

# TOWARDS A LEGAL CORE ONTOLOGY BASED ON ALEXY'S THEORY OF FUNDAMENTAL RIGHTS

Cristine Griffo<sup>1</sup>, João Paulo A. Almeida<sup>2</sup>, Giancarlo Guizzardi<sup>2</sup>

<sup>1</sup> Postgraduate student, Federal University of Espírito Santo, Ontology and Conceptual Modeling Research Group (NEMO)  
Av. Fernando Ferrari, 514, CT-VII, 29075-910, Vitória, Brazil  
E-mail: cristine.griffo@aluno.ufes.br

<sup>2</sup> Professor, Federal University of Espírito Santo, Ontology and Conceptual Modeling Research Group (NEMO)  
Av. Fernando Ferrari, 514, CT-VII, 29075-910, Vitória, Brazil  
E-mail: jpalmeida@inf.ufes.br, gguizzardi@inf.ufes.br

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**Abstract:** *Ontologies have been used in recent decades as a conceptual modeling tool in different areas of knowledge. In Law, legal core ontologies (LCO) are proposed as a means of computational representation of essential concepts in order to construct legal domain ontologies and applications for the legal world. A relevant source of legal concepts is the legal theory. However, there are divergences between legal theories about what is law. This divergence should be taken account by ontologists because of their consequences to the usefulness of the concepts. In the last decades, legal theories have proposed solutions for modern social claims. These legal theories have the potential of producing a LCO that is more suitable for the current society. An example of these theories is Alexy's Theory of Fundamental Rights. In this paper, we explore an initial ontological model for rights based on Alexy's Theory of Fundamental Rights in order to build a consistent LCO grounded in Unified Foundational Ontology (UFO). We aim to build up this LCO such that it can become a basis for building domain ontologies, languages, knowledge bases, and applications of the legal world.*

## 1. Introduction

Research in Computer and Law has its roots in the 1960s. In 1957, Mehl *apud* Bing [1] published a paper about automated legal decisions and initiated this new research trend. Since then, the transdisciplinary area of Computer and Law has remained in the spotlight, with different research niches investigating the various aspects of the field. One of the niches that has received special attention in recent decades is the one of *Legal Ontologies*.

The importance of understanding the universe of norms has to do with the broad spectrum of roles that norms play in society. As well observed Bobbio [1], individuals, from birth to death, live in a world of norms, which direct their actions. In recent decades, ontologies have been used as a proposal of conceptual models in the Computer and Law area to represent this domain. In fact, some authors have argued, "ontologies could be the 'missing link' between Legal Theory and Artificial Intelligence" [2].

In this paper, our goal is to present the outline of a *legal core ontology* (LCO), which represents essential concepts of the Law based on Alexy's Theory of Fundamental Rights. We call this legal core ontology UFO-L (Ontology of Legal Concepts) as it is proposed as a layer built on top of the *Unified*

*Foundational Ontology* (UFO). We take into account two aspects: 1) Legal theories and 2) Foundational ontologies. Also, we defend the convergence between Legal Theory and Artificial Intelligence in the same line of Valente et al [2], i.e., the understanding that “to create or use ontologies without regard to Legal Theory is a certain path to reinvent the wheel”.

*Legal theories.* The representation of a complex domain such as the Law, with polysemic concepts, and several theories for defining *what is Law*, motivates the ontologist to investigate not only computational issues but also existing legal theories. In a simple definition, a legal theory is a body of systematically arranged fundamental principles in order to describe Law under a perspective.

For the investigation of legal theories, we considered that an ontologist should know the *Ontological Problem of Law*, whereas the question “*what is Law?*” has a significant influence on the development of particular LCO. For instance, concepts in a LCO based on Kelsen’s Theory [3] differ from those in a LCO based on Cossio’s Egological Theory of Law [4] or on Alexy’s Theory of Fundamental Rights [5]. In turn, domain ontologies and applications based on LCOs with different underlying doctrinal perspectives will also reflect these differences. In this context, the problem with using, for instance, theories based on Legal Positivism (e.g. Kelsen’s Pure Theory of Law) is that they do not include modern concepts of the Law introduced by the explicit countenance of a social reality. We advocate here that modern theories can produce a *legal core ontology* more suitable for our current society. Examples of these legal theories are Reale’s Three-Dimensional Theory of Law [6], and Alexy’s Theory of Fundamental Rights. In this research work, we choose Alexy’s Theory of Fundamental Rights because two aspects. The first aspect is the classification of *norms* as *rules* and *principles*. The idea to understand *norms* in this way was firstly proposed by Dworkin [7], but Alexy gave new contours, defining principles in satisfaction degrees as opposed to *rules*, which are satisfied or not. With this understanding, Alexy’s pointed out the impossibility of representing (and solving) every legal problem only with Classic Logic. The second aspect is the relational perspective and the use of Hohfeld’s works (correlatives and opposites legal relations) as a base to extend the understanding of legal relations.

*Foundational ontologies.* In Computer Science, ontologies are used to represent categories and their ties that are countenanced to exist in a conceptualization of given subject domain. Traditionally, these concrete artifacts explicitly representing and underlying conceptualization have been successfully employed over decades to support reuse and sharing of knowledge. An important kind of ontology is a *foundational ontology*. In a *foundational ontology*, this system of categories and their ties is a domain-independent one (representing the most general aspects of reality) and should be built with the explicit support of theories from Formal Ontology in philosophy. Moreover, in the particular case of the so-called descriptive foundational ontologies, theories from areas such as cognitive science and linguistics should also be seriously taken into account [8]. The *Unified Foundational Ontology* (UFO) is an example of a descriptive foundational ontology that has been constructed for more than a decade employing results from formal ontology, cognitive psychology, linguistics, philosophical logics, but also significant accumulated empirical and theoretical results from the area of conceptual modeling in computer science.

UFO-L uses domain-independent concepts of domain provided by the *Unified Foundational Ontology* (UFO). Extending these concepts, a conceptualization for legal domain is built, which can be used in other particular domain ontologies, legal knowledge bases and so on. The use of UFO ensures an ontological consistency due to the observance of principles and postulates that it has (dealing, for example, with relations such as identity, parthood, dependence, etc.). Our choice for UFO is motivated by: (i) our experience with its successful application in a large number of domains ranging from natural

science domains such as Petroleum and Gas and Electrophysiology of the heart to social domains such as organizations, services and software; (ii) the fact that UFO comprises a rich theory of relations and complex relational properties that is absent in other foundational ontologies [9], [10], [11].

The structure of this paper is as follows. In section 2, a background describing both Computer and Law contexts. In section 3, we present the initial steps of the legal core ontology modeling. In section 4, we trace final considerations.

## 2. Background

### 2.1. The Legal Theory Perspective

In a timeline of legal theories, we notice that the Classic Legal Positivism was a successful dividing line between Natural Law Theory and Legal Positivism [12], especially with the Kelsen's Pure Theory of Law. Since then, several legal theorists have discussed the *ontological problem of law* under different perspectives, from *social thesis* of Hart [13], *legal Interpretivism* of Dworkin [7] to Alexy's *Theory of Fundamental Rights*, and *Theory of Argumentation* [5], [14].

Postpositivist theories have dealt in a general way with two problems not solved satisfactorily by Classic Legal Positivism: *determining the law in hard cases* and *judge's discretionary power*. Postpositivist theorists have also criticized the *exacerbated legalism* inherited from Legal Positivism. Researchers in AI & Law have pointed out that *Law* is more than a "set of rules or cases" [15], [2], highlighting the due importance of *legal theories* for building *legal ontologies*. Thus, we emphasize this point and add another one: the importance of choosing a legal theory coherent with the current legal reality. Using only positivist theories to build legal ontologies we run the risk of propagating the problem of *legalism exacerbated* to technological artefacts.

We have investigated the use of legal theories in studies about legal ontologies. Our systematic mapping of *legal core ontologies* indicated that 45% of the selected studies used a Legal Positivist approach; 8% used a non-positivist legal theory and 47% did not use as primary source any legal theory. For instance, Valente [16] uses Hohfeld's theory, Kelsen's theory and Hart's theory to build the FOLaw ontology. Breuker et al [17] follow the same legal theories to develop the LRI-Core. Shaheed et al [18] uses Hohfeld's theory and McCarthy's Discourse Theory to build the NM-L core ontology. Lu and Ikeda [19] uses Kelsen's Theory to build the International Copyright Ontology. Schweighofer and Liebwald [20] uses Hohfeld's theory to propose a legal information retrieval application. Palmirani et al [21] uses Kelsen's theory to propose an ontology of time, and Scharf [22] uses Kelsen's theory to propose a rule engine for legal reasoning (rOWLer).

In addition to issues about the *ontological problem of Law*, described in section 1, and to the question of "*which legal theory is more suitable for the current legal reality?*", presented in this section, there is another aspect to consider in building legal core ontologies: *what kind of representation fields in Law will be modeled*. We identified two fields: 1) the Science of Law and 2) the Law as a particular Legal Order. *The Science of Law* studies the existing concepts in the Law through a scientific method and descriptive language. It is concerned with the general notions of the Law and not with particular norms [11]. In contrast, *Law as a particular Legal System* (or *Legal Order*) is a specific system of legal norms (rules and principles) established by a competent authority. Because of its coercive nature, it has a prescriptive language [23]. For instance, the Brazilian Legal System, the Legal System of England and Wales. The Brazilian Legal System is an example of *civil law legal system*. In this system, the foundation is the written *law*. On the other hand, The Legal System of England and Wales is an

example of *common law legal system* and its foundation is the *common law*, which means that law is built by judges case by case and a judge is generally bound on a prior case. However, it is important to emphasize that this distinction is not watertight, as an example, the binding precedents and jurisprudence in the Brazilian Legal System have become very important in contemporary judgments [24].

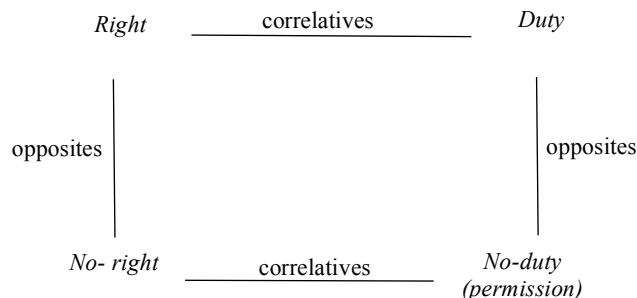
## 2.2. Alexy’s Theory of Fundamental Rights

Alexy’s theory of Constitutional Rights or Alexy’s theory of Fundamental Rights [5] (called here Alexy’s theory) addresses some problems of Legal Positivism by proposing the *Weighing and Balancing structure* based on The *Lüth case* [25]. We present a brief overview of two aspects of the Alexy’s theory: 1) Norms as *rules* and *principles*, and 2) *legal positions* (some other important discussions in this theory, e.g. *balancing system and weighing formula*, are not mentioned due to space constraints).

The first aspect of Alexy’s theory is about (*legal*) *norm*. A *norm* is defined as “the meaning of a normative enunciation”. *Norms* are classified as *deontological norms* and *axiological norms*. *Deontological norms* are, in turn, classified as *rules* and *principles*. *Principles* are optimization requirements, which have different degrees of satisfaction (degree of fulfillment) depending on both factual and legal aspects. On the other hand, *rules* are norms, which are or fulfilled or not [5].

The second aspect is concerned with *legal positions*. *Legal positions* are defined by Alexy [5] as situations in which a subject, in a legal relation, has a *right (lato sensu)* against other subject. In that sense, every *legal position* is a *relation* between two subjects and an object. Alexy’s system of *basic legal positions* divide *rights* in *rights to something*, *liberties*, and *competences (legal power)*. In turn, *rights to something* are divided in *rights to negative acts (non-obstruction of acts, non-affecting of characteristics and situations, non-removal of legal positions)*, and *rights to positive acts (factual act, normative act)*.

According to Alexy’s theory, the legal positions of the sort *rights to something* can be represented using the logical connections between legal relations from Hohfeld’s Theory [26], [27]. According to Hohfeld [27], the legal relations are grouped in a “convenient scheme of opposites and correlatives” as follows. Jural opposites (*right, no-right, duty, no-duty or permission*), and jural correlatives (*right, duty, no-right, permission*), as shown in figure 1.



**Figure 1. Hohfeld’s scheme *apud* Alexy [5]**

The use of Alexy’s theory is justified because of its structural and relational aspects, providing a “basis and a framework for everything else that follows” [5]. For our work, we have divided Alexy’s theory in two parts as follows. The first part is concerned with the system of *basic legal positions* (fundamental

rights as subjective rights). The second part refers *Weighing and Balancing* applied to the interpretation of the legal norms and the structure of norms (deontological and axiological norms). This paper deals with the first part of Alexy's theory.

### 2.3. Legal Ontologies Perspective

Since the 60's, many studies on AI & Law, conceptual modeling and Law, information retrieval in Law, among others, have contributed to solve the initial problem of representing and retrieving legal knowledge [14]. Regarding legal knowledge bases, Bing [1] accurately predicted in 1992 the strengthening of research related to the legal knowledge bases and legal philosophy or jurisprudence. Since then, a number of important research efforts concerning legal bases knowledge have appeared Casellas [21], Agnoloni and Tiscornia [22], Poblet et al [23], Breuker et al [24].

Nowadays, it is clear that is not enough to represent the syntax of legal entities; it is necessary to represent their semantics as well as their mutual relationships. In a globalized world, it is not enough that there is a legal knowledge base; it is necessary that this base interoperates with others existing knowledge bases. Ontologies applied to Law aim at addressing these representation and interoperable problems.

The concept of ontology has its origins in Philosophy (as a field of study and as a system of categories and their ties). However, in the past 2-3 decades, it has been adapted to Computer and Information Science to mean frequently a formal representation of a particular system of categories and their ties [8], [28]. From this convergence, Guarino [28], Gruber [29], and Staab [30] proposed definitions, methodologies and classifications of ontologies.

According to Gangemi *apud* Oberle [31], ontologies are classified either by their specificity or by their purpose. Related to specificity, ontologies are: 1) foundational ontology; 2) core ontology; and 3) domain ontology. Related to purpose, ontologies are: 1) reference ontology; and 2) application ontology.

A *foundational ontology* defines a set of domain-independent ontological categories. In turn, a *core ontology* defines a set of fundamental concepts of a field of knowledge (e.g. services, collaboration, law, organizations, software) that are still general concepts that occur across multiple domains. Core ontologies are often built by reusing and/or extending a foundational ontology [32]. Finally, a *domain ontology* defines a set of concepts from a specific domain (e.g. Brazilian law). *Foundational ontologies*, such as UFO [8] and DOLCE [33] are useful in building LCOs because they can help to bring both ontological consistency and completeness to the process [13]. For instance, the OPJK ontology [34] used concepts as *agent*, *role*, *document*, *process*, and *act* from DOLCE Lite + CLO, SUMO, and PROTON.

*Core Ontologies* that represent legal domain-independent concepts in Law are denominated *Legal Core Ontologies* (LCO). In this paper, a *LCO* is defined as a cohesive and coherent set of concepts, properties and relations that exist in the legal universe. A LCO can be used as basic structure in legal domain ontologies, frameworks, and application ontologies.

In the literature, the expression "*legal core ontology*" began to be used in middle 90' by Valente et al [35], and Breuker et al [36]. Among the most cited *legal core ontologies* in the literature we have:

- **Frame-Based Ontology (FBO)** published in 1993 by van Kralingen et al [37], based on legal positivism (Hart, Kelsen, van Wright, and Ross theories) and written in ONTOLingua. It is a mix of foundational categories and legal core concepts. The core of this ontology is the concept

of *norm* and concepts related to it, such as *norm subject*, *legal modality*, and *description of the act*.

- **Functional Ontology of Law (FOLAW)** published in 1994 by Valente [16], written in ONTOLingua, it is based on Kelsen, Hart and Bentham theories, and has a functional perspective and knowledge-oriented (*normative knowledge, responsibility knowledge, reactive knowledge, creative knowledge, and meta-level knowledge*). As this ontology is based on Kelsen's theory, basically, *norms are rules, which are either observed or violated*.
- **Hage and Verheij's Ontology**. Published in 1999, and written in First-Order Logic, it is an ontology based on Dworkin and Alexy's theories of norms classification (*norms are rules and principles*). For them, a legal ontology is an interconnected dynamic systems of state of affairs. The principal categories of this ontology are *individuals (state of affairs, events, and rules)* [38], and similar with FBO's ontology, it mixes foundational concepts with legal core concepts.
- **Core Legal Ontology (CLO)** published in 2003 by Gangemi et al [39] and written in OWL-DL, it is the first LCO built grounded in an explicitly defined foundational ontology (DOLCE). There is, however, no explicitly defined primary legal theory source on which this ontology is based.
- **LRI-CORE** built by Leibniz Center for Law Research Group [40], published in 2004, and written in OWL+DL, it is grounded in different foundational ontologies (DOLCE, SUO, John Sowa's ontology). It has later evolved to **LKIF-CORE**, which has been built by the same group (2007).
- **PROTON+OPJK** is a combination of ontologies built inside the SEKT European project, PROTON is a foundational ontology based on commonsense concepts. Casellas's ontology (OPJK) [34] is an ontology which contains relevant legal domain specific knowledge. Although, at first sight OPJK can be considered a legal domain ontology, it also contains several generic concepts that can be reuse in different legal domain ontologies (*e.g. judicial organization, judicial role*), giving to it a nature of core ontology.

Other works related with legal domain representation cited in the literature, are: LEGOL, the seminal work, by Stamper [41], Hafner's semantic work [42], McCarty's language [43], Mommer's ontology [44], among others.

#### 2.4. Unified Foundational Ontology (UFO)

Following a well-documented trend in the ontology engineering literature, we here strongly subscribe to the practice of using foundational ontologies as a central methodological tool for building core and domain ontologies. In particular, we employ the foundational ontology UFO as a basis for our work.

The *Unified Foundational Ontology* (UFO) was initially proposed by Guizzardi and Wagner [13], permits the building of an ontology reusing some generic concepts (*e.g. kind, subkind, relator, role, role mixin*). The ontologist does not need to rebuild these concepts. For instance, Lopes et al [46] grounded the Civil Law domain ontology in UFO, using the ontology modeling language OntoUML (containing ontological notions such as *kind, subkind, phase, mixin, relator, role*).

The *foundational ontology* UFO has three layers. UFO-A (*ontology of endurants*) is the UFO core, and includes terms as *universal, relator, role, intrinsic moment*. UFO-B (*ontology of perdurants*) is a layer built on the UFO-A, and relates terms as *event, state, atomic event, complex event*. UFO-C is built on UFO-B and UFO-A and represents *the social reality*, which relates categories such as *social agent*,

social object, social role, and, normative description. Figure 2 shows the fragment of UFO and some UFO-C categories are described as follows.

A *normative description* defines one or more rules/norms recognized by at least one *agent* and that can define nominal *universals* such as *social moment universals* (e.g., social commitment types), *social objects* (the crown of the king of Spain) and *social roles* (president, prime minister, PhD candidate or pedestrian) [47]. For instance, consider the rules of hopscotch game Even in an informal social context, there is a set of rules (in general sense) being observed by its participants. Breaking these norms will result on penalties (exclusion of the player, the game ends) or a social imbalance (the conflict). Brazilian Constitution, ICAIL 2015 Regulations are examples of *normative description*.

*Agents* are *substantials* capable of bearing special kinds of moments named *intentional moments*. Examples of agents include Barack Obama and the Brazilian Federal Republic. *Agents* can bring about *actions* (*intentional events*). According to Almeida and Guizzardi [48], they are *substantials* capable of bearing special kinds of moments named *intentional moments*. *Agents* may play *social roles*, such as *husband* and *wife* in the context of a marriage (a *social relator*), as well as, *student* and *professor* in the context of an enrollment (a *social relator*). *Social agents* are those defined by a normative description, e.g., the Brazilian Federal Republic, as opposed to a *Human (or physical) Agent*. A *social object* is a category of UFO-C that defines *non-agentive substantials* produced in a social context. For instance, the crown of the king of Spain object defined in the context a certain geo-political entity. For a detailed description of UFO categories, we refer Almeida and Guizzardi’s paper [4], which describes UFO categories, especially UFO-C categories, pointing out the nature of each one of them.

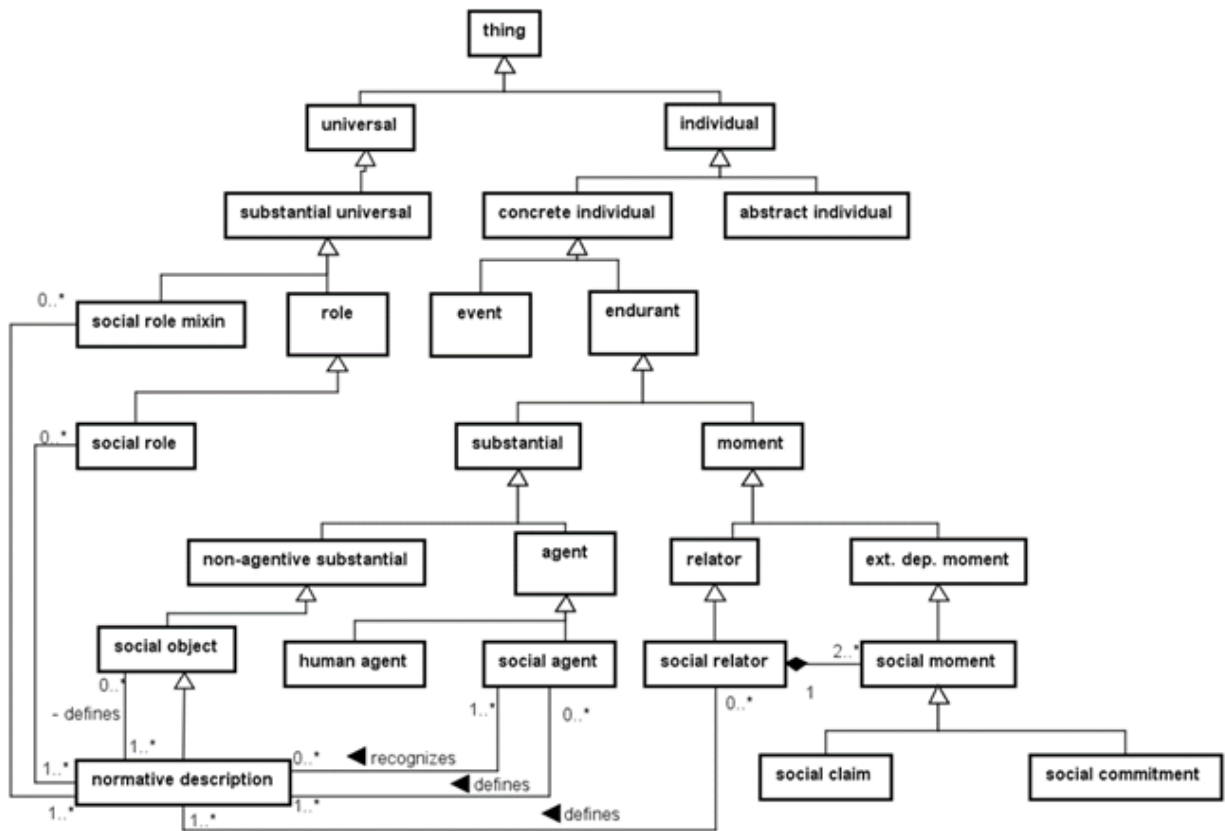


Figure 2. Fragment UFO (Almeida and Guizzardi [4])

### 3. A Model of Alexy’s notion of rights to something

In this initial work, we focus on Alexy’s notion of *rights to something*. Other rights (*protected liberty*, *non-protected liberty*, *citizen competence*, and *state competence*) will be represented in future work. These concepts are described as follows.

**Legal relation** is a *bond* between subjects achieved by the existence of a *legal fact*. In other words, it is the *social relation* typified in a *legal norm* according to Larenz [49], and Reale [6]. Since this research work is guided by the relationship perspective, this legal concept is the main concept represented in our model, using the notion of *legal relator*. According to Almeida and Guizzardi [48], a **social relator** (figure 2) is a *relator* “composed of two or more pairs of associated *social moments* (*social commitments*; *social claims*)”. In turn, a **legal relator** is a specialization of *social relator*, dependent on a number of other *individuals* or *universals* that play *legal roles* (which are universals that agents instantiate contingently when bound by the legal relator). Figure 3 shows the taxonomy of *legal relators* according to Alexy’s theory. The taxonomy shows specializations of the UFO notion of relator.

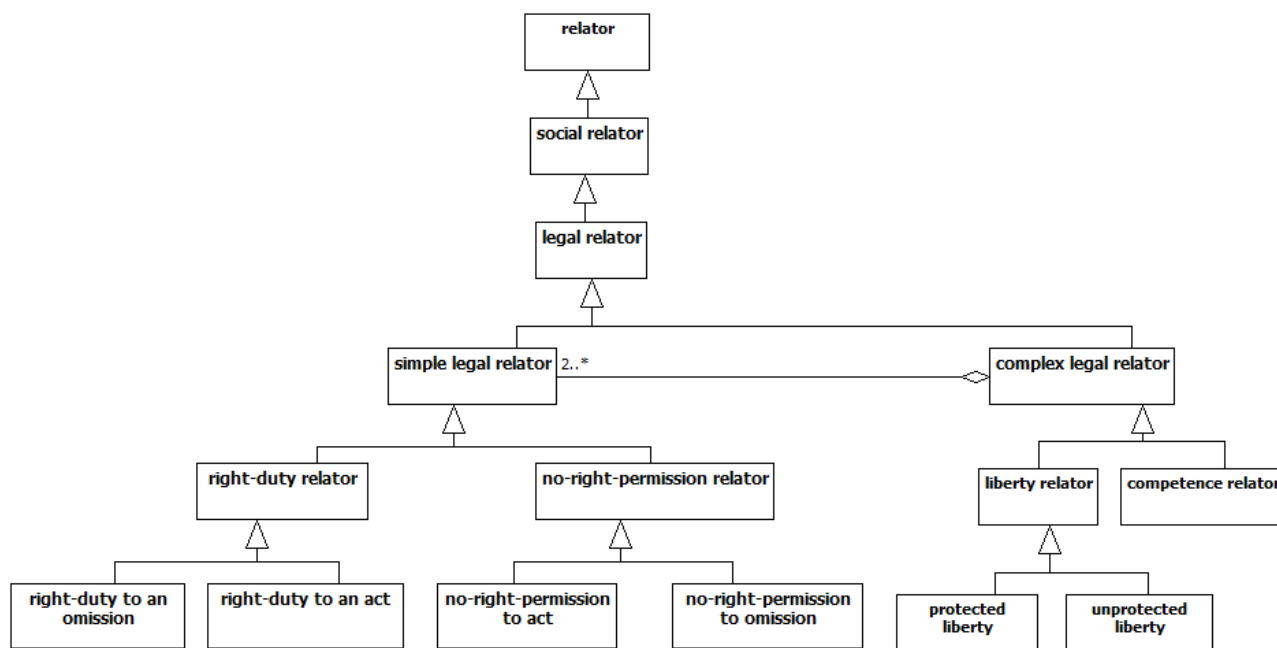


Figure 3. Taxonomy of relators

A *legal relator* is specialized in *simple legal relator* and *complex legal relator*.

**Simple legal relator.** A *simple legal relator* represents Alexy’s concepts of *rights to something*. It uses pairs of legal fundamental concepts (right–duty, no-right–permission). A *simple relator* may be classified as *right–duty relator* or *no-right–permission relator*.

**Right–duty relator.** A *right–duty legal relator* uses the *legal relation* right–duty (correlative) to bind *right holder* and *duty holder*. A *right holder* is someone who has a right to something against a *duty holder* (e.g. a citizen as right holder has a right to vote against the state as duty holder). A *duty holder* is someone who has the duty to materialize the right of a *right holder*. Table 1 discusses further examples



of this type of legal relator according to their specializations (right–duty to an omission or right–duty to an act).

Rights to an omission – right-duty relator		
Legal Position	Description	Example
<b>Rights to the non-obstruction of acts</b>	The duty-holder must not prevent or hinder certain acts of the right-holder.	<i>The right to express an opinion.</i> Right-holder: person (citizen, non-citizen); Duty-holder: State Act: non-obstruct person to express an opinion.  If “Person <b>a</b> has the <b>right</b> , against <b>s</b> , to express an opinion” then “State <b>s</b> has the <b>duty</b> not to obstruct <b>a</b> in expressing an opinion”.
<b>Rights to the non-disruption of characteristics and situations</b>	The duty-holder must not adversely affect certain characteristics and situations of right-holder.	<i>The inviolability of the confidentiality of correspondences.</i> Right-holder: person (citizen, non-citizen) Duty-holder: State Act: non-disrupt characteristics and situations  If “Person <b>a</b> has the <b>right</b> , against <b>s</b> , to the inviolability of the confidentiality of correspondences” then “State <b>s</b> has the <b>duty</b> not to disrupt the characteristic (or situation) of <b>a</b> to inviolability of the confidentiality of correspondences”.
<b>Rights to non-removal of legal positions</b>	The duty-holder must not remove certain legal positions of the right-holder. The existence of a legal position means that a corresponding norm is valid. Removing a certain legal position of right-holder is similar to derogating particular norm.	<i>The right to express an opinion.</i> Right-holder: person (citizen, non-citizen) Duty-holder: State Act: non-remove legal positions  If “Person <b>a</b> has the right, against <b>s</b> , to express an opinion” then “Person <b>a</b> has the right, against <b>s</b> , that <b>s</b> should not remove from <b>a</b> legal position to express an opinion”.
Rights to an act – right-duty relator		
<b>Rights to factual act</b>	The duty-holder must act when a fact exists.	<i>The right to education.</i> Right-holder: child; Duty-holder: State Act: to educate a child  If “Child <b>a</b> has, against <b>s</b> , the right to education” then “State <b>s</b> has the <b>duty</b> to undertake the positive factual act in order for <b>a</b> to be educated”.
<b>Rights to normative act</b>	The duty-holder must create certain legal norms.	<i>The right to have a legal norm regulating the right to strike.</i> Right-holder: public employee Duty-holder: State Act: to create a legal norm regulating the right to strike  If “Public employee <b>a</b> has, against <b>s</b> , the <b>right</b> to have a legal norm prescribing the right to strike” then “State <b>s</b> has the <b>duty</b> undertake the positive normative act of creating the legal norm which regulates the right to strike of the public employee <b>a</b> ”.

**Table 1: Rights to something – right-duty relator**

**No-right–permission relator.** A *no-right–permission legal relator* uses the *legal relation no-right–permission* (correlative) to bind *permission holder* and *permitter*. A *permission holder* is someone who has a permission (no–duty), against the *permitter*, to do (or not to do) something. Table 2 discusses examples of this type of legal relator according to their specializations (no-right–permission to an act or no-right–permission to an omission).

Legal Position	Description	Example
<b>Permission to act</b>	Permission to act is the no-duty not to act. The permission-holder may act.	<i>Permission to smoke in open place.</i> Permission-holder: smoker Permitter: State Act: smoke in an open place. “Smoker <b>a</b> has <b>permission</b> to smoke in an open place, against to State <b>s</b> ” iff “State <b>s</b> has <b>no-right</b> to obligate smoker <b>a</b> not to smoke in open place”.
<b>Permission to omission</b>	Permission to omission is the no-duty to act. The permission-holder may omit an act.	<i>Permission to do not join an association.</i> Permission-holder: person Permitter: State Act: not to join an association ‘Person <b>a</b> has, against State <b>s</b> , <b>permission</b> not to join an association” iff State <b>s</b> has <b>no-right</b> to obligate person <b>a</b> to join an association.

**Table 2: Permission to something – no-right–permission relator**

#### 4. Final Considerations

In this paper, we outlined the fragment of a legal core ontology grounded in a *foundational ontology* as well as based on Alexy’s Theory of Constitutional Rights. The focus is on the representation of *rights to something* on a relational perspective, specifying concepts and its legal relations. For this, we used categories from UFO, especially, *relators* to represent the triadic relations between *holders* and *rights, duties, no-rights* and *permissions*. Although the theory is directed to *constitutional rights*, it was possible to use the structure of legal relations to model generic legal relations.

We presented the theoretical issues about legal theories and ontologies, discussing the importance of *foundational ontology* for building both core and domain ontologies, as well as the importance to use a legal theory as basis for legal ontologies. We emphasized that the choice of a legal theory should take into account the reality of our contemporary society. Nowadays, legal theories propose different solutions to solve problems not addressed by Logical-Normative Positivism.

As future work, we will extend the formalization of *rights (liberties and competences)*. In addition, we will extend the study to the second part of Alexy’s theory (*Weighing and Balancing*). Finally, we intend to validate the LCO using existing domain ontologies.

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