On formalisation of the goal concept in law

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Abstract

The paper raises a problem of formalising several key concepts in legal theory, namely, goal, function and value. The law is viewed from a perspective of computer science in law. I intend to apply requirements engineering methods in law. The Berman and Hafner’s [1993. Representing teleological structure in case based legal reasoning: the missing link. In: Proceedings of the Fourth International Conference on AI and Law. ACM Press, New York, pp. 50–59] challenge to model case-based reasoning in legal domain and the more systematic research, which is collected in Artificial Intelligence and Law journal in 2002, are considered as possible approaches to solutions. The term “goal” covers purposes, policies, interests, values, etc. I find a formalisation to have different levels depending on a distinct meaning of the term “law”. E.g., legal drafting is closer to engineering than to legal reasoning. European Union law and implementation of EU directives provide us with court decisions based on the teleological method. National implementation measures could employ goal-driven systems engineering techniques. Conclusions: (1) the formalisation is a challenging problem, (2) experts from other domains will gain from explicit representation of aims behind the law, (3) analysis of the structure of law is not enough; the studies of the content of law are required, too.

Keywords: Goal formalisation; Artificial intelligence in law; Legal engineering; Using legislation; Teleological method

1. Introduction

The paper raises a problem, namely, the problem of formalising the “goal” concept. This formalisation would contribute to conceptualise several related categories in legal theory—“purpose”, “value”, “function” and “task”. Possible approaches to solutions are referenced throughout the paper.

The paper views the law from the perspective of computer science in law, more precisely, artificial intelligence and law (AI & law).

The conclusion is drawn that the formalisation is a problem, indeed, at least from the point of view of knowledge representation (KR). Hence the paper aims to contribute to appropriate descriptions and representations of problems and problem spaces. I think that lessons learned from AI in engineering can contribute to AI in social sciences and vice versa.

The research may result in two products. First, formalised conceptualisation of the concepts above, which is identified as an ontology. Second, a model of goals, which are inherent in European Union law: EC Treaty, EU Treaty and the Treaty establishing a Constitution for Europe.

2. Motivation

My research is motivated to gain from explicit representation of goals in law. The motivation is viewed from two perspectives:

- **Tracing of goals**, a computer science perspective. Goals in the law should be verified, in particular, while creating law. Goals are similarly traced in information system (IS) development.
- **Using the teleological method** in law and legal reasoning, a legal perspective. Purposive interpretation of law is broadly used by courts. Therefore it is reasonable to make purposes explicit.
2.1. Legal engineering–systems engineering

The following intent regarding legal drafting motivates the research. From systems engineering (SE) standpoint, I can view the law as a formal system. Here no distinction between systems engineering and information system engineering is made. Therefore a legal engineering task is modelled to include the following stages:

- First, formulate goals of a system to be designed.
- Second, from the goals derive requirements.
- Third, from the requirements design the system.

The model above is similar to analysis–design–implementation stages in a software life-cycle model. Here I am guided by the idea of Čapulinas and Mokševičius (2002) who treat a statute as a system. Therefore systems development methods should be used when developing a statute.

Such an intent can be treated as an oversimplified view to law. A bootstrapping technique can be successful in software engineering, but it may be doubtful in legal engineering. Jurists emphasise that the formal usage of the law is alien to law. But I note that the latter is totally distinct from the formalisation of legal concepts.

2.2. What law is–what goal is

I try to discover the essence of law through the category of goal. Can the related categories in legal theory be built on the basis of it? In other words, can the category of goal be placed on the top of an ontology of law?

A key question in legal philosophy “what law is” can be supplemented with “why one obeys the law”. Answers to both questions are explored in jurisprudence. Lawyers see problems, primarily, not in the law, but in the use of the legislation. The latter task serves as a niche for AI researchers.

I find law as a domain with the following issues at the heart of the matter:

- Deep models of KR.
- Purposive interpretation of the text of a statute.

2.3. Legal knowledge engineering and legal theory

I aim to contribute to two areas:

- Legal knowledge engineering, which is part of AI & law.
- Legal theory.

I agree with Valente (1995, p. vii) that “building legal knowledge-based systems involves more than AI techniques” and “it involves theories and views about what law is, which are typical legal problems and how they are solved”.

However, my intent to contribute to the two areas involves a risk to be accepted not seriously. The reason is that computer science community and law community focus on different tasks.

2.4. Goal concept depends on a legal task

I share Valente’s view (1995, p. viii) that “another path to develop models of problem solving, complementary to the one based on the ontology, is the development of models of typical legal tasks”. He proposes typology of legal problems comprising some main views on the use and design of legislation. In this typology, he uses three complementary perspectives (emphasis added):

- The perspective of elaborating legislation.
- The perspective of an agent using the legislation.
- The perspective of elementary internal problems implied or indicated by the ontology.

I think that the goal concept depends on the perspectives above.

2.5. Derivation and legal reasoning

The text of a statute can be treated as a knowledge base (KB). A very rough formalisation is that the statute is a list of norms. The structure is the subject matter in the legal system.

The question “what a norm is” is at the heart of legal theory. Valente (1995, p. 51) relies on Kelsen (1991) and derives the following basic conception of norm to be used in the ontology:

A norm expresses an idealisation: what ought to be the case (or to happen), according to the will of the agent that created the norm.

AI researchers should note that the latter conception requires further formalisation. In legal theory, the structure of a norm consists of three elements: hypothesis, disposition and sanction. This model can be compared to if then else rule in rule-based KR.

Regarding the concept of a KB, I share the formalisation of Delgrande and Mylopoulos (1986) who concern primarily “the nature of knowledge and its formalisations, rather than its representation”. They formalised a KB as a pair (KB₀, ⊢_L) where KB₀ is a collection of statements in the language of some logic L, for example,

\[ KB₀ = \{ \text{Student(John), Supervisor(John, Mary)} \} \]

and ⊢_L is the derivability relation in L, i.e., specifies what can be derived from the axioms, given the rules of inference of L. Then

\[ \alpha \in KB \iff KB₀ ⊢_L \alpha. \]

Delgrande notes that “adoption of this view implies that KBs are essentially treated here as theories in
Mathematical Logic, with KB0 playing the role of a set of proper axioms”.

The above formalisation supports us from mathematical logic. In order to represent a statute as a KB, a higher level support is still needed. Ontologies can also contribute.

In KR, Brachman and Levesque (2004) rely on the role of reasoning. I also share views of authors who emphasise the importance of formalisation of purposes. However, I think that logical reasoning and legal reasoning (legal argumentation) constitute distinct epistemological levels (cf. symbol level and knowledge level representation in KR Stefi, 1995).

2.6. The problem of interpreting a formal representation of a statute

I see the following risk in representing the text of a statute as a KB. A judge is entitled to interpret the statute and to make a decision in the court. Suppose that a contradiction between the interpretation of a statutory text and a KB arises. Who is then in charge for the contradiction: the court (judge) or a knowledge engineer who developed the KB?

3. Goals in law and the functions of law

A reader of legal texts can find multiple occurrences of the term “goal” (and synonyms “aim”, “purpose”, etc.). I am interested in the meaning of these concepts. Thus a problem of semantics is raised.

3.1. Different meanings of the term “law”

The term “law” has different meanings:

(1) A social phenomenon.
(2) A legal or judicial system; structure and contents, e.g., continental law and common law.
(3) A (logical) system of rules.
(4) A body of rules made by legislature; statute law.
(5) The science or knowledge of law: jurisprudence.
(6) The principles originating and formerly applied only in courts of common law: equity.

The above concepts are examined in legal theory. Therefore, the goal concept is a subject to different formalisations depending on the level above.

Goals may be assigned to a structural part of the law, too. We may speak about goals of a norm, goals of a contract, aims of the norm-sender—the will of the legislator, etc. Therefore, the levels of granularity in the law are subjects to different formalisations.

3.2. Goals of law in legal theory

The question “what the goals of law are” can be reduced to “what the functions of law are”, see Van Hoecke (2002). The functions of law are in the focus of legal theorists, e.g., Hart, Krawietz (1967), Raz (1973), etc. I discover further in Van Hoecke (2002, p. 61) that “the (main) aim of the law” is reduced to values, more precisely, to “realise values such as justice”, “equality”, “individual freedom” and the like. Aims are formalised as values by AI & law authors, too (Bench-Capon, 2002; Hafner and Berman, 2002; Prakken, 2002; Sartor, 2002).

In their motivation, AI researchers should take seriously Van Hoecke’s (2002, p. 61) note about overestimating the aims of the law:

In traditional jurisprudence attention often has been paid too exclusively to the aims of the law. This is narrowing the analysis to deliberate law-making, thus leaving aside a not unimportant part of the law, but at the same time is it probably overestimating the possible effects of law as a means for social engineering.

Summers (1977, pp. 119–131) has rightly called such an approach “naïve instrumentalism”. Further Van Hoecke notes ones again (emphasis added):

When taking such a position, moreover, jurists tend to mingle a descriptive analysis with normative points of view. This is especially the case when it is posited that the (main) aim of the law is to realise values such as “justice”, “equality”, “individual freedom” and the like, thus offering an idealistic picture of law.

In the quotation above, I discover a dimension that is identified earlier: aims are formalised as values. Formalising goals as values is proposed and investigated by other authors: initially by Berman and Hafner (1993), later Hafner and Berman (2002), Bench-Capon (2002), Prakken (2002), Sartor (2002), etc.

3.3. Overestimating the aims of the law: is it a real risk in computer science?

Further I provide a comment to the latter Van Hoecke’s note. Contrary to a jurist, a computer scientist does not risk to pay too much attention to the aims of law. The reason is in the distinction of tasks of CS and law. An in-width border between the two domains determines the distinction. When formalising aims, a jurist develops jurisprudence. The scope of this task in the legal domain has no in-depth limits. In the task of formalising aims of law (a CS task), the computer scientist is scoped by elicitation of the aims. This task is scoped by the in-width border with law. However, the task of the computer scientist to develop CS has no in-depth limits, too.

I find the following comparison of law and CS. Both have similarities and differences. Both are about obligations and permissions. However, the subjects of law and CS are different: people (or their arrangements) and computers (or abstract machines), respectively. As one knows from a formalisation of normative knowledge, e.g., Valente (1995, p. 83), Van Hoecke (2002, p. 94), an ought or may deontic
operator is a structural element of a norm. Thus, the law is about obligations and rights of people, namely, what people ought or may do. CS is about what computers ought/may do. For example, the requirements specification of an IS provides what IS ought to do (imperative norm—order), may do (dispositive norm—permission), or is not allowed to do (prohibitive norm).

3.4. Classification of the functions of law

Ordering society is one of the functions of law. From a societal perspective, Van Hoecke (2002, p. 62) distinguishes two main functions:

1. Structuring political power.
2. Creating and keeping social cohesion.

Achieving social cohesion implies the function of consolidation of the social system and of the legal system. I represent the latter statement as a transition to the graph node marked with the goal “social cohesion”. The transition is achieved by the function “consolidation”, which is represented as an edge.

Legal theory classifies the functions of law to four categories:

1. The ordering function.
2. The punitive function.
3. The informative function.
4. The preventive function.

Such classification can be represented in an ontology of law, but as very high level concepts.

4. The teleological method in law

Legal theory distinguishes the following methods of interpretation of law (Van Hoecke, 2002, p. 140):

1. The grammatical method.
2. The systemic method.
3. The use of legislative materials.
4. The historic method.
5. The teleological or purposive method.

The last method is the focus of the paper. The driving force of the research is to make purposes explicit. The reason is that “[...][T]he teleological or purposive method takes the objective of the statute as interpretation context. In certain cases the interpretation of a statute in the light of the purpose of the statute, or that of the entire legal system, is necessity, either for an adequate understanding of the statute itself, or in order to prevent absurd or unreasonable applications of the statute, often in the light of changed circumstances” (Van Hoecke, 2002, p. 140).

The statement that “purposive interpretation is by far the most used method by the European Court of Justice” (Van Hoecke, 2002, p. 140) is also backed by other authors. One of the most striking characteristics of the legal order established by the Treaty is the competence vested in the Community institutions to enact legislation for the purpose of carrying out the objectives of the Treaty (Arnull et al., 2000, p. 83). A ground for looking at the aim of the statute is the clearly absurd or unjust result of applying the statute in its plain prima facie meaning. Another ground concerns historical developments which have arisen since the enactment of the statute. Sometimes also here the immediate cause for a teleological construction is the absurd result of a literal interpretation (Van Hoecke, 2002, p. 147).

Text retrieval systems and experts in domains outside law rely on the grammatical method of interpretation. However, “the historical and teleological dimensions of the law entail that the liberty of interpretation enjoyed by the reader of a statute from a linguistic point of view becomes even wider within a legal context” (Van Hoecke, 2002, p. 150).

4.1. Motivation to formalise purposes of an EU directive

A challenging example for goals elicitation is in the European Union law, namely, interpreting the supremacy of Community law and direct applicability of EC Treaty provisions. Purposes of an EU directive have to be transposed into the national legal systems. Article 249 (ex 189) EC Treaty sets:

A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods.

Thus, the legislation adopted to implement a directive need not use the same words as the directive itself. Implementation of a directive requires the transposition of the requirements of the directive by binding measures of national law. The national implementing measures of the transposition are up to a Member State. Here a natural question is raised: are the purposes explicit enough in the text of the directive?

How one can verify that the purposes are implemented correctly in the national legislation? Do only lawyers know a purpose behind the law? May experts from other domains also find out this purpose?

I think that AI community can contribute to the research on the verification.

4.2. Modelling objectives of the EU treaty and the EC treaty

The main objective of the EU is set in Article B (now 2) of the Maastricht Treaty on European Union (TEU), 1992:

[T]o promote economic and social progress which is balanced and sustainable, in particular through the creation of an area without internal frontiers, through
the strengthening of economic and social cohesion and
through the establishment and monetary union, ultimately including a single currency…). This is the first of five objectives presented in Article B TEU. AI researchers could propose a semantic network to represent the five objectives including the main objective above. The content of the objectives is included in the subject matter of EU law and is examined in legal literature.

One of the objectives of the EEC Treaty is to establish a common market. From a perspective of the substantive EU law, the latter objective can be represented as an AND-tree of four rights:

- common_market
  - free_movement_of_goods
  - free_movement_of_persons
  - free_movement_of_services
  - free_movement_of_capital

This can be decomposed further. A resulting graph should be not trivial.

In order to answer the questions raised above in this section, deep studies of law are required. For example, examining of the purposes in the EU law, leads to a variety of concepts, e.g., direct application, direct effect, vertical direct effect (invoking Treaty provisions against Member States), horizontal direct effect (invoking Treaty provisions against private individuals and companies), etc. (Arnull et al., 2000).

4.3. Examples of goals and the Court’s decisions based on teleological reasoning

Further in this section I analyse statements about purposes. References to decisions of the European Court of Justice (the Court), which are based on teleological interpretation of EU law, are provided. Quotations are taken from Barnard’s book (2004), which is devoted to the substantive law of the EU.

Barnard (2004, p. 2) starts with a summary of the benefits of free trade. Her statement about the consequences of free trade can be represented as a sequence of causal relationships (treated as a chain of goals):

- free_trade → specialization → comparative_advantage → economies_of_scale → consumer_welfare & efficient_use_of_world-wide_resources

4.4. Meaning of restrictions on free trade

In order to formalise the concepts “the single market”, “free trade” and “barriers”, purposes of respective EC Treaty’s articles have to be considered.

Chapters 5 and 6 of Barnard (2004) consider non-fiscal barriers to trade. Article 28 (ex 30) EC Treaty provides:

Quantitative restrictions on imports and all measures having equivalent effect shall be prohibited between Member States.

This provision prohibits two types of national measure: quantitative restrictions (QRs) on imports and measures having an equivalent effect to a quantitative restrictions (MMEs). The purpose of Article 28 can be represented in terms of propositional logic:

\[ \neg \text{QRs_on_imports} \land \neg \text{MMEs_on_imports} \]

Similarly is with Article 29, but on exports.

Article 30 lists the grounds of derogations from Article 28 and Article 29, shortly: “public security”, “protection of health”, “protection of national treasures”, and “protection of intellectual property”.

In Henn and Darby (Case 34/79 [1979] ECR 3795) the Court spoke on the function of the second sentence of Article 30 and on the proper purpose of derogations. Barnard (2004, p. 78) considers the second sentence of Article 30 and the principle of proportionality (emphasis added):

[The Court] noted that the function of the second sentence of Article 30 was to prevent restrictions on trade based on the derogations mentioned in the first sentence of Article 30 from being diverted from their purpose (…). It said that since the British laws, taken as a whole, had as their purpose the prohibition of the manufacture and marketing of publications or articles of an indecent or obscene character, there was no breach of the second sentence of Article 30.

4.5. The principle of proportionality

The proportionality principle of EU law also relies on the concept of purpose. The Court has long emphasised that the measures taken by Member States must not only genuinely serve the purpose for which they are intended but they must also be proportionate to the risk presented by the import (Barnard, 2004, p. 79). “Therefore, the essential characteristic of the proportionality principle is that the Court performs a balancing exercise between the objectives pursued by the measure at issue and its adverse effects on individual freedom” (Barnard, 2004, p. 80) (emphasis added). In Campus Oil (Case 72/83 [1984] ECR 2727, para. 37), the Court mentioned objectives in order to determine proportionality (emphasis added):

Article [30], as an exception to a fundamental principle of the Treaty, must be interpreted in such a way that its scope is not extended any further than is necessary for the protection of the interests which it is intended to secure and the measures taken pursuant to that Article
must not create obstacles to imports which are disproportionate to those objectives.

4.6. From Cassis de Dijon through Dassonville to Keck

I discover teleological reasoning in Barnard (2004, Chapter 6) where the concept of measures having an equivalent effect to a quantitative restrictions (MEEs) is considered. I find that the definition and the classification of MEEs heavily rely on criteria of purposes. MEEs are considered as prohibitions in Article 28. MEEs restrict free movement of goods and thus restrict the single market.

The general definition of MEEs, known as the Dassonville formula, is now found in Case 8/74 [1974] ECR 837, para. 5:

All trading rules enacted by Member States which are capable of hindering, directly or indirectly, actually or potentially, intra-Community trade are to be considered as measures having an effect equivalent to quantitative restrictions.

The concepts of “all trading rules”, “enacted by member states”, “directly or indirectly” and “actually or potentially” deserve a separate section to discuss (Barnard, 2004, p. 87). MEEs are decomposed to distinctly applicable measures and indistinctly applicable measures. Each of them is classified further on and should be included in an ontology.

In Case 120/78 Cassis de Dijon [1979] ECR 649, para. 14, the Court formulated the idea, known as the presumption of equivalence or mutual recognition.

On the road to Keck (Joined Cases C-267 & 268/91 Keck and Mithouard [1993] ECR I-6097), a two-stage test based on establishing first whether the national measure pursued some objective consistent with Community law and applying the superficial balancing act is considered (Barnard, 2004, p. 133) (emphasis added).

Examples of the Court’s decisions which involve teleological reasoning can be continued.

4.7. Aim ≠ obligation!

The following conclusion is important. After examining external economic relations of the EU, Barnard (2004, p. 227) concludes that “trade liberalization has always been an aim rather than an obligation”.

The above quotation illustrates a conceptual difference between the notions of “aim” and “obligation”. I also find that this statement draws a border between AI and law. AI task is to model aims; a legal task focuses on the content of obligations.

4.8. Dynamics of law

The transition of the Court’s decisions from Cassis de Dijon through Dassonville to Keck provides an example of the dynamics of law. The content and interpretation of the law is developed.

The dynamic nature of law is emphasised by Hage and Verheij (1999). They summarise the abstract model of the law:

- The law is a system of states of affairs.
- The law is dynamic: the states of affairs that obtain are subject to change due to the occurrence of events.
- The law is interconnected: there are (directed) connections between the states of affairs that obtain, based on what I will call rules.

5. Goals in AI and requirements engineering

When formalising goals in law, I am guided by visions of goals in AI and RE. In this section I try to answer “why AI” and “why RE”.

5.1. Why requirements engineering?

Goal-oriented requirements engineering is addressed since several decades. A guided tour on goal-oriented RE is presented by van Lamsweerde (2001). Goal-driven approaches are examined by Rolland and Prakash (2000) where conceptual modelling (CM) is treated as the first phase of the two-phase organisation of the IS life cycle. I treat CM to be in the intersection of RE and AI. CM glues RE and KR. However, I note that the universe of discourse in law—the society—taken as the whole is more complicated than the universe of discourse in IS.

Van Lamsweerde shares definition that a goal is as an objective the system under consideration should achieve. Van Lamsweerde notes differences between goals and requirements: “unlike requirements, a goal may in general require the cooperation of a hybrid combination of multiple agents to achieve it (Dardenne et al., 1991)”.

The reasons why goals are so important in RE process are formulated further in van Lamsweerde (2001):

- Achieving requirements completeness.
- Avoiding irrelevant requirements.
- Explaining requirements to stakeholders.
- Goal refinement provides a natural mechanism for structuring complex requirements documents.
- Alternative goal refinements allow alternatives overlooked so far.
- Managing conflicts among multiple viewpoints.
- A requirement represents one particular way of achieving some specific goal.
- Goals drive the identification of requirements to support them.

Goals are generally modelled by intrinsic features such as their type and attributes, and by their links to other goals and to other elements of a requirement model.
Many different types of links have been introduced in the literature to relate goals (a) with each other and (b) with other elements of requirements models. Directly borrowed from problem reduction methods in AI, AND/OR graphs may be used to capture goal refinement links.

Van Lamsweerde formulates the problem of verification/validation as follows. One of the benefits of goal-oriented RE is that one can verify that the requirements entail the goals identified, and check that the set of requirements specified is sufficiently complete. More precisely, if $R$ denotes the set of requirements, $AS$ the set of environmental goals, $D$ the set of domain properties, and $G$ the set of goals, the following satisfaction relation must hold for each goal $g$ in $G$:

$$R, AS, D \models g \quad \text{with} \quad R, AS, D \not\models \text{false}$$

This may be checked informally, or formally if the goal specifications and domain properties are formalised.

Built on van Lamsweerde’s notes above, my vision is that methods of systems development can be used in law-making.

The Lithuanian bylaw that regulates the life cycle of IS establishes the content of IS specification (see Lithuanian Gazette, 2004, No. 155–5679). One specification’s chapter is devoted to IS goals. The goals may be decomposed to form a tree. Hence the bylaw does not require a more precise representation of goals—structured prose is enough. I see a problem of formalising this decomposition. Will the goal tree be represented as an AND/OR tree or a more elaborated structure?

5.2. Why artificial intelligence?

Bolchini and Mylopoulos (2003) use the term “goal-oriented revolution” and note that a goal-directed philosophy to systems design was borrowed from AI where goals have been studied since 1950s. I think that nowadays research in AI-like ontologies (Lehmann et al., 2003) glues AI and IS better.

The concept of goal is essential to early AI. Early AI treats problem solving as search. Nilsson (1982, p. 11) relies upon the notion of AI production system and formalises it as a triple: (1) a global database, (2) a set of production rules, and (3) a control system.

I think that early AI got stuck in the problem of scalability. Mathematically, the problem is formulated as NP-completeness. Graph-searching algorithms are exponential. Therefore, in 1980s AI starts focusing on knowledge-based systems. Intuitively, the requirement to be a “good” method means a scalable method. Such requirement is a true challenge both in AI and in law. It seems that in the legal domain only text retrieval methods have reached certain success during past decades (see Oskamp and Lauritsen, 2002).

6. Possible approaches to solutions

6.1. The “state” concept in law

The goal concept is closely related to the concept of “state”, a core concept in computer science, e.g., in automata theory and models of computation.

In the model of law, which is presented in the study of Hage and Verheij (1999), I recognize similarities with the state concept in CS. The model of Hage and Verheij uses three primitives:

- **States of affairs.** A state of affairs can be characterised as a possible part of the world as expressed by a (descriptive) sentence.
- **Events.** An event causes a change of the obtaining states of affairs.
- **Rules.** A rule is a directed connection between states of affairs.

The model distinguishes between two types of connections between states of affairs: causation and constitution. Causation occurs when a state of affairs comes about, or is changed as a consequence of an event. Causation involves the lapse of time, while constitution is timeless.

6.2. Teleology in legal argument

Modelling teleology in legal argument is elaborated in a special issue of AI in Law journal (2002) in memory of Donald H. Berman. A series of papers (Hafner and Berman, 2002; Bench-Capon, 2002; Prakken, 2002; Sartor, 2002, etc.) recapitulate the ideas of Berman and Hafner (1993) regarding the role of teleology in legal argument. All the authors discuss three classic cases concerning wild creatures as property: hunting (1805), shooting (1707) and fishing (1844). The common law considers the doctrine of stare decisis (i.e. similar facts should lead to similar results). Thus case-based legal reasoning is involved. The authors analyse courts’ decisions and extract (teleological) values including certainty, social utility and sanctity of property. Precedents are connected to social values they serve. These values are treated as goals.

Bench-Capon (2002) models a theory as a partial order. A partial order diagram involves factors (pro-plaintiff, pro-defendant) and rules (if ... then plaintiff, if ... then defendant, and higher priority of rules).

6.3. Q. Smith’s concept of aim in philosophy

Smith (1981) uses the notion of “teleological order” and proposes the following classification of aims. The teleological orders interconnect three different types of aims: (1) ends, (2) goals and (3) purposes. By “teleological orders” Smith means the kinds of relations that obtain among the aims of our actions. The four teleological orders that shall be described are the relations of one aim to
another as (1) a “means to” it, (2) a “part of” it, (3) a “concretion” of it, and (4) as “subsumed” under it. Smith notices that there are no terms in ordinary language that express exactly the teleological differentiations. Thus he gives the terms “aims”, “ends”, “goals”, and “purposes” a more technical and exclusive meaning than the roughly equivalent meanings they have in ordinary language. I note that the teleological orders of Smith can be compared to aggregation, is-a, instance-of and part-of relations which are used in KR and CM.

6.4. Structure and content

My vision of formalising goals in law initially was based on a (naïve?) intent to succeed in separating structure and content of the law. Such an intent is based on an ancient “divide and conquer” principle, which is also successfully used in AI problem solving. However, after years of deep analysis of law, I agree with Van Hoecke (2002, p. 119) that “when analysing the structure of legal systems we have to take into account this intertwining of form and substance”. He concludes that “the structure of legal systems cannot be studied in isolation from its content”.

7. Conclusion

The research in the paper is driven by pure cognition. After years of studies in law and analysis of legal texts, which use the notion of goal, I draw the following conclusions.

1. Challenge. Formalisation of the goal concept in law is a challenging problem for AI researchers.

2. The true sense. It makes sense to making aims of the law explicit. A purpose behind the law has to be made easily discovered by experts from other domains. This contributes to understanding legal reasoning.

3. Structure and content. In order to formalise the goal concept in law, studies of the structure of law are not enough; the studies of the content of law are required, too.

4. Why aims? Specification of aims behind the law would contribute to the quality of law. The aims can be verified. The teleological method can be made more explicit.

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