A Pattern for the Representation of Legal Relations in a Legal Core Ontology

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Abstract. This paper extends UFO-L, a Legal Core Ontology (LCO) based on Robert Alexy's Theory of Constitutional Rights and grounded on the Unified Foundational Ontology (UFO). We present the first pattern of UFO-L's patterns catalogue and its application. The general idea is to use these ontological patterns to support the modeling of legal concepts in conceptual models of the legal domain. Moreover, our approach has the specific purpose of emphasizing the use of a relational perspective rather than a normative perspective of the Law.

Keywords. Legal core ontology, UFO, UFO-L, legal relation, pattern.

1. Introduction

In the last decades, Law has turned to Computer Science in search for solutions for suitably representing concepts in the legal domain. One of these solutions is the development of legal core ontologies. A Legal Core Ontology (LCO) is a kind of legal ontology that represents a shared conceptualization of generic legal concepts, which can be used and reused in the construction of other more specific legal ontologies.

In parallel, we have observed a shift in the conceptual modeling discipline, with an increasing interest in the use of ontological theories to evaluate and semantically ground modeling languages and reference models. An example of a system of ontological theories that has been successfully employed with these objectives is the Unified Foundational Ontology (UFO) [1]. UFO is based on Aristotle's square and defined as a system of *Universals* and *Individuals* categories. This has led us to introduce a LCO based on Alexy's theory and grounded on UFO named UFO-L [2].

Alexy's Theory of Constitutional Rights (hereinafter called Alexy's theory) is an instance of contemporary legal theories that proposes: 1) a theory of fundamental rights represented by legal positions and triadic legal relations; and 2) a balancing and weighing structure, as a proposal to solve collisions of principles [3].

In this paper, we aim at presenting UFO-L pattern for representing right-duty relations. Moreover, we want to provide an interpretation of existing concepts in Alexy's theory in terms of the ontological categories of UFO. The underlying assumption of this

work is that the combined use of Alexy's theory and UFO allows a better clarification of existing legal positions in legal relations.

In the next section, we present a very brief review of UFO and UFO-L before presenting details on the proposed UFO-L pattern. In section 3, we show an example of the application of this pattern. Section 4 presents final considerations and future works.

2. Background

In Computer Science, ontologies are used to represent categories that are countenanced to exist in a conceptualization of given subject domain. *Foundational ontology* is a sort of ontology defined as a domain-independent ontological system of categories, which should be built with the explicit support of theories from Formal Ontology to Philosophy. UFO is an example of a foundational ontology that employs results from Formal Ontology, Cognitive Psychology, Linguistics, Philosophical Logics. It has three layers: (i) UFO-A (ontology of *Endurants*) is part of the UFO core and includes a system of categories, such as *Universal, Individual, Relator;* (ii) UFO-B (ontology of *Perdurants*) is a layer built on UFO-A that relates temporal aspects by means of categories, such as *Event, Complex Event*; (iii) UFO-C is built on UFO-B and UFO-A and represents the social reality by means of categories such as *Social Agent, Social Role*. Recently, UFO-S, a layer of service aspects, has been proposed by [4].

In addition of these layers, UFO-L has been proposed as a layer of legal aspects built under a *relational perspective* rather than a *normative perspective* [2]. It specializes categories of UFO-A and UFO-C. For instance, in UFO-L, the notion of **legal roles** specializes the notion of *social roles* in UFO-C. Examples of legal roles are *personal taxpayer* and *citizen*. Legal roles are prescribed by a legal norm before their assignment to an agent or group of agents and are played within the scope of legal relations. In their turn, **legal relations** are represented by triadic structures based on legal positions of Alexy's theory and reified by means of **legal relators,** which are relational entities existentially dependent on a number of individuals playing legal roles.

Regarding the research field on legal ontologies, since this field is extensive and the available space here is limited, we indicate the following systematic mapping of literature on the subject for more details [5].

3. Applying UFO-L pattern: right-duty relation

Rights to something. Fundamental rights are usually written without specifying the addressee, that is, without making it clear who has the duty to guarantee those fundamental right. In recent years, research has demonstrated the importance of using legal theories combined with ontologies as a solution to the *semantic gap* [6]. Building models only based on the law (*in casu* a Constitution) is not enough to make explicit actors and roles present in a legal relation. The lack of clarity also propagates in infra-constitutional normative acts and agreements. Added to this problem, the building of legal ontologies without grounding on foundational ontology has resulted in both ontological inconsistencies and ontological incompleteness. As a result, judicial disputes and financial losses can occur during the existence of legal relationships [7].

UFO-L has a taxonomy of legal relators based on the Alexy's classification (rights to something, liberties, and powers) [2]. Particularly, in rights-duties relations, UFO-L

drives the modeler to ask some specific questions: i) who is the right holder? ii) who is the duty holder? iii) What is the type of action that a duty holder must to do (or refrain from doing)? iv) What should be the result of the action: a fact, a legal norm? And what about the result of an omissive action: a non-obstruction of acts, a non disruption of situations or characteristics, a non-removal of legal positions?

Figure 1 shows the UFO-L pattern right-duty relator represented in the UFO modeling language OntoUML [1]. A *right to something* is represented by a bundle of *legal relators: Right-duty to an omission;* and *Right-duty to an act*. Also, an addresser of rights is called *Right-holder* and an addressee of duties is called *Duty-holder.* For each *material relation* exists a *legal relator* that mediates the *subjects. Each legal relator* is composed by *modes,* thus, *Right-duty to an omission* is composed by *Right to an omission* and *Duty to omit* modes. The first one inheres in the *Right-holder* and the second one inheres in the *Duty-holder*. Thus, for instance, the *constitutional norm* "Everyone has the right to life" (Figure 2) means that: a) each instance of person *qua* right holder *p* has, in face of instance of State *qua* duty holder *S*, an instance of *right* that obliges State *qua* duty holder *S* to refrain from killing person *p;* b) each person *qua* right holder *p* has, in face of instance of State *qua* duty holder *S*, an instance of *right* that obliges State *qua* duty holder *S* to protect person *qua* right holder *p's* life against illegal interventions of third parties. The former *right* is called *negative (or defensive) right* and the latter is called *positive right* in Alexy's theory.
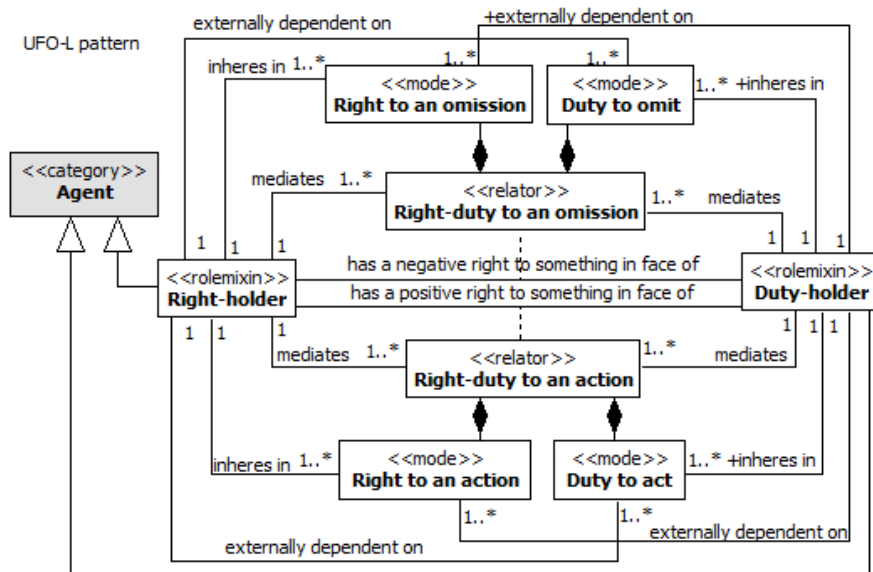

Figure 1. UFO-L pattern for right-duty relations

Would those issues also have been asked if the model had been built using only the normative act or the agreement? Would those issues have been considered in requirements elicitation? Even if this were the case, would they have been adequately modeled without the support of a core ontology that has been built based on a legal theory and with a relational perspective? These issues remains open and will be analyzed in empirical experiments planned as future work [8].
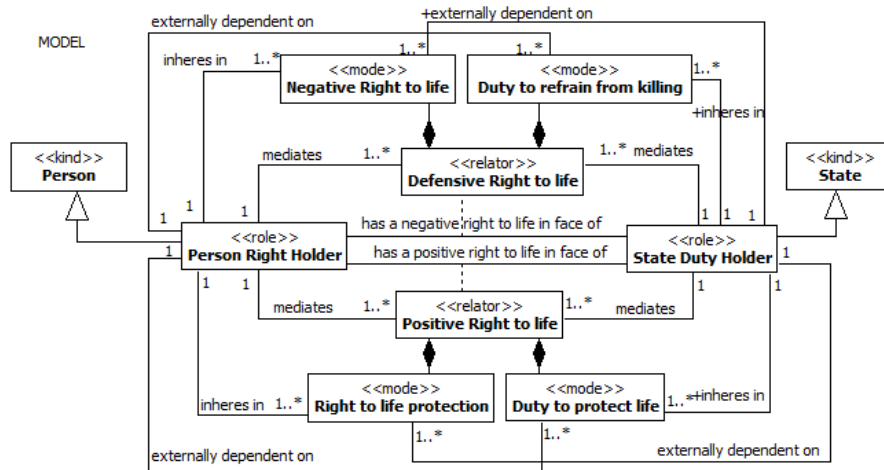
Figure 2. A model of "Everyone has right to life" as an instantiation of the pattern of figure 1

4. Final Considerations

In this paper we have presented a part of UFO-L, a legal core ontology grounded on UFO and based on Alexy's theory. In particular, the pattern for right-duty relations. The proposal advocated here is to relate Alexy's theory and UFO foundational ontology theory in order to represent legal positions by means of triadic structures and *relators*. We have applied the pattern in an example of legal norm aiming to demonstrate that the combination of these theories can make more explicit elements of a legal relation.

Regarding future works, we point out a study of Balancing and Weighing, the second part of Alexy's theory, in order to represent it into UFO-L; empirical experiments to validate UFO-L and its catalogue of patterns; and the building of a domain-specific language based on UFO-L.

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