legal capacity*: in fact, a legal subject has legal capacity, but not the capacity to perform valid legal acts. *Legal power* is specifically dependent on power-conferring norms: an important sub-class is *Institutional Power*.
Faculty/Implicit Permission: in deontic logic the implicit permission derives from the absence of obligation; it differs from power because it doesn't imply the production of new legal effects. It is opposite, to non-right. *Explicit Permission* implies a liability of the permitted agent towards the agent who detects the power to permit, the adoption of the permitted goal, and the empowerment of the permitted agent in relation to the permitted action. It is specifically dependent on *Authorisation* [14].
Legal-Empowerment: it is *specifically dependent* on power-conferring norms, and it implies, as a precondition, *Potestas* (potestative right), or simple power. Potestas is the power to create (or modify) legal states of affairs in the sphere of other legal subjects. Its precondition is the disability of the involved subject (e.g., *patria potestas* of parents towards minor sons), or the willing of the *involved* subject, as *expressed by* an act of delegation and *represented by* a mandate. The *opposite of* Potestas is *Liability* (not of the directed bearer of obligation, but of the involved subject).

Legal Roles are descriptions of functions endorsed by either physical or non-physical objects. Among legal roles, some of them constitute the basic entities of the legal world, such as *legal subjects* and *legal assets*. Legal-subject is an *agentive* legal role, while legal asset is *non-agentive*. Physical existence is a sufficient but not a necessary condition for being a *legal subject*: legal agent is therefore a *role*, created by (constitutive) rules and played either by human or social individuals. A *natural legal person* is a legal subject just because of its physical existence (even before birth and after death), whereas the *legal person* role needs to fit strict requirements, such as age, mental non-illness, or artificial existence. Legal person implies legal subject, but not the contrary. Agentive legal roles are distinguished into 1) Legally Constructed Institutions, specifically dependent on constitutive norms, perform legal acts, and are created by constitutive norms that justify their existence and validity, e.g. Ministry, Body, Society, Agency, and 2) Legal Functions, which are played by legal subjects.
Legal Information Objects *depend on* agents' cognitive states and *represent* legal descriptions. For example, Expression of Willingness may be not only a Linguistic

Object (an Oral Expression), but this can also be manifested with behaviours. Legal Documents are legal information objects that depend on some Physical Representation (paper, electronic form, etc.); there are cases in which a certain form is a requirement for the valid existence of a Legal Act.
Legal Cognitive Objects are internal descriptions, (e.g. *agreement* and *mistake)*, which are *results of* mental processes or which *embody* cognitive states. Cognitive objects are specifically dependent on agentive physical objects (e.g. a natural person).
Among **cognitive states** (that are *perdurants*), intentionality is subsumed by will, which is subsumed by consciousness. For example, *Suitas* (Free will), based on the distinction between will and intentionality, grounds the distinction between fault and intentional fraud in crime law.
Legal Facts (including *cases*) are situations *depending on* norms (only facts relevant to legal systems are legal facts). Some subclasses are *Natural facts* (e.g. death) vs. *Human facts,* that depend on consciousness (but not on will), which can be distinguished into: 1) *Institutional facts,* satisfying constitutive rules, 2) *Legal acts* (in a strict sense), depending on will, 3) *Legal transactions*, depending on intentionality, 4) *Crimes*, which satisfy incriminating norms.

A lexical extension: Jurwordnet

Jur- (Ital) Wordnet (Jurwordnet, [7]) is a formal ontology-based extension to the legal domain of the Italian version [8] of *EuroWordNet*. Its motivation comes from the NIR project, to which Jurwordnet provides a metadata lexicon for semantic tagging. Jurwordnet can also be used as a support tool for information retrieval systems, in order to facilitate the access to heterogeneous and multilingual data[3], and a conceptual source for information extraction, automatic tagging, etc.[4]
Jurwordnet leverages on WordNet, Eurowordnet, and DOLCE+, envisaging a multilingual legal ontology, at least as far as the lexical knowledge of Law is concerned. With reference to norm comparison, Jurwordnet can be considered a link between the domain ontologies and the legislative texts, since it provides a wide coverage of legal concepts and their lexical realizations.
Jurwordnet is still under development: we expect to reach a satisfying coverage of the basic legal contents through the definition of about 3000 synsets. The enrichment of the lexical database will probably act as a testbed for the ontological level.

4. Compatibility between entrenched norms: an example

According to [18], «a significant part of legal reasoning can be considered as contradiction handling». Until recently, formal methods applied to contradiction handling have been limited to the exploitation of nonmonotonic reasoning, belief

[3] The Project LOIS (Legal Ontologies for Knowledge Sharing), aims at creating a Jurwordnet in five European languages.
[4] The Jur-WN methodology will be tested in the E-Psinet Project (e.Content Program), aimed at comparing the regulatory environment of Public Sector Information in the EC.

change, and similar techniques. Hierarchical structure of legal systems has also been indicated as a possible source of conflict resolution [18]. Hierarchical structure is based on:

1. Source ordering (*lex superior* prevails), based on authoritative entrenchment
2. Specialty ordering (*lex specialis* prevails), subordinated to source ordering
3. Chronological ordering (*lex posterior* prevails), subordinated to specialty ordering
4. Domain ordering, where a legal domain can be superordinated to a subdomain

Contradiction detection between norms can be considered as a special case of *norm comparison* [6][15], and it does not necessarily lead to *norm incompatibility*, since there exists an entrenchment of norms [19] that derives from the hierarchical structure of legal systems and that preserves compatibility. Hierarchical compatibility requires a *local* consistency of the logical theories representing legal norms.

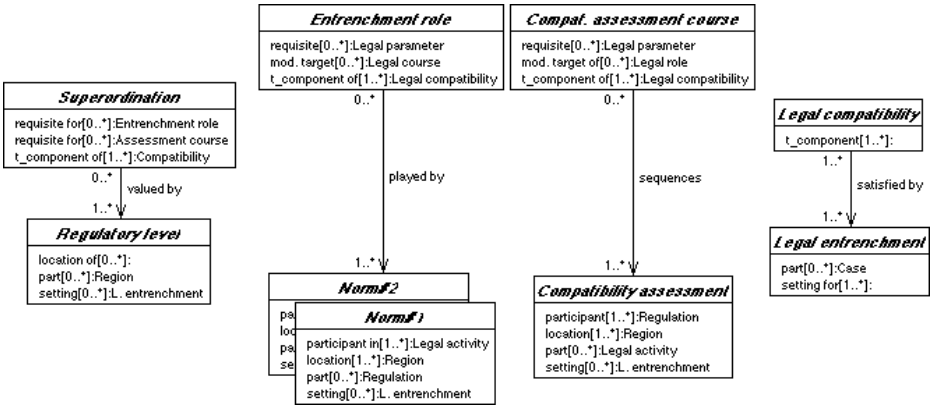

Fig. 3. *A D&S conceptual template for the legal compatibility scenario*

In the *theory reification* framework of DOLCE+ and CLO, which was partly present in [6], norms are first-order entities, then their possible logical *inconsistency* disappears, and migrates into class *disjointness*. Compatibility is then assessed as a case of conformity between a *compatibility scenario* and a situation including a set of norms. By *conformity* we mean that a case satisfies a legal description. In case of ground regulative norms (norms not involving other norms in their satisfying cases), like banking regulations analyzed in [6], a social state of affairs must *conform* to a norm in its legally relevant setting. In case of more abstract norms, conformity is assessed against states of affairs that can contain other norms. Compatibility assessment is one of those cases: two or more possibly incompatible norms should conform to a compatibility meta-norm (or principle, ideal, scenario, etc.).
In Fig. 3, a *compatibility scenario* is represented as a specialization of the CLO conceptual template. Legal compatibility is represented as a kind of legal description

that can be satisfied by a legal entrenchment situation whose setting includes certain regulatory levels for pairs of norms, according to *superordination* parameters, *entrenchment* roles, *compatibility assessment* courses, etc. Hierarchical structuring is represented as superordination parameters valued by regulatory levels according to the source, specialty, time, and domain of norms. Norms play some entrenchment role according to their hierarchical position. The algorithm to assess compatibility is specified in a compatibility assessment course.
Each norm involved in legal compatibility can be exploded into a CLO template that represents its satisfiability conditions, until ground norms have been reached.
Despite the hierarchical structuring of norms, legal compatibility is not always satisfiable in legal theory (*norm dynamics*), as well as in jurisprudential practice, leading also to the problem of *alternative interpretations*. The compatibility scenario can be used to assess or simply to represent those cases. In the following, a relatively simple example from theoretical jurisprudence is presented.

Non-mediated applicability of an EC directive

European Court of Justice has repeatedly stated the superordination of European norms against national ones. In order for this superordination to be enacted, a European norm needs an explicit acceptance from a national government.
On the other hand, due to the delays from the national governments, Luxembourg judges have continuously stated the validity of the *direct application* of European norms, provided that the European directive is *clear*, *unconstrained*, and *beyond terms*. The first statement of this principle is present in the Van Duyn judgment [17], which states that: «where the Community authorities have, by directive, imposed on Member States the obligation to pursue a particular course of conduct, the useful effect of such an act would be weakened if individuals were prevented from relying on it before their national courts and if the latter were prevented from taking it into consideration as an element of Community law».
More recently, this principle has been extended to all administrative bodies of Member States, which have the duty of applying a directive's provision, even by disregarding *non-conforming national norms*. Obviously, these principles hold only *vertically*, since a Member State cannot transfer the consequences of its delayed adoption to an individual citizen.
Member States have mostly recognized those principles, for example the Italian Constitutional Court has definitively recognized the superordination of EC norms to Italian ones, especially after the judgment 64/90 [20], stating that whenever the directives are sufficiently precise and unconstrained, and their adoption is still missing beyond the terms of enactment, nevertheless they can be used to contrast any national norm that does not conform to them.
Fig. 1 shows a modular architecture that covers a reasonably complete ontology library for EC directives. Modularizing ontologies is a first step towards the formal representation of entrenched norms, in order to maintain *local* consistency. But in order to assess the kind of relation between entrenched norms, or even to assess their compatibility, a *strongly modular approach* is needed. By "strongly modular" we mean a contextual awareness at the level of norm content, which is obtained by

exploiting the D&S framework in DOLCE+ [9]. We will show the use of strong modularity to represent the Enasarco judgment [21] of the Italian *Corte di Cassazione*, the highest Italian judicial Court.
In the Enasarco judgment, the *Corte di Cassazione* states that the EC Directive 653/86, which excludes the obligation for commercial agents to be enrolled in a dedicated registry, is *directly applicable* to Italian jurisprudential system. The problem arose from a decree obtained by Enasarco (the institution that manages the pension system for commercial agents) against a company that did not pay any pension tax to some commercial agents. The company objected that, since those agents weren't enrolled in the registry, then, according to the Italian law 204/85, art. 9, stating that agents not enrolled in the registry are not allowed to act like commercial agents, the company is not obliged to pay those taxes. The preliminary judicial Court rejected the decree on the basis of the company's objection. But the *Corte di Cassazione* agreed with the counter-objection of Enasarco on the basis of the EC Directive 653/86.

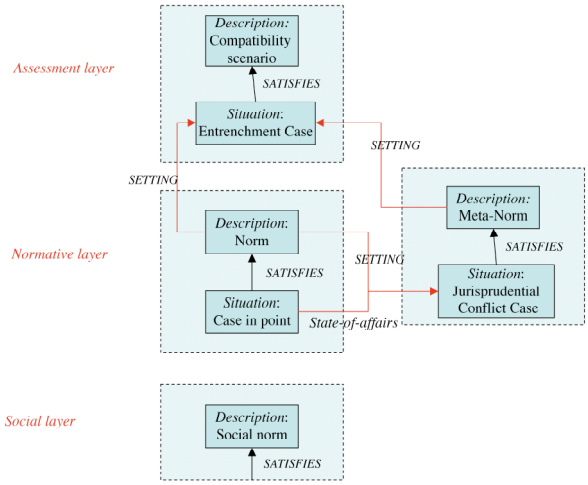

Fig. 4. Epistemological layering in compatibility jurisprudence

In this judgment, the *Corte di Cassazione* has applied the superordination of *source* and of *chronology* to the entrenched norms, even in absence of a *specialty* superordination that was lacking from Italian legislative bodies. Consequently, the compatibility scenario is preserved according to:

1. The EC 653/86 and the Italian 204/85 laws, potentially in conflict within an integrated (and non-reified) logical theory
2. The meta-norms stated by EC Court of Justice, for example in the Van Duyn judgment, as well as in its interpretation dedicated to the 653/86 (stated in February 18th, 1988), and stating that national norms cannot subordinate the validity of agency contracts to the agent's enrolement in a dedicated registry
3. The superordination parameters derived from the hierarchical structure of norms presented in [18]

4. The resolution procedures adopted by Courts
5. The attributes of the parties involved in the judgment.

Saying that the compatibility scenario is preserved amounts to finding that the legal entrenchment between the potentially conflicting norms actually *satisfies* a particular legal compatibility description. This case also shows a peculiar feature of the DOLCE+, namely its capability of expressing an *epistemological layering* (EL). EL appears whenever a theory is satisfiable by a model that includes elements that are models or theories on their turn. This is a notoriously hard logical problem, and requires turnarounds to be implemented in an efficient way.
The D&S (and CLO) solution is to represent EL as a scenario in which a description is satisfied by a situation that contains in its setting some other situation or description, thus constraining EL reasoning at first-order. In the Enasarco judgment, EL (Fig. 4) derives from the representation of meta-norms (interpretations or advises from previous judgments, usual superordination of norms, etc.), which are satisfiable by cases in which norms are in the setting (this is also the case of the compatibility scenario, which belongs to a further *assessment* layer). Norms included in that setting are on their turn satisfiable by cases in which social objects (or even social norms) are included, and so on, until the EL mechanism runs out of the scope of the Legal World.

Conclusions

We have introduced some projects, resources, and methods that are being developed in a joint collaboration between the Laboratory for Applied Ontology and ITTIG-CNR. The general methodology applied in the collaboration uses formal ontology techniques and resources to formalize legal knowledge and the legal lexicon. Applications based on the same techniques are being built to perform comparison of diachronically distinct norms in the same domain [6], to detect compliance of synchronically distinct norms, to control the conformity of activities against previous agreements or contracts, and to support Semantic Web searches. In the paper we have introduced: the DOLCE+ foundational ontology, on which a Core Legal Ontology is being defined; the Jurwordnet lexicon based on CLO, and an example of how to use CLO to represent judicial Acts delivered in presence of incompatible norms.
Compatibility is shown as distinct from logical inconsistency, and we explain how it can be mapped to a first-order classification of concepts. Nevertheless, the ontological representation of compatibility does not ensure *per se* either an effective obtainment by individuals, or the actual exploitation of legal compatibility in a widespread legal system. We only claim that exploitation and effectiveness would be aided in principle by our formal methods. In our example, Enasarco got the right to be payed by the company, but the Italian Court has no power to impose to Enasarco to actually *use* those pension taxes to provide incomes to the future retired agents. In other words, formal assessment of legal compliance and conformity would result in a weapon in the hands of large organizations, unless this technology is coupled with e-government policies aiming at integrating legal compliance with social enactment.

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