Distributive Multimedia and Multisensory Legal Machines

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Machines produce legal acts

Examples:
- vending machines
- traffic lights
- computers in organisations
- workflows (e.g. FinanzOnline)
Factual acts (raw facts)

‘Alice puts a coin in a piggybank’

\[ \text{factType} = \langle \text{condition}, \text{actor}, \text{action}, \text{effect} \rangle \]

\[ \text{fact}_1 = \langle \text{condition} = \text{undefined}, \]
\[ \quad \text{actor} = \text{‘Alice’}, \]
\[ \quad \text{action} = \text{‘puts a coin in a piggybank’}, \]
\[ \quad \text{effect} = \text{‘making savings’} \rangle \]
Legal acts

- ‘Chris puts a coin in a ticket machine’
- ‘Policeman raises a hand’

Institutional facts and legal institutions [McCormick & Weinberger 1992]:
1) institutive rules
2) consequential rules
3) terminative rules
Traffic lights
distributes time and space

A multisensory device:
• produces sound
• haptic information
• points visually
The message is clear for well-informed and the direction
Making the context explicit – situational normativity

• The situation is clear for pedestrians.
• However, normativity is still lacking.
Traffic lights

Verical effect – administrative law

Pedestrians:

\[ O(\neg A) \lor T[O(\neg A) \rightarrow P(A)] \lor T[P(A) \rightarrow O(\neg A)] \lor P(A) \]

where \( O = \) obligation, \( P = \) permission, \( T = \) transition, \( A = \) go-action
Organisation

- Legal condition
- Legal actor
- Legal action

Actor:
- human being
- machine

Legal effect

Condition
Workflow

• Information systems = legal machines
• Events (e.g. entering data and pushing buttons) initiate legal facts.
• Users acquire rights and duties through human beings and machines.

Example: https://finanzonline.bmf.gv.at/
Legal person: three layers

Layer 1. Legal person

Layer 2. Office

Layer 3. Official
- Human being (usually at computer)

Layer 3. Machine
Legal relationships

Substratum:
- Human → Organisation
- Human → Machine (not yet)

Machine ≠ Legal person
(?) legal capacity (*Rechtsfähigkeit*)
(?) contractual capacity
(?) Geschäftsfähigkeit
(?) e-Person, electronic agent
Future: machines as legal actors

Today
Machines as
• tools
• auxiliary to humans

Future
Machines as
• legal actors
• e-Persons

Boundary

Office
Official
Machine

E.g. a national register
Multisensory machines

Multisensory production

- Norm producer
  - Human
  - Machine

Produce

Product

- Sight / Machine vision
- Hearing
- Touch
- Temperature
- Smell
- Electromagnetic waves
- Other

Multisensory perception

- Legal texts
- Text
- Sign
- Road radar
- Phone voice
- Traffic light for disabled
- Thermostat
- Smoke detector
- Airport radar
- Etc.
The context of multisensory law
Role-based Access Control

RBAC model [Matulevičius & Dumas 2010] adapted from Ferraiolo et al. (2001)

SecureUML metamodel [Matulevičius & Dumas 2010]
‘Authorization’ in software engineering

- permission delegation
- execution dependency
- objective
- capability

An example in SI* modeling language [Compagna et al. 2009]
Conclusions

The context of research issues

• The executive function of law
• Multisensory legal machines

• Taxonomies and notations:
  – patterns to produce legal acts by machines
• e-Person [Schweighofer 2007]
• Construction issues:
  – artificial agents; see e.g. [Sartor 2002; 2009]
  – software agents; normative multi-agent systems
  – “Computer code is law”; see e.g. [Lessig 2006]