

# Normative Issues and Limitations

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# Background

Connectionist	Semantic
Emergent from context of training data	Based on explicit definitions of concepts, procedures
Statistical computations	Logical computations
LLMs, Generative AI	Rules-based systems, DBPedia
Control - Training data, fine-tuning of model	Control - Actual encoding, logical models

# Latest Chapter Plan

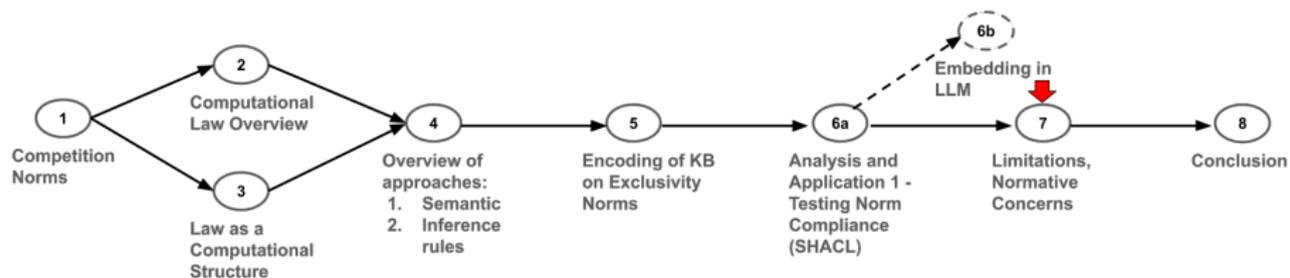


Figure: Chapter Plan, January 2026

# Reified I/O Logic

## Theorem (A1, General Norm)

$$\forall_x \forall_t (\exists_{e_a} \exists_{e_{xs}} \exists_{s_1} [(RexistAtTime\ e_a\ t) \wedge (allows'\ e_a\ e_{xs}\ x) \wedge (exsupplier'\ e_{xs}\ s_1) \wedge (supplier\ s_1)], \exists_{e_f} [(RexistAtTime\ e_f\ t) \wedge (flagged'\ e_f\ x)]) \in O$$

# Layers of Encoding

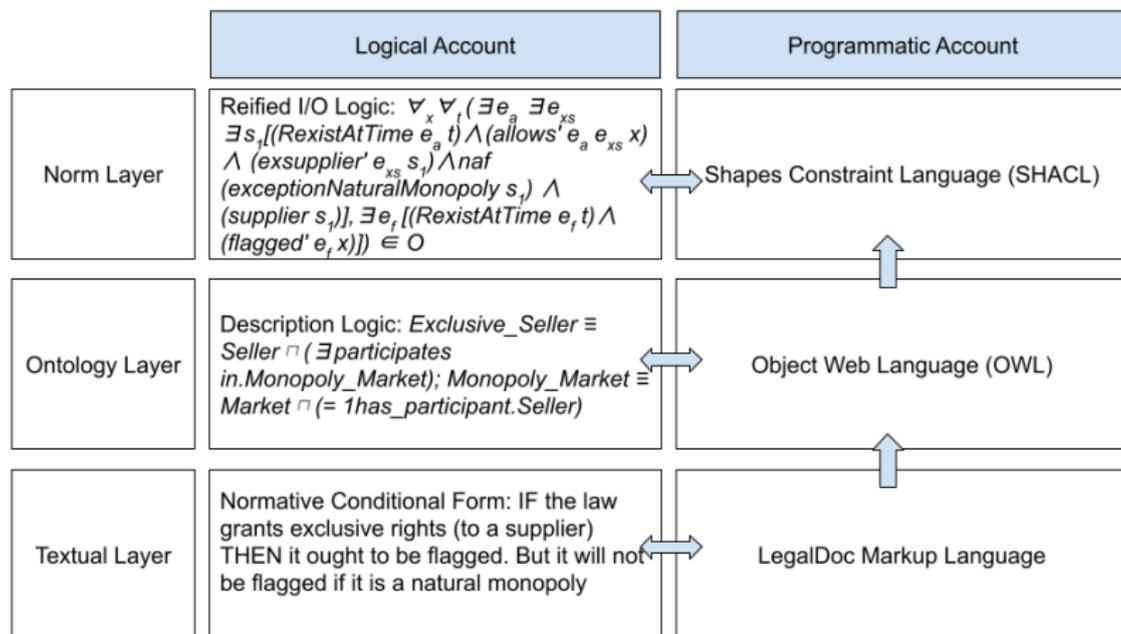


Figure: Layered Encodings (Robaldo, 2020)

# Computational Encoding

- Narrower scope, deeper treatment
- A1 of OECD, elaboration based on Art. 102 of the TFEU (Abuse of Dominant Position)
- Use of Shapes Constraint Language (SHACL) over LegalRuleML

# SHACL Sample

```
acs:DominanceThresholdShape
  a sh:NodeShape ;
  sh:targetClass acs:Undertaking ;
  sh:name "Akzo Presumption Check" ;
  sh:sparql ;
    sh:select ""
      SELECT $this?share
      WHERE {
        $this acs:hasMarketShareValue?share.
        FILTER (?share >= 50).
      }
    ""
```

# Normative Issues

- Inherent Design Limitations (No Ground Truth)
- Cost - Finance, Environmental, etc.
- Impact on the Legal Profession

# Inherent Limitations

- No Ground Truth
- Hallucinations, Sycophancy
- Bias, Toxicity
- Opacity
- Knowledge, Language Limitations

# Costs

- Financial Costs
- Environmental Costs
- Opportunity Costs

# Impact on the Legal Profession

- Fewer associates
- Atrophy of skills
- Talent development pipeline

# Neurosymbolic AI

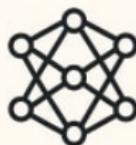
## Symbolic vs Neural vs Neuro-symbolic AI

### Symbolic AI



- Logic and rules
- Human interpretable
- Difficult to scale

### Neural Networks



- Pattern recognition
- Learns from data
- Data hungry

### Neuro-symbolic AI



- Learning and reasoning
- Combines knowledge
- More robust

IBM Research

# Next Steps

- Code baseline norms in SHACL, instances in RDF
- Example instances (laws, decisions, even factual situations), for validations against the norms - Yes/No
- Embedding into a neural network(?)

# End

*Thank you!*



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