TRANSFORMING LEGAL RULES INTO VIRTUAL WORLD RULES: A CASE STUDY IN THE VIRTUALLIFE PLATFORM

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Abstract: The paper addresses operationalisation of legal rules in online 3D virtual world software. The development is performed in the frame of a virtual world platform within the FP7 VirtualLife project, which pursues the goal to create a secure and legally ruled collaboration environment. The novelty of the platform is an in-world legal framework, which is real world compliant. Legally ruled behavior of avatars is addressed. We call this kind of ruling virtual law. A sample (toy) rule is 'Keep off the grass'. We follow the legal approach "From rules in law to rules in artefact". It accords with the thesis "Computer code is law" of Lawrence Lessig. We also approach the concept of a code of avatars that is concerned by Raph Koster. VirtualLife implies the transformation of legal rules (which are formulated in a human language) into machine-readable format. Such a translation requires natural intelligence.

1. Introduction

The paper is devoted to the operational implementation of legal rules (norms) in virtual world software. (Further the terms "rule" and "norm" are treated as synonyms; discussing the difference is out of scope.) The issues arose while developing a virtual world platform within the FP7 project "Secure, Trusted and Legally Ruled Collaboration Environment in Virtual Life" (VirtualLife).¹

Legal rules of a VirtualLife virtual world are formulated in a human language. A norm is treated as it is generally accepted in law – a rule of human behavior. However, in virtual worlds the subject of a norm can be extended (from the legal person and the juridical person) to the avatar. The operationalisation of rules aims primarily at preventing unwanted behaviour. An example of a rule is ‘Keep off the grass’. It can be expressed more formally: ‘The subject – avatar – is forbidden the action – walking on the grass’. Thus the concept of “Ought to Be reality” (see e.g. [Pattaro 2007])

can be extended from the real world to virtual worlds. While developing software, a further translation of the rules into machine-readable format is required. Such a translation seeks capabilities of a whole team of experts. A team usually comprises a legal expert, virtual world developer and programmer. We claim that the translation of legal rules requires natural intelligence. The translator copes with the following problems (including but not limited to):

1. **Abstractness of norms.** Norms are formulated (on purpose) in very abstract terms; see e.g. [Vázquez-Salceda et al. 2008].

2. **Open texture.** This can be illustrated by Hart’s example of “Vehicles are forbidden in the park” and its analysis [Bench-Capon 2002].

3. **Heuristics.** This serves to translate abstract high level concepts and invent low level ones.

4. **Teleology.** The purpose of a legal norm usually can be achieved by a variety of ways. They need not to be listed in the text of a statute and specified in detail.

5. **Legal interpretation methods.** The meaning (semantics) of a legal text cannot be extracted from the sole text. Apart from the grammatical interpretation, other methods can be invoked, such as systemic and teleological interpretation.

6. **Consciousness of the society.** Law enforcement is subject to complex social phenomena such as legal consciousness of the community. Modeling these phenomena is a tough task.

Figure 1: Interacting with an object, a complex solid – dodecahedron, in the context of a geometry lesson within a virtual world.
The paper is devoted to the analysis of transformation problems listed above. We proceed with an introduction to VirtualLife and its legal framework.

2. About VirtualLife

The goal of VirtualLife software is a new form of civil organization, realized by the creation of secure and ruled places within a virtual world, where important transactions can occur (where transactions are those that normally occur in real life) [Bogdanov et al. 2009]. At present VirtualLife is targeted at scenarios focused on learning support, such as a university virtual campus. A professor avatar gives a lesson whereas student avatars listen. Avatars can interact with each other and with objects in the world. An interactive object is shown in Figure 1.

Novelties of the project comprise security and trusted transactions, the use of a peer-to-peer network communication architecture and legally ruled collaboration.

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3. Focus on VirtualLife Legal Framework

The legal framework was elaborated in project deliverables (see Figure 2); see also [Spindler et al., 2009]. Further the elaboration was in the form of the technical specification of Virtual Nation laws which comprises the editor of rules. The editor serves to compose rules in machine readable format. VirtualLife’s legal framework consists of three tiers:

1. A “Supreme Constitution”;
2. A “Virtual Nation Constitution”. For instance, Constitution VN1, ..., Constitution VNn;
3. A set of different sample contracts.

It should be noted that the Supreme Constitution is placed at the level of contract law. This binds the user on the contractual level and thus contributes to law enforcement. The user is bound by a shrink-wrap End User License Agreement (EULA).

3.1. From Rules in Law to Rules in Artefact

A Virtual Nation Constitution contains special provisions as regards, for example, the protection of objects used in that Virtual Nation under copyright law or the authentication procedure required to become a member of that nation. Distinct virtual nations, e.g. a university virtual campus and a virtual mall, should be governed by different rules.

Below are examples of rules:

- An avatar is forbidden to touch objects not owned by him or a certain group.
- An avatar not belonging to a given group is forbidden to a given area of the zone.
- An avatar is forbidden to create more than a given number of objects.
- An avatar is forbidden to use a given dictionary of words (slang) while chatting.
- An avatar of an age is forbidden to chat with avatars under age.
- An avatar is forbidden to execute authorized scripts in a certain area.

If an avatar violates a rule (e.g. walks on the grass), his reputation is decreased. Rule enforcement is implemented by a trigger mechanism. A change of a virtual world state is triggered and a certain script program is invoked.

In the context of a virtual world, ‘Keep off the grass’ can be viewed as a toy rule. In the real world it is usually written on a sign. This is a specialization of a more general norm. The norm is usually formulated abstractly to cover a broad set of cases. The norm also assumes certain values to be preserved such as public order, common property, the nature, etc.

In order to operationalise the rule, a computer has to be explained what the ‘grass’ is. Apart from this objective element, intentional factors have to be explained, too. Thus such legal concepts as fairness, malice and negligence have also to be explained. In the case an avatar can be harmed (e.g.

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5 See 2.
6 See 4, p. 17.
pushed) by another avatar, the fault analysis can invoke formalization of distinguished causation theories⁷. The question is: How far can one reach in the deep representation of legal concepts?

A virtual world user cannot escape from the real world law [Spindler et al. 2009]. If legal issues are neglected in the beginning, problems will be faced later. This lesson can be learned, for instance, from e-mail. Initially e-mail has been designed to promote the freedom of communication. Currently the problems of spamming and information overload are faced.

A legal informatics approach “From rules in law to rules in artefact” is identified and explored together with Friedrich Lachmayer [Cyras & Lachmayer 2008]. Some elements can be traced to the works of other authors in earlier times. The history leads to early applications of artificial intelligence and expert systems in the legal domain; see e.g. [Jones & Sergot 1992].

The rules establish the regimes (paradigms) of a virtual world. The rules can be divided into different classes. The technical rules establish factual limitations, for example, to fence the grass. Then the legal rules come. The structure of a legal rule is the same as in the real world. The subject is a natural person, a juridical person, etc. The legal rules are primary rules. Sanctions are determined by the secondary rules. They are associated with authorities, which enforces the rules. A virtual procedure can be raised for the violation of a rule. An example is online dispute resolution. Different kinds of rules are those related to reputation rules and “energy-points”.

The nature of the legal rules is that they can be violated. For example, you can step the grass, cross the street on the red light, or take a train without the ticket. But you risk to be punished. Punishment is enforced by a certain office such as police, peacekeepers in a virtual world, etc.

![Diagram](attachment:diagram.png)

**Figure 3: Translation of a legal rule into computer code of virtual world software.**

Some rules (primarily the technical rules and reputation rules) can be implemented in computer code. Some rules are hardcoded in the engines of a virtual world. (These engines are out of scope of

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The framework of the virtual world is established constitutively. Other rules have to be implemented by the developers and users of the virtual world. The editor of rules serves as a tool.

The flow of translation from a legal rule to a technical rule is shown in Figure 3. The translation requires natural intelligence of a whole team. First, the technical rule has to be designed. Then it has to be programmed in computer code.

The “effects” of obedience to security and trust rules and reputation rules are shown by the avatar identity card in VirtualLife. Each avatar has an ID card, which contains information about both his virtual and real life identities (see Figure 4) [Bogdanov et al. 2009]. The ID card includes simple indicators of trust. A red bar means that the avatar is a guest and has not proved his identity; a yellow bar – the avatar has an identity, but it has not been verified by any certification authority; and a green bar – the avatar’s identity has been verified by a certification authority.

![Figure 4: Virtual identity card in VirtualLife. The reputation of avatars can be regarded while chatting.](image)

Each avatar also has an economical, social and civic reputation, whose indicators are handled by a sophisticated reputation system, depending on the avatar’s behavior. Avatars can take into account the indicators when establishing a chat.
3.2. The Editor of Rules

The rule concept follows the approach in Vázquez-Salceda et al. (2008). Similarly, laws are expressed in VirtualLife in the form of Norms.\(^8\)

A Norm is composed by: (1) norm\_condition, (2) violation\_condition, (3) detection\_mechanism, (4) sanction, and (5) repairs.

A norm\_condition is expressed by:

- **modus. modus ::= OBLIGED | PERMITTED | FORBIDDEN**
- **subject. subject ::= avatar | zone | nation**
- **action. action ::= ENTER | LEAVE | CREATE | MODIFY | MOVE | CREATE | TRADE | SELL | BUY | CHAT | etc.**
- **complement. complement ::= area | avatar | object | etc.**
- **IF C. Here C is a logical expression (usually using subjects’ properties). This is the condition when the norm holds. The norm is active when the condition C holds.**

Following is an example of Norm, referring to Norm composition:

1. **norm\_condition: FORBIDDEN student\_avatar ENTER library IF student\_avatar.age < 18**
2. **violation\_condition: NOT over\_age(student\_avatar) AND admit(student\_avatar, library)**
3. **detection\_mechanism: call over\_age(student\_avatar) when student\_avatar enters library**
4. **sanction: decrease\_reputation(student\_avatar); notify avatar**
5. **repairs: log and roll back if applicable**

3.3. Values Protected by Copyright Law and NoCopy, CopyRight and CopyLeft nations

VirtualLife laws – like laws in general – identify purposes and protected values. These are the values of a Virtual Nation (VN). The values shall be enforced by computer code – a set of technologically implemented rules and laws.

The purpose of a Virtual Nation is described in the beginning of the Virtual Nation’s constitution. For example, in the case of a university virtual campus scenario, the purposes in short can be formulated as teaching and learning.

NoCopy, CopyRight and CopyLeft nations are all different implementations of a law to do with copying. These of examples of setting up the nation/zone tables are proposed for allowing different scenarios in VirtualLife. Hence different values and rights can be taken into account. Computer code in the form of permission language tables serves to represent the distinguished rights. The permissions of permissive norms are represented explicitly in these tables.

In a NoCopy nation, no one is allowed to make copies. In a strict copyright nation, only the author of the object can make copies. The receiver of the copied object cannot make copies. The zone has no ability to change the nation policy.

In a non-strict copyright nation, the original author of an object can decide if the new owner can copy the object or not. By default, an author or owner can copy. The Zone has no ability to change the nation policy.

\(^8\) See 4, p. 15.
In a CopyLeft nation, the creator’s information is preserved. Each user can change and copy its own objects.

In a Second Life® model nation, you can sell objects controlling whether they are editable, copyable or sellable. The creator cannot modify a sold object. Of course, you can move your own objects. For example, the seller can decide to sell non-copyable objects. This object cannot be duplicated by the new owner. Therefore if she puts them in her inventory they disappear from the world.

4. Conclusions

We focus on two activities which are implied by a legal framework. The first is the compliance with the law by software users. This is a classical function of law as identified in legal theory. The second activity is the transformation of legal rules into computer code.

The latter activity is attributed to informatics. It contributes to the enforcement of avatars law. A human translator has to distinguish the methods of law and informatics. Several differences are as follows: abstractness of legal norms, open texture problem in law, heuristics to identify lower level concepts, legal methods of interpretation, teleology of the law, etc. There is no “silver bullet” for automatic translation of legal text into computer code. Distinguished permissions to copy objects can be illustrated by implementation in NoCopy, CopyRight and CopyLeft nations.

Operational implementation of legal rules accords with the conception “Computer code is law” [Lessig 2006]. We also approach a code of avatars that is concerned by Koster (2000).

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5. Literature


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