Transforming Legal Rules into Virtual World Rules: A Case Study in the VirtualLife Platform

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Virtual Worlds

• Serious, e.g. Second Life, Active Worlds Educational Universe

• Leisure purposed – a game
  – e.g. World of Warcraft

• I am neither proponent nor opponent of them
  – Consider negative factors such as addiction. Thus “pro” and “contra” arguments

• Research & software development project
  – FP7 ICT VirtualLife project, 3 years 2008-2010
  – Title “Secure, Trusted and Legally Ruled Collaboration Environment in Virtual Life”
  – Goal: software platform – peer-to-peer architecture
  – Learning support as a use scenario, e.g. “University Virtual Campus”
About FP7 VirtualLife project

• Objective
  – safe, legally ruled collaboration

• Novelties
  – issues of security and trust
  – in-world legal framework.

Implemented as shrink-wrap agreements
  1. a “Supreme Constitution”
  2. a “Virtual Nation Constitution”
  3. a set of contracts

– peer-to-peer network communication architecture
Legal framework of VirtualLife

Three tiers:

1. A “Supreme Constitution”
   - Code of Conduct
     • values that the user has to respect, e.g. avatars integrity, sanctity of property, reputation, etc.
     - A part of EULA (End User License Agreement)

2. A “Virtual Nation Constitution”
   - authentication procedure to become a member of Nation
   - copyright law of a Nation, e.g. “CopyLeft” or “CopyRight”

3. A set of different sample contracts
   - sales contract
   - teacher employment contract
   - student contract
Sample scenarios

Web 2.0

- information as a content

Virtual world

- interaction as a content
From legal rules – to virtual world rules – to rules in software

‘Keep off the grass’

Natural intelligence – a team of
- legal expert
- virtual world developer

‘The subject – avatar – is forbidden the action – walking on the grass’

Natural intelligence
- a programmer

A software program, i.e. a script.
Implemented by triggers which control the avatar

This translation complies with:
- Lawrence Lessig’s conception “Code is law”
- Raph Koster’s “Declaration of the Rights of Avatars”
Examples of rules

1. An avatar is forbidden to touch objects not owned by him or a certain group.

2. An avatar not belonging to a given group is forbidden to a given area of the zone.

3. An avatar is forbidden to create more than a given number of objects during a given time interval.

4. An avatar is forbidden to use a given dictionary of words (slang) while chatting with other avatars.

5. An avatar of age is forbidden to chat with avatars under age.
The editor of rules

• A law is composed of **Norms**, see (Vázquez-Salceda et al. 2008).

• **Norm** is composed by:
  1. NORM\_CONDITION,
  2. VIOLATION\_CONDITION,
  3. DETECTION\_MECHANISM,
  4. SANCTION
  5. REPAIR.

• **NORM\_CONDITION** is expressed by:
  – TYPE {Obliged, Permitted, Forbidden}
  – SUBJECT {Avatar, Zone, Nation}
  – ACTION {ENTER, LEAVE, CREATE, MODIFY, MOVE, CREATE, TRADE, SELL, BUY, CHAT, etc.}
  – COMPLEMENT {AREA, AVATAR, OBJECT, etc.}
  – IF {logical\_expression\_using\_subjects\_properties}
Norm example

(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) **Repair:** log and roll back if applicable
Facing the problems of translation

- **Abstractness of norms.** Legal rules are formulated abstractly.
- **Open texture.** Hart’s example of “Vehicles are forbidden in the park”.
- **Legal interpretation methods.** The meaning of a legal text cannot be extracted from the sole text.
  - grammatical interpretation
  - teleological interpretation
- **Legal teleology.** The purpose of a legal rule usually can be achieved by a variety of actions.
- **Heuristics.** The ability to translate abstract high level concepts and invent low level ones.
- **Consciousness of the society.** Law enforcement is a complex social phenomenon.
Spatialization – a virtual world as a whole

Virtual space. Frame: constitutive. ~ Theatre
F. Lachmayer’s spatialization

Virtual space. Frame: constitutive. ~ Theatre

Regimes, paradigms, ethics, professional morality

Rules 1. Technical
Factual limitations, e.g. to fence the grass.

Avatar

Stage

Avatar

Avatar

Actions
F. Lachmayer’s spatialization

Virtual space. Frame: constitutive. ~ Theatre

Regimes, paradigms, ethics, professional morality

Rules 1. Technical
Factual limitations, e.g. to fence the grass.

Rules 2. Legal
Obligations, permissions, prohibitions.

Authorities: virtual procedures, e.g. online dispute resolution
F. Lachmayer’s spatialization

**Virtual space.** Frame: constitutive. ~ Theatre

**Regimes, paradigms, ethics, professional morality**

**Rules 1. Technical**
Factual limitations, e.g. to fence the grass.

**Rules 2. Legal**
obligations, permissions, prohibitions.

**Rules 3. Reputation**
economic, social, civic.

**Rules n. Energy**

**Authorities**: virtual procedures, e.g. online dispute resolution

**Stage**

**Avatar**

**Actions**

**Avatar**
An example of reputation rules

Reputation:
• economic,
• social,
• civic.
Principles of construction

Core ontology

- Special ontology 1: Rules 1. Technical
- Special ontology 2: Rules 2. Legal
- Special ontology 3: Rules 3. Reputation
- Special ontology n: Rules n. Energy

Stage

Avatar

Actions

Avatar

Avatar
Principles of construction

Core ontology

Special ontology 1
Rules 1. Technical

Special ontology 2
Rules 2. Legal

Special ontology 3
Rules 3. Reputation

... Special ontology n
Rules n. Energy

Different modes of effect (Wirkung) or relevance

Barrier. Strict
“Entering without stop is refused”

Occasional. Probability p%
“Policeman fines you for stepping the grass”. But this happens with p% probability – if you do not succeed.

Step-by-step.
“Reputation/energy is decreased by 10 points”
Example of a technical rule

• E-law project, Austria

if document.XML_format = OK
then put_on_legislative_workflow ( document )

“Running sushi” transport belt

Legislative workflow in Austria
Terminology: “factual” and “technical” rules?

- if door = closed then factual_hindrance
- if no pincode then no money
- “Natural” rules ≠ Natural law (Naturrecht) – e.g. gravitation force
- Natural image or essence of man → ??? behavior
3 legal stages

1. Legislative stage
   Community

2. Stage of the game – everyday life
   Negotiations, contracts, etc.

3. Judicial stage
   \( p\% \)
   Judgement
2 legislative substages

2. Stage of the game

People think in **roles**, not rules

Stage of access – “enter airport”

- Citizen, ticket
- Passenger
- Having meals
2 legislative sub-stages

1a. Legislative rules
   General rules

1b. Contract rules
   e.g.
   Buyer <-> Seller
   Individual rules
   inter partes

2. Stage of the game
   People think in roles, not rules
   Having meals
   Stage of access. Like “entering an airport”
   Citizen, ticket
   Passenger

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1a. Legislative rules
   People think in roles, not rules

1b. Contract rules
   Buyer <-> Seller
   Having meals
   Citizen, ticket
   Passenger
   Stage of access. Like “entering an airport”
Technical rules

Causation is formalized with the *modus ponens* rule.

**Example.** (pincode → money) & pincode ⇒ money

(1) Rule($P \rightarrow Q$)

(2) Fact($P$)

**Conclusion.** Fact($Q$)

*Modus ponens* rule in mathematical logic:

Sequent notation:  

\[
\frac{P \rightarrow Q, \ P}{\neg Q} \quad \text{Rule form:} \quad P \rightarrow Q, \ P \quad \neg Q
\]

Lachmayer’s notation:  

\[
P \rightarrow Q \quad \& \quad P \Rightarrow Q
\]

In some domains the following interpretation of a technical rule is aimed:

(1) Rule($P \rightarrow Q$)

(2) Fact($\neg P$)

**Conclusion.** Fact($\neg Q$)

Obtained inference Fact($\neg P$) ⇒ Fact($\neg Q$) and (1) imply equivalence of $P$ and $Q$, denoted, $P \leftrightarrow Q$.

Consequently, such reasoning is sound in the case of equivalent facts, only.
Legal rules

(1) Permission\( (P \text{ iff } Q) \Rightarrow \text{Norm}(\neg P \rightarrow \neg Q) \)

*Example.* green if and only if cross \( \Rightarrow (\text{red} \rightarrow \text{do_not_cross}) \)

(2) Fact(\( \neg P \)) – red is on

(3) Fact(\( Q \)) – you cross the street, nevertheless

*Interpretation.* You are simply a bad guy. Nobody can stop you crossing.

Notes:

- Here \( P \) denotes “green”, \( Q \) denotes “cross”, \( \neg P \) denotes “red”.
- A punishment procedure is exercised with probability \( p\% \), e.g. by a policeman.
- \( P \text{ iff } Q \) is also denoted \( P \Leftrightarrow Q \)
Reputation/energy rules

(1) Norm(¬A)
(2) Fact(A)

**Conclusion.** Energy reduction by 10%

Formalization:

- Norm(¬A), A
- \[ A := 0.9 \times A \]

Energy is reduced to \( A_1 \), then \( A_2 \) and so on to \( A_n \). And at last \( ¬A \).
Spatialization of Norm and Status


III. Normativer Status
Spatialization of Norm and Status

Virtual space

Norm

Stage

Avatar

Actions

Avatar

F. Lachmayer, Grundzüge einer Normentheorie, 1977, Seite 67
Spatialization of Norm and Status

F. Lachmayer, Grundzüge einer Normentheorie, 1977, Seite 67, 76
Spatialization of Norm and Status

Virtual space

Norm

Status

Stage

Avatar

Actions

Avatar

Avatar

F. Lachmayer, Grundzüge einer Normentheorie, 1977, Seite 89
Characterization of Normative Status

• Suppose a huge set of rules $r_1, r_2, \ldots, r_n$.

• What is a characterization of the normative status, $O$, of a subject (avatar) $S$?

$$O(\text{subject}=S, \text{duty}=X, \ldots)_{(r_1, r_2, \ldots, r_n)}$$

– Has $S$ a duty $X$? 
– Is $S$ permitted to do $Y$?

• “... the power ... does not reside in the inference method; almost any inference method will do. The power resides in the knowledge” (Feigenbaum 1984, p.101)

![Diagram of Synthesizer of normative status](image)

- $r_1, r_2, \ldots, r_n$ are roles, such as “passenger”, “professor”, etc.
Motivation of learning

• “Pro” virtual worlds
  Learning materials
  – static, searchable in 2D for learner’s queries (Web)
  – interactive objects (virtual worlds)

• “Contra” virtual worlds
  – values?
    – mono-sensorial, perceived through computer’s display
    – multi-sensorial learning in the real world
      • human’s brain and senses (seeing, hearing, feel) work concurrently
      • “learning by doing” when accomplishing real-world tasks
Thank you

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