Legal Norms and Legal Institutions as a Challenge for Legal Informatics

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Abstract. Although legal informatics is on the periphery of jurisprudence, it can make a significant impact on the centre in respect of legal dogmatics. We believe that the impact from legal informatics can be reached through situational legal visualisation and situational terms, for example, by correcting the boundaries of legal terms. The latter is the subject matter of legal theory and hence contributes to the centre of jurisprudence. This paper makes analogy between Begriffsjurisprudenz in the nineteenth century and legal ontologies of the present, and stresses a situational treatment of law in addition to a normative one. Therefore both situational contents and institutional contents are important when representing legal semantics within legal informatics. However, the differences between legal norms, texts and documents have to be taken into account. Legal norms are interpretative products whereas legal documents are tangible products and are represented according to documentary rules. The themes of granularity and metadata remain aside from the norm-institution relationship but emerge in the law-legal informatics relationship. The granularity question, “What is the smallest entity?”, can have different answers in legal documentation: the whole text of a law, an article, a paragraph, or a word. An example of a situational visualisation to discuss is a four-minute film about the familiar “Menzi-Muck timber” case in which the Swiss Federal Court defined demarcation criteria between favour, gratuitous contract and negotiorum gestio.

Keywords: legal education, legal logic, legal ontology, legal semantics, metadata, norm notation, situational terms, situational visualisation.

I. Impact of legal informatics from periphery to the centre of law

Legal dogmatics\(^1\) and legal theory lie at the centre of jurisprudence and both have their own expansion. Endogenous developments in judicature, for example, legal personality (e-persons, e-identity) etc. have a significant impact on jurisprudence. Legal theory also has its thematic mainstream. In contrast to the centre, there are peripheral sciences such as legal philosophy, legal psychology, legal sociology, legal logic and legal informatics which form the surroundings.

There is a certain dialectic between the centre and the periphery. A specific feature is that innovations often and unexpectedly come from the periphery. An example is Colette R. Brunschwig’s work on multisensory law, for example, Brunschwig (2011), which brings legal psychology into service. Her research is more important to legal informatics than to legal theory. The reason is that legal machines need to imitate human beings in order to be effective in law enforcement. Humans perceive legally important information with all of their senses and react accordingly. Therefore legal machines ought also to perceive and react multisensorily. Hence, Brunschwig’s research in legal psychology has a direct impact on legal informatics.

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Legal logic is another aspect of centre-periphery relations. Legal logic aims to reconstruct law, however, the way is not easy. The high expectations of the 1950s (see, e.g., von Wright 1950) have not been achieved. Hence, a reconstruction of law in a shallow model is not fully successful. But there are interesting partial models. One question is whether law is characterised by a special kind of formal logic or by applications of general logics. Hajime Yoshino (2011) in his Logical Jurisprudence approach tries to reconstruct law in Prolog, a logic programming language. His legal sentence is a primary element and is represented in the Compound Legal Formula. He uses the modus ponens rule for deduction and does not build a special logic.

We distinguish between applications of formal logic and specific legal notations. A notation is a writing system and not logic. Legal notations play the role of artificial languages. These are similar to chemical formula notations that are neither logic nor natural languages. However, there are connections between logic and notations, and this is a research field for legal informatics.

Although legal informatics appears peripheral, it is important for representing the law, namely, in the form of legal information. The law is represented by legal documents and this is part of legal culture. Nowadays legal information and informational processes are becoming more important than in past decades. For example, in Austria about 5000 documents are added to the legal corpus database each month, and more than 100 million legal documents are queried in RIS\(^2\). Legal informatics has moved from technical periphery to a power in practice, hence acquiring a new quality and becoming a player in the legal community. A next step is that the challenges of legal informatics will affect law and legal dogmatics. This can happen through the judicature and shaping legal documents. Hence, the themes of the periphery can be displaced increasingly to the centre.

II. Legal texts and legal documents

In legal informatics it is important to distinguish between legal text and legal document (Figure 1). A legal text expresses the meaning of a legal act, such as of a law or a court judgment, and is part of the legal realm, the Ought. On the other hand, a legal document is part of the legal documentation realm that is determined by legal technology. In modern legislation, legal documents include the medium of electronic documents. However, this is only a change of substrate. From the view of the model, there remains a difference between the legal text and the (electronic) legal document. This can be seen in different treatments of corresponding structural parts. Legal texts are structured according to legal rules, and namely, into sections, articles, items, clauses, etc. On the other hand, (electronic) legal documents are structured according to documentary rules, for example, the markup rules of Extended Markup Language XML.

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\(^2\) The Legal Information System of the Republic of Austria (RIS), [http://www.ris.bka.gv.at/](http://www.ris.bka.gv.at/).
Legal validity is distinguished from documentary validity. Legal validity, i.e. the validity of a legal text, such as a norm or a law, is treated according Hans Kelsen’s “ideell existence” of a norm in the Ought realm, i.e. ‘ought-to-be-observed’. This was first described in Kelsen’s Pure Theory of Law (1960) then in his General Theory of Norms: “That a norm ‘is valid’ means that it exists. A norm which is not ‘valid’ is not an existing norm.” (Kelsen 1991, ch. 8 vi). On the other hand, documentary validity, i.e. the validity of a legal document in a legal database, is determined by the rules of (electronic) legal documents. The dates of coming into effect and lapse are represented explicitly in a legal document. To sum up, documentary validity is determined by database time events including the time of successfully obtaining an answer to a query.

The following is a side effect of distinguishing between legal validity and documentary validity. Deciding whether a norm is valid or not valid can rest, on the one hand, on a legal act and a legal text and, on the other hand, on a legal document. Norms are mental constructs; however, documentary validity can also be applied here. Legal reality thus demonstrates that a norm becomes valid when a corresponding (electronic) legal document is uploaded to the database.

1. Metadata

The importance of metadata has emerged from the beginnings of legal documentation in the European Union in the 1970s. Metadata constitutes supplementary information that comes with documentary structures and is primarily comprised of categories. In the beginning, categories were written as metadata within documents and could be handled separately. Nowadays metadata build a separate layer in legal documentation and are used more widely than in document management. Metadata can be represented in markup languages such as XML which are more powerful than former categories.

2. Metadata in searches

Metadata is important not only in the production of legal documents but also in searching, where queries are allowed to contain various combinations of tags. For example, in judicature databases one can search for full texts, abstracts, judgments, specific legal sentences, words, etc. A thesaurus allows queries in more abstract or specific terms than the relevant documents may contain. Hence, metadata contributes to a separate model of documents, which can be employed in searching.

3. References

3 see, e.g., CELEX. Nowadays see EUR-Lex for access to European Union law http://eur-lex.europa.eu/.
Metadata contributes to making references. References can be made more explicit and rich using XML. Separate clauses of laws can be referenced, first, with cases and, second, with commentaries, in electronic commentaries of laws. Such XML structures form a separate layer and provide various opportunities for document management including search and actualisation. A reference is a kind of relationship. A variety of relationships comprises strong logical relations, such as synonymy, semi-synonymy, antonymy and hyperonymy/hyponymy, as well as weak relations, such as dialectical relations, context relations and metaphorical relations.

4. **Begriffsjurisprudenz and ontologies**

From the point of view of legal informatics, supplementing legal documents with metadata is insufficient. A tendency to build legal thesauruses has its roots in the nineteenth century *Begriffsjurisprudenz*. Georg Friedrich Puchta developed a legal system according to a pyramid of legal terms. A century later, since the 1990s, this research has come to be called *legal ontologies*. Here the term *ontology* is understood as in computing. According to the generally accepted definition of Thomas Gruber (1993), an ontology is an explicit formal specification of a common conceptualisation with term hierarchies, relations and attributes that makes it possible to reuse this knowledge for automated applications. Ontologies aim to collect legal terms into a semantic structure that comprises axioms about the terms. Nowadays see, for example, Metalex and research at the Leibniz Centre for Law of the University of Amsterdam and the CIRSFID Centre of the University of Bologna. Metadata constitutes a separate layer, a meta-level, in legal document databases (Figure 1).

*Begriffsjurisprudenz* used metaphors such as vitality, pyramid (*Begriffspyramide*), etc., which differ from more formalised representations such as logic, informational techniques and relationships in modern ontologies. Of course, in the nineteenth century there was no emphasis on searching. However, the method was not so different. The aim was to organise modally indifferent substrate into a semantic structure.

III. Legal norms and legal documents

The notion of legal norm is not as simple as it may appear from the first impression of the meaning in natural language. Legal texts are not made of norms but of structural arrangement units such as parts, sections, paragraphs, sentences, etc. Moreover, legal norm is not a primary elementary notion of law. Legal documents as a form of legal information do not know the notion of norm. Legal documents reproduce the structural arrangement units of legal texts and contain their own document units, for example, in XML. Legal dogmatics holds that legal norm is a mental product. It extracts, reconstructs and formulates the contents, i.e., the legal meaning of a legal norm. A norm is obtained by interpreting legal text. A paragraph of a document can contain several norms of behaviour or a norm can continue through several paragraphs, part here part there. As a basic principle, legal norms are formulated in a natural language. A simple form is: “if A then B”, read “when a state of affairs (SF) is given, then the legal consequence (LC) applies”, $SF \rightarrow LC$. This is a methodological step which precedes formalisation. Besides legal norms as mental constructs, legal institutions and situations can be extracted interpretatively from legal texts. Institutional thinking is also a mental construct

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2. see, e.g., Sartor et al. (2011). See also Valente (1995), Schweighofer and Liebwald (2007), etc.
3. CEN Metalex concerns metadata standardisation. This is an Open XML Interchange Format for Legal and Legislative Resources (by Comité Européen de Normalisation), see [http://www.metalex.eu/](http://www.metalex.eu/)
5. [http://www.cirsfid.unibo.it/](http://www.cirsfid.unibo.it/) especially see research by Giovanni Sartor and Monica Palmirani, e.g., Palmirani, Cervone, and Vitali (2011).
and is obtained through interpretation. This clearly shows in Roman law, where institutions make a systematic layer which is separated systematically from legal sources such as legal gestures.

1. Legal norm and legal sentence
The notion of legal norm has its significance in legal theory and also in the teachings of Hans Kelsen, who distinguishes between legal norms and legal sentences. According to Kelsen, legal norms belong to law whereas legal sentences belong to science, which describes the norms (Figure 2).

![Diagram of relationships between legal norm, legal text, and legal document]

**Figure 2: Relationships between the notions of legal norm, legal text and legal document**

2. Logical Jurisprudence of Hajime Yoshino
This interesting approach is presented, for example, in recent work by Yoshino (2011 b). It contributes to formalisation and representation of legal knowledge, in particular, to top-down inference from the rules about rules, which is called legal meta-inference (Yoshino 2011 a). However, Logical Jurisprudence raises doubts about the notion of norm. Yoshino places the so called *logical legal sentences* (LLS), i.e. legal sentences, in the foreground, although they are part of legal science. Therefore this reduction is not plausible. After a more thorough examination, one could argue that Yoshino is right, because LLS are represented as Compound Legal Formula in Prolog and thus LLS are not legal texts. Hence, one could argue that LLS belong to the realm of law and not to science. However, we hold that such an argument is flawed. Indeed, a non-natural language representation of LLS is not a sufficient condition to make an analogy with legal norms that are mental constructs.

3. Institutional and situational contents of law
It is also interesting that the institutional and situational layers of the contents of law that are mental constructs are not dealt with explicitly in legal texts, but through interpretation within semantic spaces of law. Therefore there is no essential difference between a normative and a situational treatment of law. Both are interpretative, furthermore, they enter with the text, go through the text and aim to structure semantic spaces of law. When reconstructing law in legal informatics, it is important not only to capture legal texts in legal documents, but also to represent semantic spaces of law. This means that both normative contents and situational contents are important to represent legal semantic spaces within legal informatics.

IV. Granularity
The granularity theme remains aside from the norm-institution relationship but emerges in the law-legal informatics relationship. There are structures in the background which are independent from the norm-institution relationship but which are important for the
functioning of legal documentation, namely, for back-office software systems. Back-office contrasts with front-office which is concerned with the user-computer interaction. Granularity raises the question, “What is the smallest entity?”. In legal documentation this question can have different answers: the whole text of a law, an article, a paragraph, a sentence, a word or even a symbol. The granularity could produce structures which differ from the current documentary structures. However, this would be a task for the future.

![Figure 3: Granularity levels](image)

The whole text of a law or a regulation is nowadays a primary option in legal databases (Figure 3). Another option is a particular article of a regulation, see, e.g., RIS\(^9\). The next option is a paragraph, a clause or a provision, see, e.g., Dietmar Jahnel’s text-step program of the federal constitution of Austria (Schäffer and Jahnel 1991). An option is also a sentence, see, e.g., the Tasmanian legislation website\(^10\). Probably, a word is also an option. Automation of all this would require elaborate XML structures. On the one hand, too fine-grained granularity may cause a metadata redundancy problem. On the other hand, too coarse-grained granularity may cause a problem while making amendments. Probably a middle level, such as the paragraph granularity, is the most reasonable happy medium.

V. Notations for legal norms

As noted previously, legal texts are not structured in the units of norms. In other words, a legal norm is neither a structural element of a legal text nor of a legal document. A norm is a product of interpretation. This is conducted by legal sciences, courts and the judicature. Probably, a legal norm is closer to what Kelsen called “legal sentence” (Rechtssatz). However, norms are linguistically formulated and jurists are linguistically-oriented. For example, this can be observed in a speech of a judge. A legal provision may be collected from several places.

A notation is the next question. A generally accepted one is “if \(A\) then \(B\)”, \(A \rightarrow B\) or \(N(A/B)\), which means “when \(A\) then ought \(B\)” (Figure 4). There are other notations, such as the Polish prefix notation that comprises a deontic modality and was used by Ilmar Tammelo (1978). An

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\(^9\) see note 2.

example of a Prolog-like notation is logical legal sentence in Yoshino’s Logical Jurisprudence (2011 a, b). This was done within a traditional research of legal logic and was an achievement on the level of a model, however, it did not succeed in implementing the whole interconnectedness of norms.

Figure 4: Relationships between a legal text, a legal norm as an interpretative product which is linguistically formulated, and norm’s representations in a certain notation

We propose to supplement traditional elements – a condition and an ought-behaviour – with finality (or, in other words, a purpose, goal or telos). Taking into account that an ought is composed of four elements (a subject, a modus, an action, and an object), the structure of a norm is as follows (Figure 5):

1. condition
2. ought
   2.1. subject
   2.2. modus
   2.3. action
   2.4. object
3. finality (telos)

Figure 5: A structure of a legal norm
VI. Modally indifferent substrate and the representation of normativity in situations

Granularity could be viewed in connection with the modally indifferent substrate (MIS), which was examined by Hans Kelsen (1991, ch. 16). Kelsen considers the legal norm to be the decisive entity. According to Kelsen, Ought is a mode that comprises MISs. In contrast, we think that, in addition to legal norms, legal terms can be viewed as a separate layer of self-dependent entities of law. A paradigm shift in the granularity is that, in addition to norms, the centre legal elements comprise legal terms.

Suppose an act A is prescribed to the addressee of a norm. This can be expressed as Obligatory(A) or in other words O(A), which connects the ought O with the intended action A. According to Kelsen, A is an MIS that is imbedded in the mode O.

In our view, it is interesting that O as well as A appears in a logical context. Therefore, we can treat O, the mode of obligation (prescription), abstractly. The reason for this is that the background of obligation involves the entire deontic field. The modes comprise concepts such as permission P, prohibition (forbidden, vetum) F, liberty L and probably other modalities, and could therefore be defined alternatively; see arrow (1) in Figure 6.

On the other hand, a legal term A could also be viewed in relationship to other legal terms; see arrow (2) in Figure 6. Legal ontologies attempt to develop such relationships and make use of them, for example, in searching. In European Union law, such stereotypical relationships of legal terms occur as an MIS. In addition to this, there is the translation problem. The reason is that separate legal terms, e.g., A, B and C, in different national legal orders, could have different systemic significance. This produces different mappings of legal terms to the structural backgrounds of the terms in respective legal orders.

Situational elements: An idea we put forward in this paper is also to consider situational terms besides normative terms. We hold that situational elements should build a separate layer that is supported by institutional elements, which are taken from ontologies, see arrow (3) in Figure 6. Hence, a parallel virtual legal world shall be expanded with a normative notation for situations. A reason emerges from legal practice. Besides ex-post analysis and case law,
which, for example, is supported by RIS in Austria, there is *ex-ante* analysis, which is supported by the e-Portal [HELP.gv.at](http://HELP.gv.at). The two forms – *ex-post* and *ex-ante* – correspond to two forms of legal thinking. Cases are at the core of jurists’ professional legal thinking. A case is closed and a wrong behaviour cannot be reiterated in order to make a right choice. Lawyers (not laypeople) deal with cases whereas laypeople think of situations. A situation is a type, it is open and a layperson may seek advice on the behaviour to adopt. A choice is possible. Therefore situational representations serve ordinary citizens. Hence, expanding legal ontologies from normative terms to situational terms is both an important theoretical problem for legal science and a practical one.

**VII. Situational visualisation of a Federal Court judgment**

An example of a situational visualisation is “Menzi-Muck timber case – the Film!”11 This four-minute film takes a familiar case (BGE 129 III 181 ff.). In this 2002 decision, the Swiss Federal Court defined criteria to distinguish between favour (*Gefälligkeit*), gratuitous contract (*unentgeltlicher Auftrag*), negotiorum gestio (*Geschäftsführung ohne Auftrag*) and the claim to compensation by a person who gave voluntary help to another (*Schadenersatzanspruch der unentgeltlich helfenden Person*)..

**Figure 7:** A film visualisation of the “Menzi-Muck timber” case of the Swiss Federal Court.

In the film, the type of situation is visualised with a Playmobil excavator-calf set (Figure 7, left). The film shows and explains the decision tree (Figure 7, right), which is employed by the visualised judge to make the judgment. The film is designed for educational purposes and can be used in electronic learning via the Internet. To explain the law, clear graphic style

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11 [http://www.youtube.com/watch?v=KI7zeuayum4](http://www.youtube.com/watch?v=KI7zeuayum4). See also the comment by lawyer Arnold Rusch, [http://www.arnoldrusch.ch/pdf/130311_menzimuck.pdf](http://www.arnoldrusch.ch/pdf/130311_menzimuck.pdf). The case concerned the claim for damages suffered by the person who gratuitously helps another. A farmer helped a neighbouring farmer to attach large logs to a Menzi Muck excavator for transport. The former fell from the ladder without any third party being at fault and was gravely injured. Is this a question of gratuitous contract, favour or negotiorum gestio? The distinction is relevant because only negotiorum gestio entitled him to compensation. The Federal Court limited the bases for claims, but applied with respect to compensation of the helping person, and also cases of gratuitous contract and requested favour, Article 422 para. 1 or by analogy, because the identical interest situation so requires. See also BGE 129 III 181 ff: [http://jumpcgi.bger.ch/cgi-bin/JumpCGI?id=BGE_129_III_181](http://jumpcgi.bger.ch/cgi-bin/JumpCGI?id=BGE_129_III_181) and [http://jumpcgi.bger.ch/cgi-bin/JumpCGI?id=21.10.2002_4C.56/2002](http://jumpcgi.bger.ch/cgi-bin/JumpCGI?id=21.10.2002_4C.56/2002).
descriptions are employed. Colette Brunschwig (2011) calls this trend *multisensory law*. Hence, situational visualisation is used in the film for multisensory learning.

The judgment in the “Menzi-Muck timber” case demonstrates an influence from the periphery. The impact on the centre is that the boundaries of standards are made more precise. Standards often come from the periphery. Hence, the periphery-centre dialectic produces a progressive step.

The use of plastic characters and not real ones is important in representing law within this film. A kind of relaxed area is produced in this way. This is important from a semiotic point of view. A relaxed area serves for learning purposes better than a real one. Learning is easier in an abstract situation. The film represents a generalisation of the judgment in a concrete case.

We believe that in the future situational visualisations will influence normative representation of law in two directions: first, legal ontologies, and second, parallel virtual legal worlds. Both are in the mainstream of research. Legal ontologies contribute to representing legal knowledge. Figurative situational imaginary legal worlds can be implemented in computer applications which are called three-dimensional online virtual worlds.

References


