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Friedrich Lachmayer's Landscape of Legal Informatics

This paper presents the landscape of legal informatics which was originally drawn and explained by Friedrich Lachmayer. The landscape is a mental map, and I attempt to interpret it. The work stems from numerous conversations with Lachmayer. His method of legal visualisation is briefly tackled in this paper, although one should note that the method needs a separate thorough study. Lachmayer uses various metaphors and only two are presented here: the vertical and horizontal stages of Is/Ought and the multi-arch bridge.

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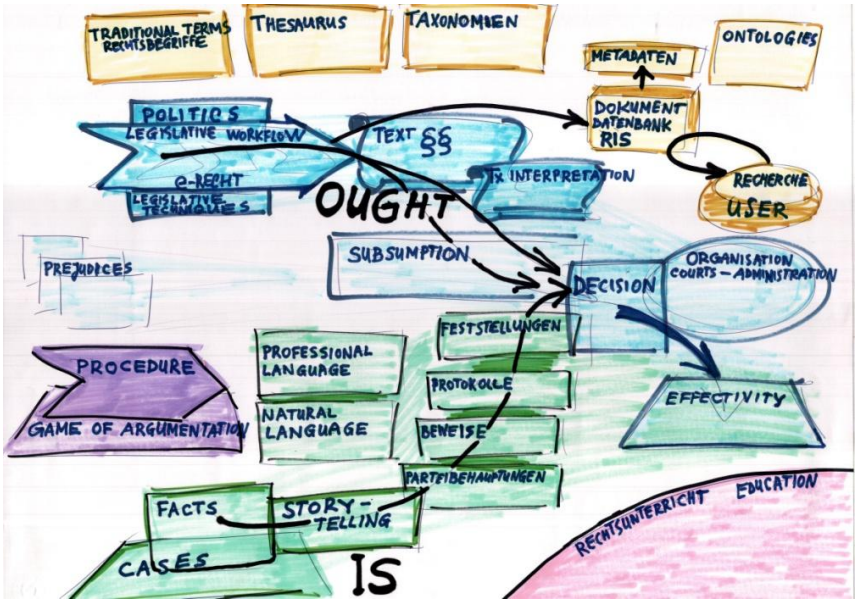
1 Introduction

[Rz 1] This paper originates from conversations with Friedrich Lachmayer which sprang up in 2006. Of special importance were some conversations during JURIX 2011 in Vienna. We attempted to sketch out the course content for teaching artificial intelligence and law to computer science students. But the discussion resulted in Lachmayer describing his outlook on the landscape of legal informatics as a whole. Lachmayer brought to our last conversation a picture (Fig. 1) that reaches far beyond a course outline.

[Rz 2] The present paper attempts to interpret this picture. Two subjects are tackled: first, Lachmayer's view of legal informatics and, second, his method of legal visualisation. I have dared to intertwine Lachmayer's words in this paper, without using quotation marks. I take responsibility if my interpretation differs from what Lachmayer would say.

Figure 1: Lachmayer's original landscape of legal informatics, 16th December 2011 (I have sharpened the text and some contours)



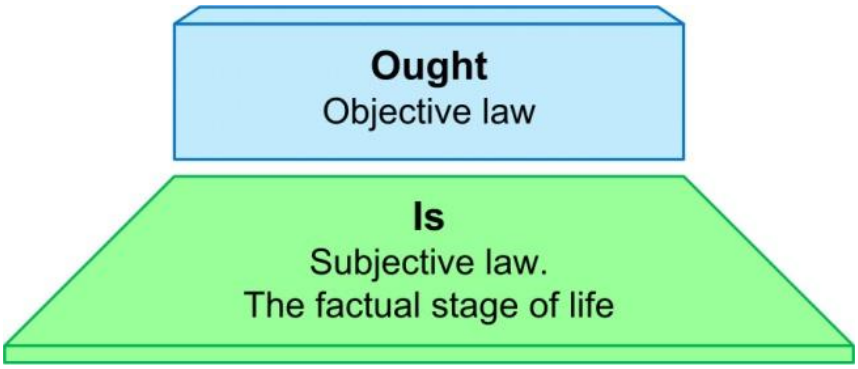
2 Visualisation Method

[Rz 3] The notion of «legal visualisation» can include both processes and artefacts. Abstraction, i.e. discerning the content of law to comprehend it, is carried out by a human being by sight. The subject matter of legal visualisation can be viewed from many perspectives; (cf. Röhl and Ulbrich 2007). Legal informatics has many perspectives, too. This is shown by the decades of research in the field. This paper is limited to Lachmayer's views, since they provide the big picture of the discourse.

2.1 Two Stages Metaphor

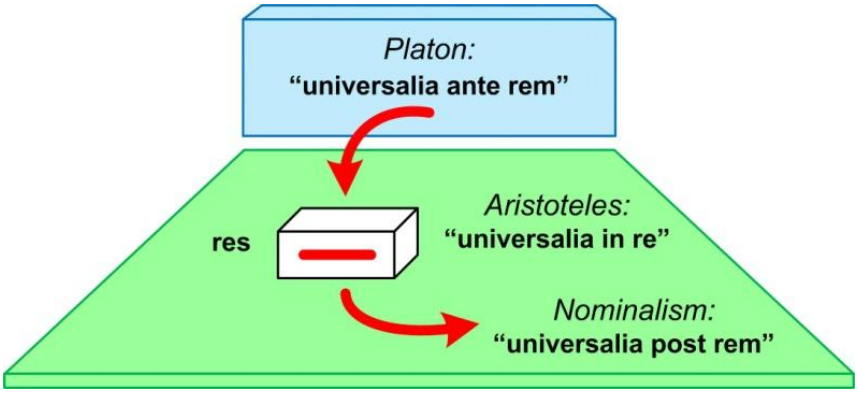
[Rz 4] Lachmayer's visualisation pattern is composed of the vertical stage and the horizontal one (Fig. 2).

Figure 2: The vertical and horizontal stages



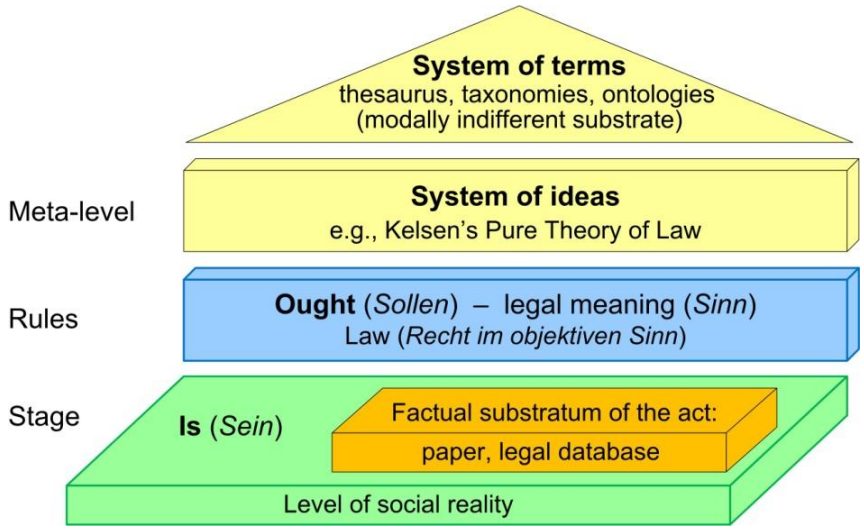
[Rz 5] The two stages metaphor is also used in Fig. 3, which illustrates the so-called *universalia dispute* in (Schweighofer and Lachmayer 1997). This metaphor accompanies examples which show that a concept *post rem* can be transformed into a concept *ante rem*. The Platonian position (*universalia ante rem*) is drawn on the vertical stage and the Aristotelian one (*universalia in re*) on the horizontal one.

Figure 3: A basic concept map; redrawn from (Schweighofer and Lachmayer 1997)



[Rz 6] The two stages depict Kelsen's categorical distinction between Is and Ought; see (Kelsen 1967). Other elements (see Fig. 4), such as a system of terms, constitute a modally indifferent substrate, and appear on the meta-level. The irreducible Is-Ought duality corresponds to a very old mythical and religious duality between Earth and Heaven, or, in other words, nature and spirit. Fig. 4 summarises three pictures in (Schweighofer and Lachmayer 1997), which illustrate the *universalia* dispute and several conceptualisations.

Figure 4: Meta-layers extend beyond the two stages of Ought and Is

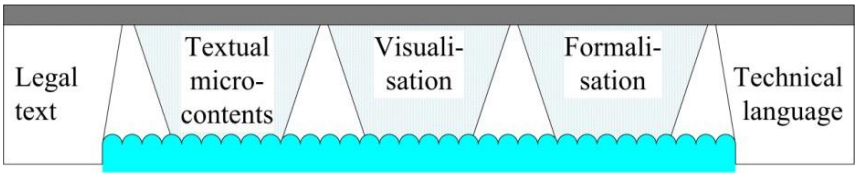


[Rz 7] **Assigning meaning to colours**. Lachmayer is concerned with colours, too. For instance, the Ought, the legal world, is tinged with blue – the colour of the sky. The Is, the world of facts, is tinged with green – the colour of grass. The elements on the meta-level are tinged with yellow – the colour of stars. Dark yellow colours are, *inter alia*, for legal texts as containers which lay on the Is stage. Violet is the colour of legal procedure and the argumentation game. Education is tinged with pink.

2.2 Multi-arch Bridge Metaphor

[Rz 8] The bridge metaphor explains how to connect two entities. Lachmayer holds that legal informatics is about building a bridge between law and informatics. The approach is to build a multi-arch bridge. The problem is formulated as follows: implement the norms, which are inherent in a legal text, into the machine's technical language. Lachmayer emphasises the importance of intermediate steps such as textual micro-contents, visualisation and formalisation (Fig. 5).

[Rz 9] **Figure 5: The multi-arch bridge approach which is called Multiphase Transformation. This emphasises the importance of intermediate steps when building a bridge**



[Rz 10] One has to take into account the fact that law and informatics are separated by too wide a span for them to be connected directly. Therefore intermediate steps are necessary. This approach is called Multiphase Transformation. The comprehension of the subject matter of legal informatics contributes to building the bridge. This can be achieved step-by-step – not in one leap.

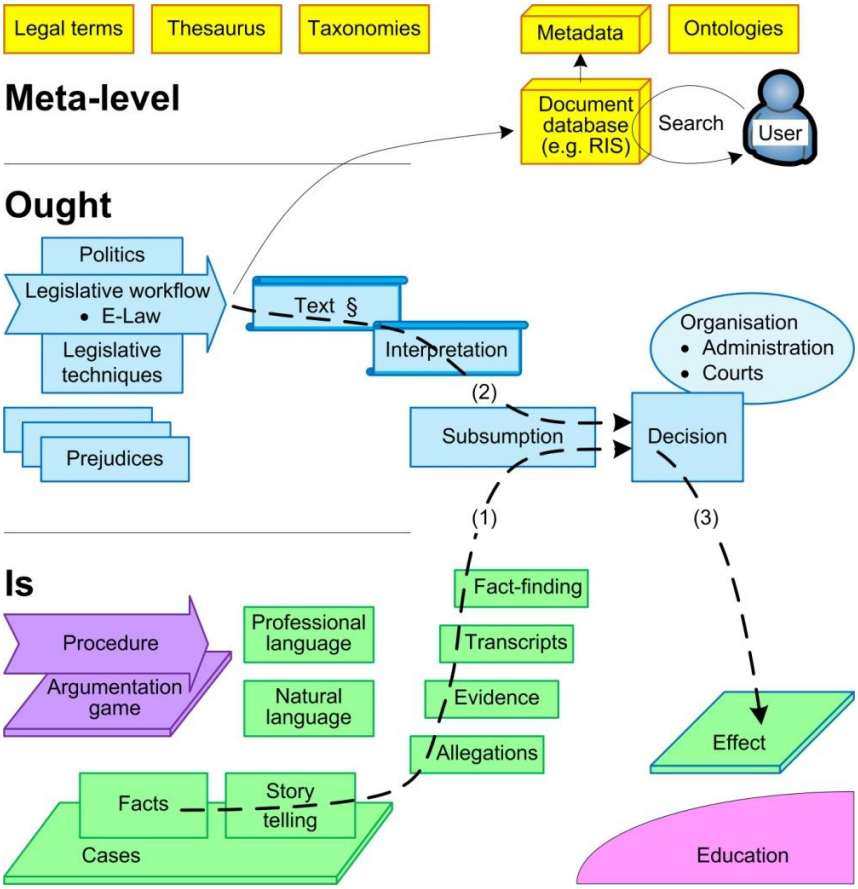
3 Explaining the Landscape of Legal Informatics

[Rz 11] In Fig. 6 I redraw Lachmayer's original picture, which is shown in Fig. 1, and provide comments which originate from our conversation on 16th December 2011.

[Rz 12] The landscapes in Fig. 1 and Fig. 6 consist of many components. The first layer represents the factual Is world and is coloured in green. A case starts from facts (see bottom left). Then comes story-telling. Both the natural language (e.g. that of witnesses and parties) and the professional language of jurists is used. Then come the allegations, evidence, transcripts and fact-finding that comprise the process.

[Rz 13] The second layer represents the Ought world and is coloured in blue (a metaphor for the clouds in a blue sky). The texts of the law are central here. They are preceded by legislation, which consists of two layers, namely, politics and legislative techniques. Interpretation is the second key element. The law has to be interpreted. Then comes the subsumption procedure. This couples the conclusions which come from the Is (see curved arrow (1) in Fig. 6) and those which come from the Ought (arrow (2)). Then comes the decision. Prejudices precede this. The decision is taken by an organisational body such as a court. The procedure and argumentation game, which appear in the Is world, are involved here. The subsumption procedure is central to this layer. The decision is put into effect on the Is stage: see arrow (3) in Fig. 6. Recall, for instance, that traditional practices of criminal law have the following scheme: crime – investigation – criminal trial – criminal sentence, and so fit the landscape. A metaphor of a rainbow can be employed to visualise this.

Figure 6: Redrawing of Lachmayer's picture which was shown in Fig. 1



[Rz 14] The third layer comprises first, legal terms, a thesaurus and taxonomies. Then come legal databases such as the RIS[1] in Austria. These contain the legal documents that are produced by legislation. Next come the metadata and ontologies that accompany the databases. Their users carry out searches.

[Rz 15] Lachmayer proposes annotating the landscape elements in Fig. 1 and Fig. 6 with:

- references to, for example, contributions at JURIX conferences; and
- projects which are devoted to developing informational processes and software.

[Rz 16] As an example, every JURIX 2011 article (Atkinson 2011) can be attached to the elements in Fig. 1 and Fig. 6. An exhaustive list of projects and researchers in legal informatics, however, would extend beyond the scope of this paper.

[Rz 17] A layman does not know the contents of legal terms. Therefore every element of the landscape should be explained in more detail. Thus new knowledge will be communicated to people who are not legal professionals. This contributes to education. Lachmayer proposes expanding the context he has presented, in two research directions:

- formal sciences (for instance, computer science); and
- information technology (the internet, Extensible Markup Language (XML) in legal drafting, etc.)

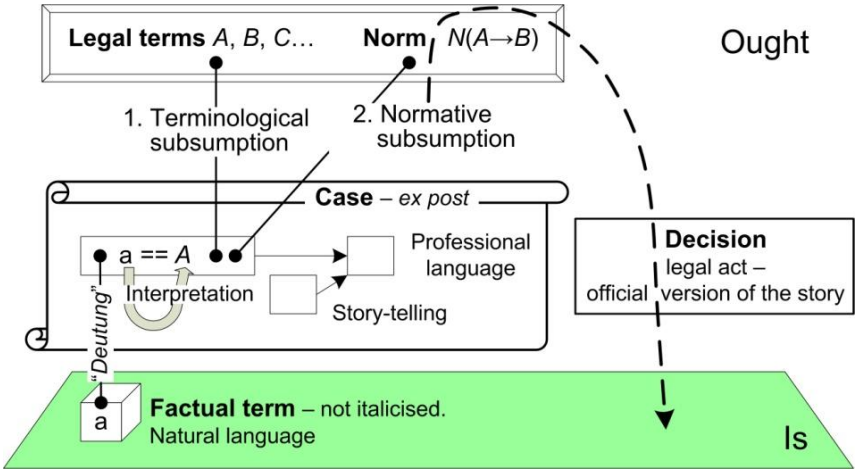
[1] The Legal Information System of the Republic of Austria; http://www.ris.bka.gv.at/.

[Rz 18] The purpose is to obtain an impact of the formal sciences on legal informatics.

4 Two Kinds of Subsumption: Terminological and Normative

[Rz 19] Lachmayer explains subsumption in more detail. Legal subsumption can be considered as the way of bringing the text of a case under norms.

[Rz 20] **Figure 7: A notation (conceptualisation) for a case**



[Rz 21] The facts of a case are transformed into legal terms (legal facts) (Fig. 7). The facts are obtained from story-telling, witnesses, etc. For example, a fact, a, is treated as a theft, *A*, not as a burglary. This is the first kind of legal subsumption, called *terminological subsumption*. A notation for this is a==*A* or, in terms of computer science, *instance-of*(a,*A*). A pool of legal terms is used for terminological subsumption. Legal ontologies can serve here.

[Rz 22] The second step is *normative subsumption*. Here the interpreted legal fact is brought under the state of affairs of a norm *N*, for instance, of the format

Norm(status=Obligatio, state_of_affairs=A(x), legal_consequence=B(x))

[Rz 23] If the norm *N* is applied the obligation *B* is concluded. The first step, terminological subsumption, corresponds to unification. It is linked with the minor premise. The second step, normative subsumption, corresponds to the major premise:

$$\forall x\, A(x) \rightarrow O\, B(x)$$

[Rz 24] The conceptualisation above is similar to a syllogism, which consists of a minor premise, a major premise, and a conclusion.

5 Conclusions

[Rz 25] Lachmayer's visualisations contribute to understanding the legal domain. This is effective in education and also in communicating legal knowledge to laymen. Every part of his visualisation can be treated as a knowledge source and also as a work of art; see also Lachmayer's webpage http://www.legalvisualization.com.

[Rz 26] Legal informatics may have other perspectives, too. The landscape above can be characterised as a «view from the law». The reason is that the subsumption procedure is central to this view. Professionals in information technology (IT) or enterprise architecture (EA) may have other views. They can also add more details, and supplement the subject with other elements, especially those related to IT. As an example, take regulatory compliance in enterprise information systems. An attempt to formulate a compliance problem can lead to various conceptual frameworks; see for example the work (Čyras and Riedl 2012) which was also encouraged by Lachmayer.

6 Literature

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