Computational Law Approach to Competition Impact Assessment

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Outline

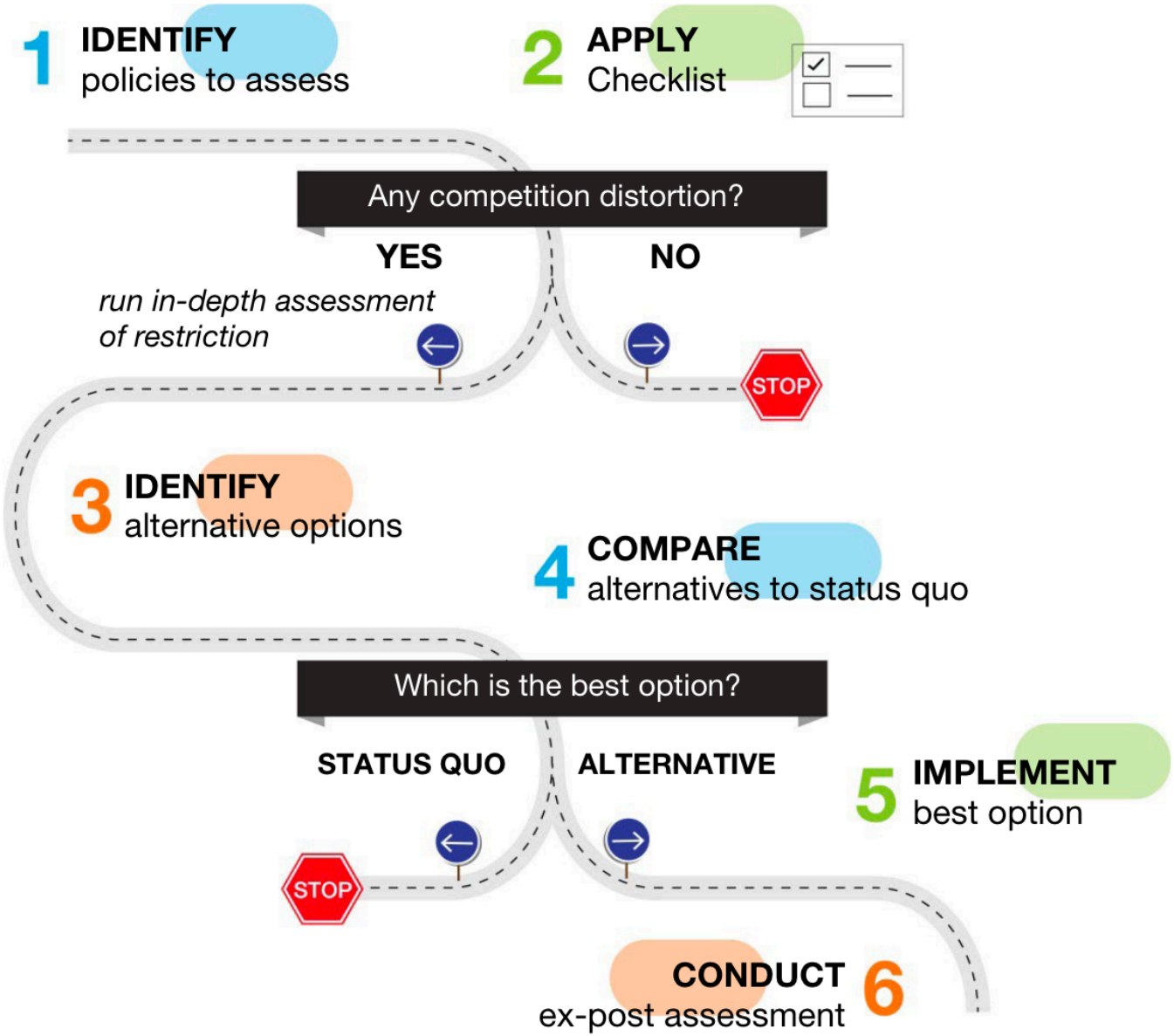
Competition Impact Assessments

- Givens:
  - More competition is better
  - Law can shape the competitive environment
- Therefore:
  - Review laws for competition effects (-)
  - Amend those laws to enable more competition.

Competition Impact Assessments

- BUT: Growing Search Space
  - Statutes
  - Regulations
  - Decisions
  - Direct and indirect subject matter
  - Add up depending on the economic sector

Competition Impact Assessments



Competition Impact Assessments

COMPETITION ASSESSMENT CHECKLIST

Competition assessment should be conducted if a legal provision has any of the following effects:

A — Limits the number or range of suppliers

This is likely to be the case if the provision:

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- ☐ **A2** Establishes a license, permit or authorisation process as a requirement of operation
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- ☐ **A5** Creates a geographical barrier for companies to supply goods,

B — Limits the ability of suppliers to compete

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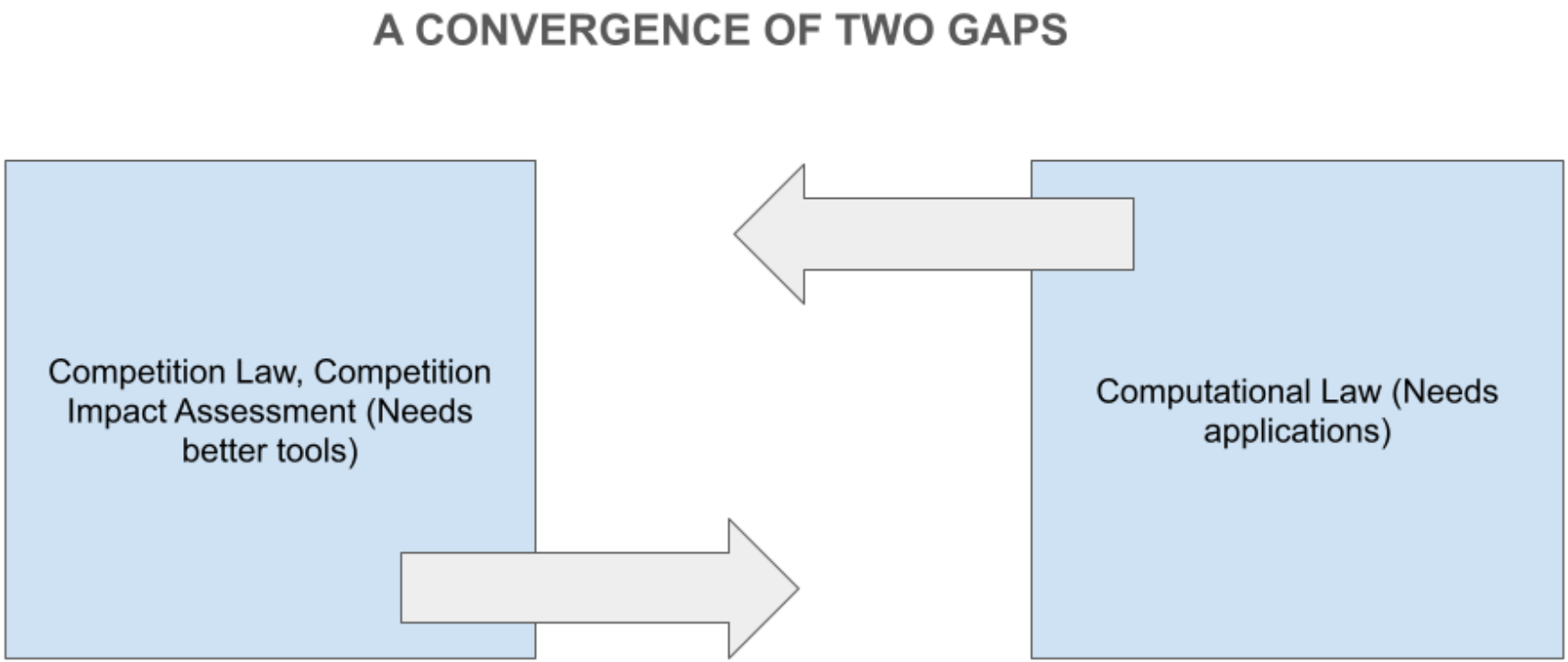
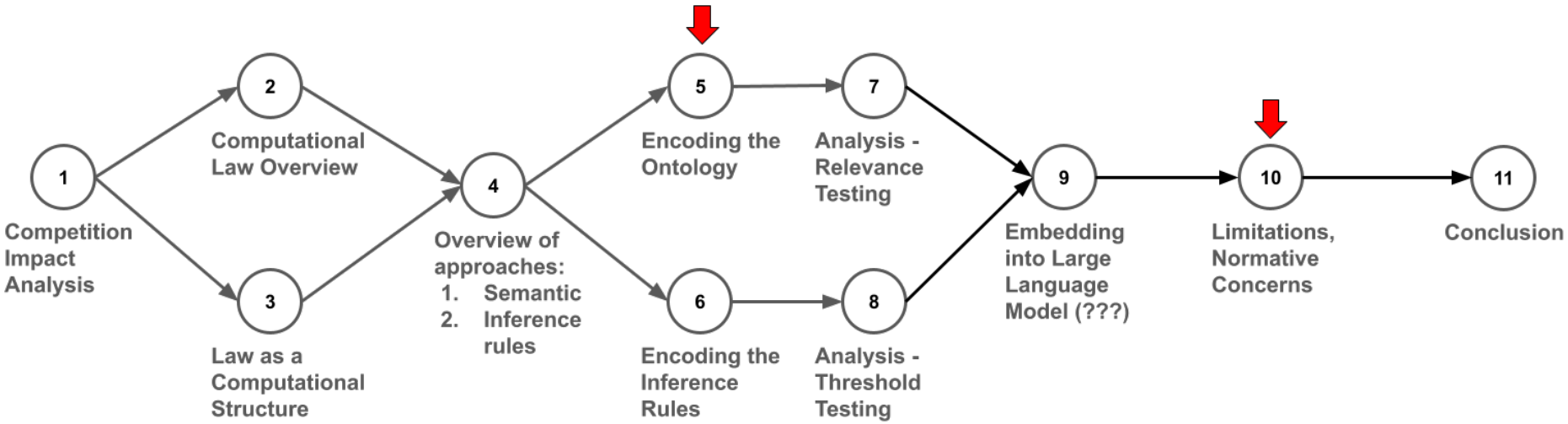
Gap in Scholarship



Chapter Plan



Computational Law

- "Law that works like software"
- Steps:
  - Encode the law into computational structures
  - For automated analysis and evaluation $\rightarrow$ Legal Determination

Why Computational Law?

- Law - Reason over Power
- Universality in Computation
- Higher Towers of Consequences

Limits of Legal Reasoning

Figure: Beauvais Cathedral, Interior

Example applications

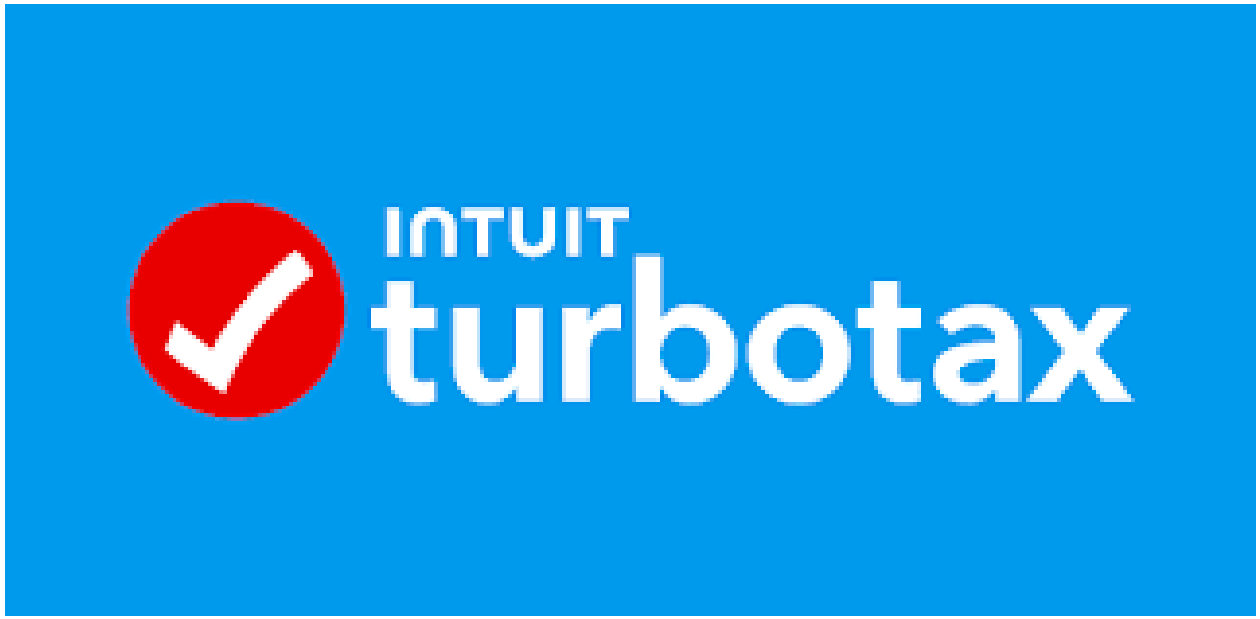


Figure:

Example applications

Figure: Autonomous Systems

Distinction from functional code

- Encode and analyze legal rules "as such"
- Easier to update separately when the law changes

Example applications

- Determine possible legal outcomes
- Making plans, giving advice
- Identifying lines of argumentation
- Drafting of legal documents

Scope of Computational Law

- Some laws more amenable to computability
- Does not mean giving up on decision-making

Some Laws More Amenable

- YES:Tax Law, Commercial Law, Contracts
- NO: Criminal Law, Constitutional Law
- ???: Case Law

Not a Substitute to Human Decision-making

- Determines "what follows" from premises
- Confirmation, prediction, generation of arguments

Choice of Models

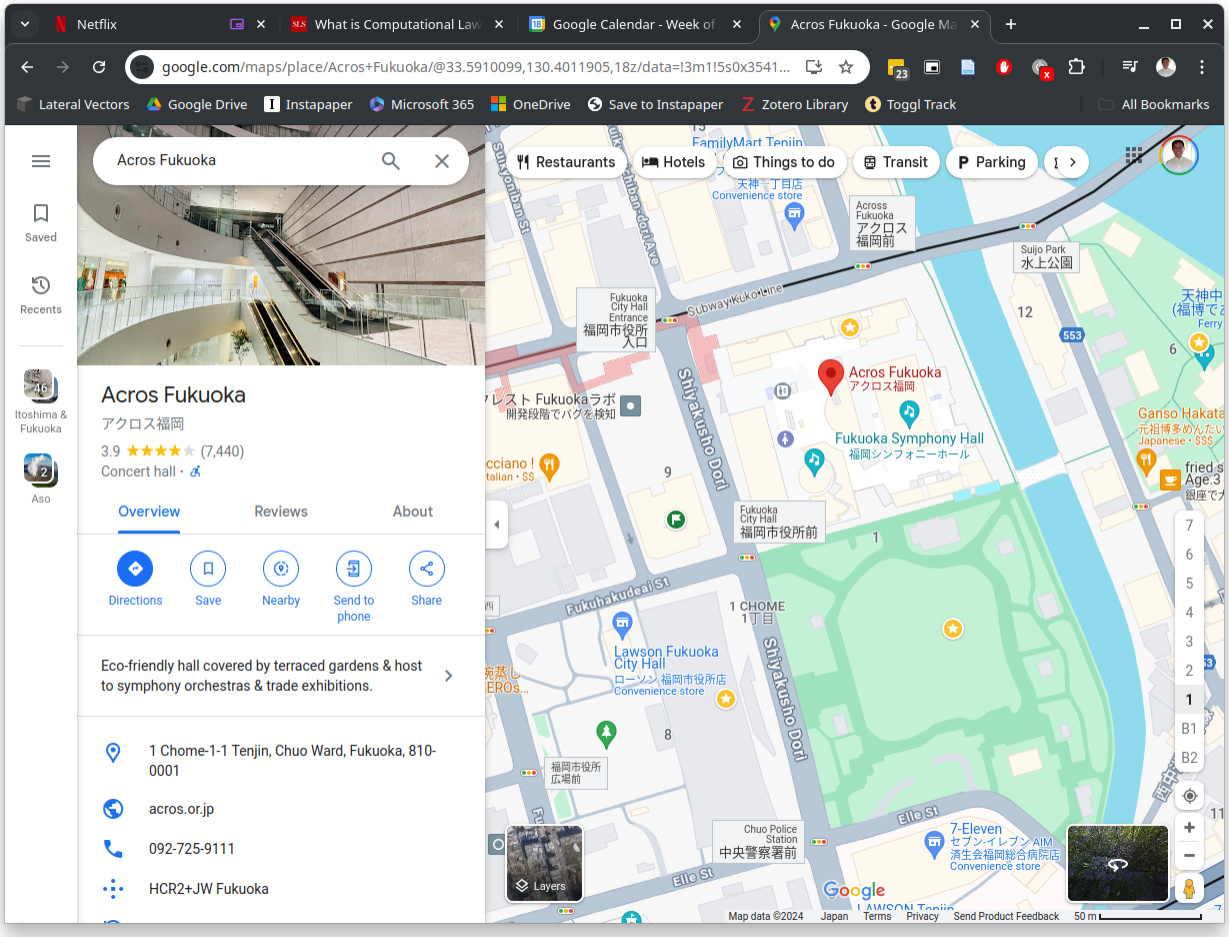


Figure: “All models are wrong, but some are useful - George Box”

Choice of Models

British Nationality Act 1981:
"A person born in the United Kingdom after commencement shall be a British citizen if at the time of birth his father or mother is
(a) a British citizen; or..."
Extended Horn Clause:
x becomes a British citizen
if x was born in the United Kingdom on date y
and date y is on or after commencement
and x has a parent z and z is a British citizen

Choice of Models

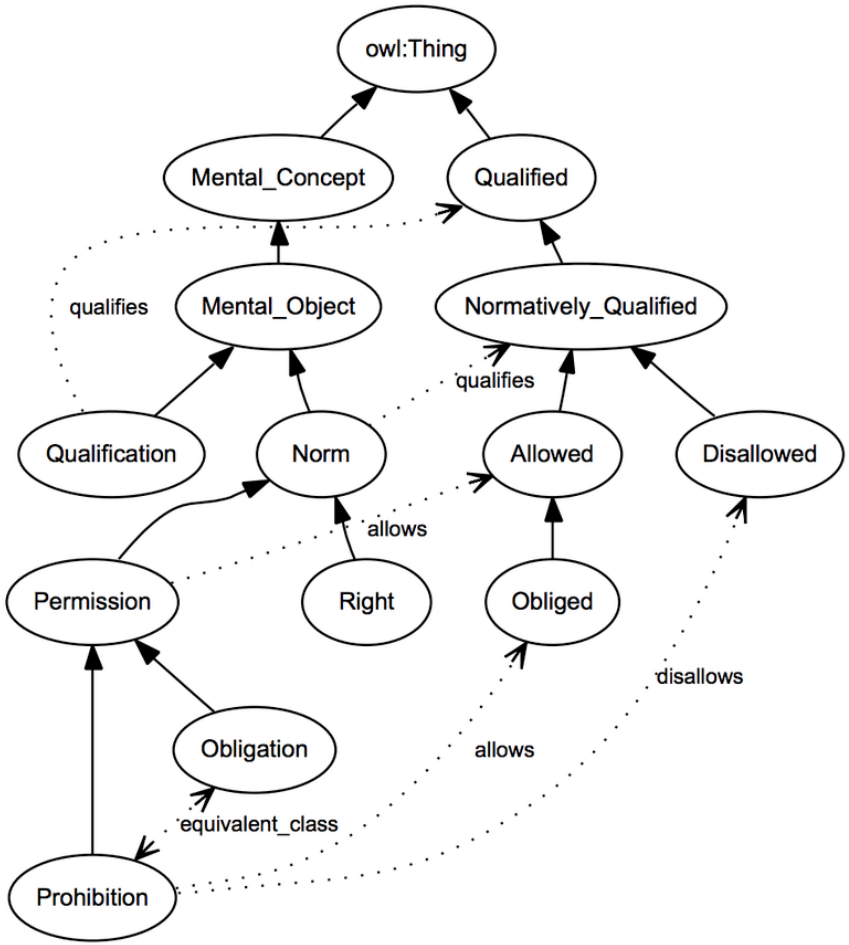


Figure: Ontology Model

Choice of Models

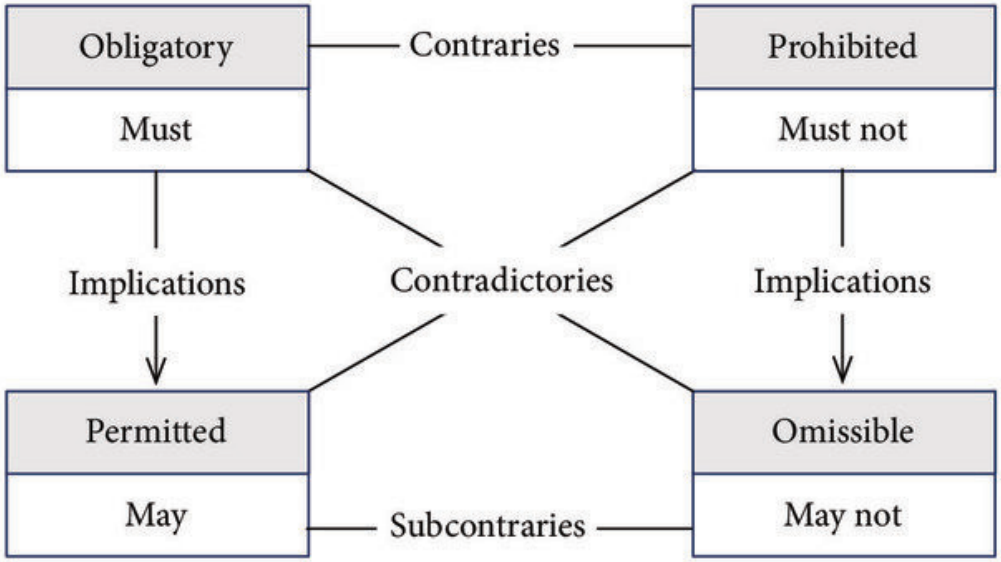


Figure: Deontic Logic Model

Choice of Models

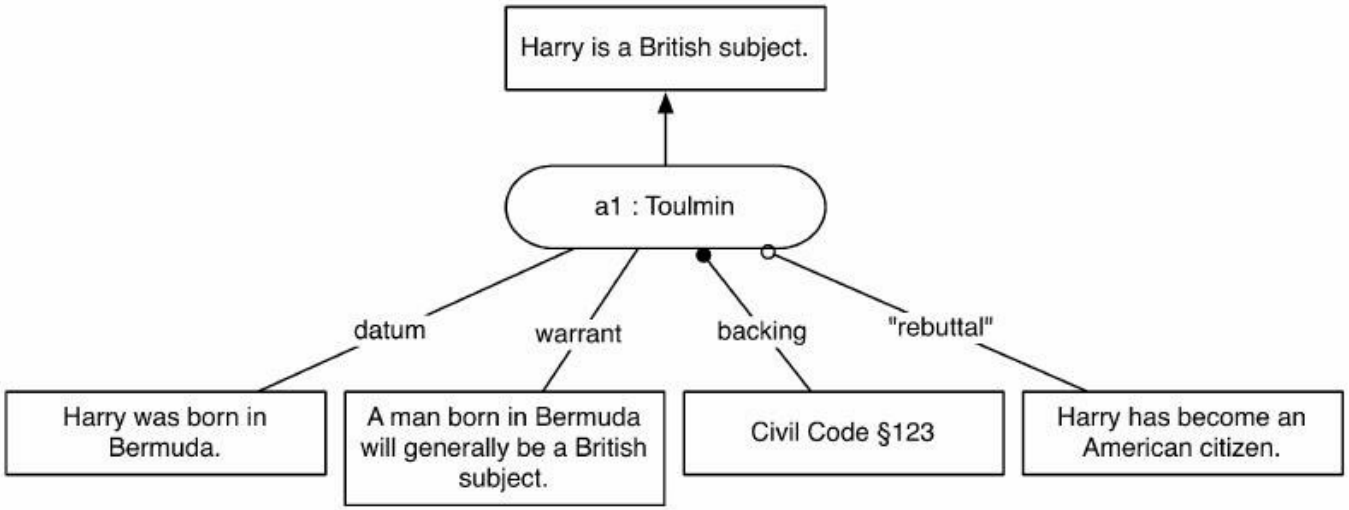
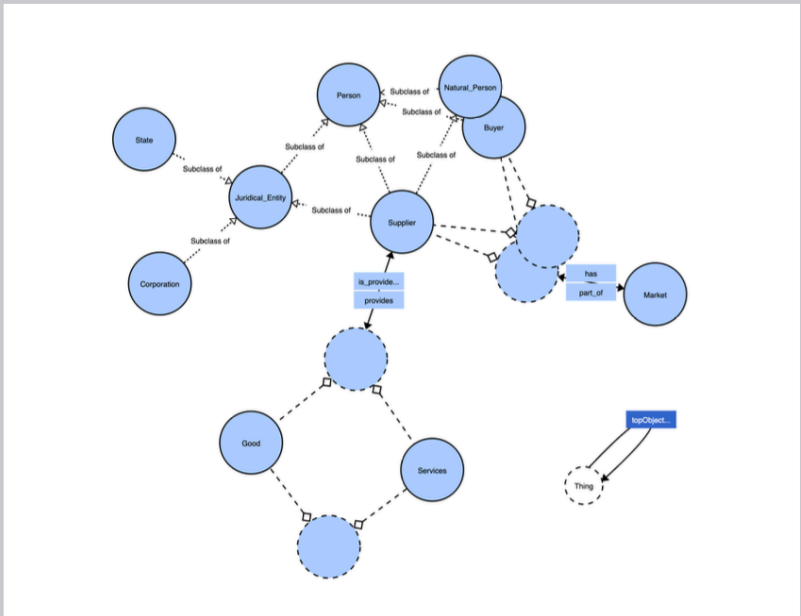


Figure: Argument Theory Model

Choice of Models

Problem	**Encoding**	**Analysis**
Relevance Testing: Does the law map with the industry being assessed? (Actors, transactions)	Value chain analysis $\rightarrow$Ontologies (Ontology Web Language)	Reasoning engines to determine relationships: - No mapping? - Identity? - Classification? - Mereological?
Threshold Testing: Given a specific rule within a relevant law - How does this rule relate to the norm of the threshold test?	Inference rules (Prakken, Sartor) - LegalRuleML	Argumentation Frameworks (?) Propositional networks (?)

Computational Law

Text	Deontic Logic Version	Ontology
A1 - Grants exclusive rights for a supplier to provide goods or services	If it is *permitted* to supply goods, AND it is *obligatory* that the supplier = 1 THEN (P(Supply Goods) ∧ (O(Supplier=1)) → (0 - No effect; 1 - Indirect Effect; 2 - Direct effect)	

Law and Logic

"The life of the law has not been logic; it has been experience."
Oliver Wendell Holmes, Jr.

Law and Logic

- Historical arguments
- Epistemological arguments
- Practical arguments

Threshold Test

A. Limits the number or range of suppliers
A1 - Grants exclusive rights for a supplier to provide goods or services

Step 1 - Determine domain and scope

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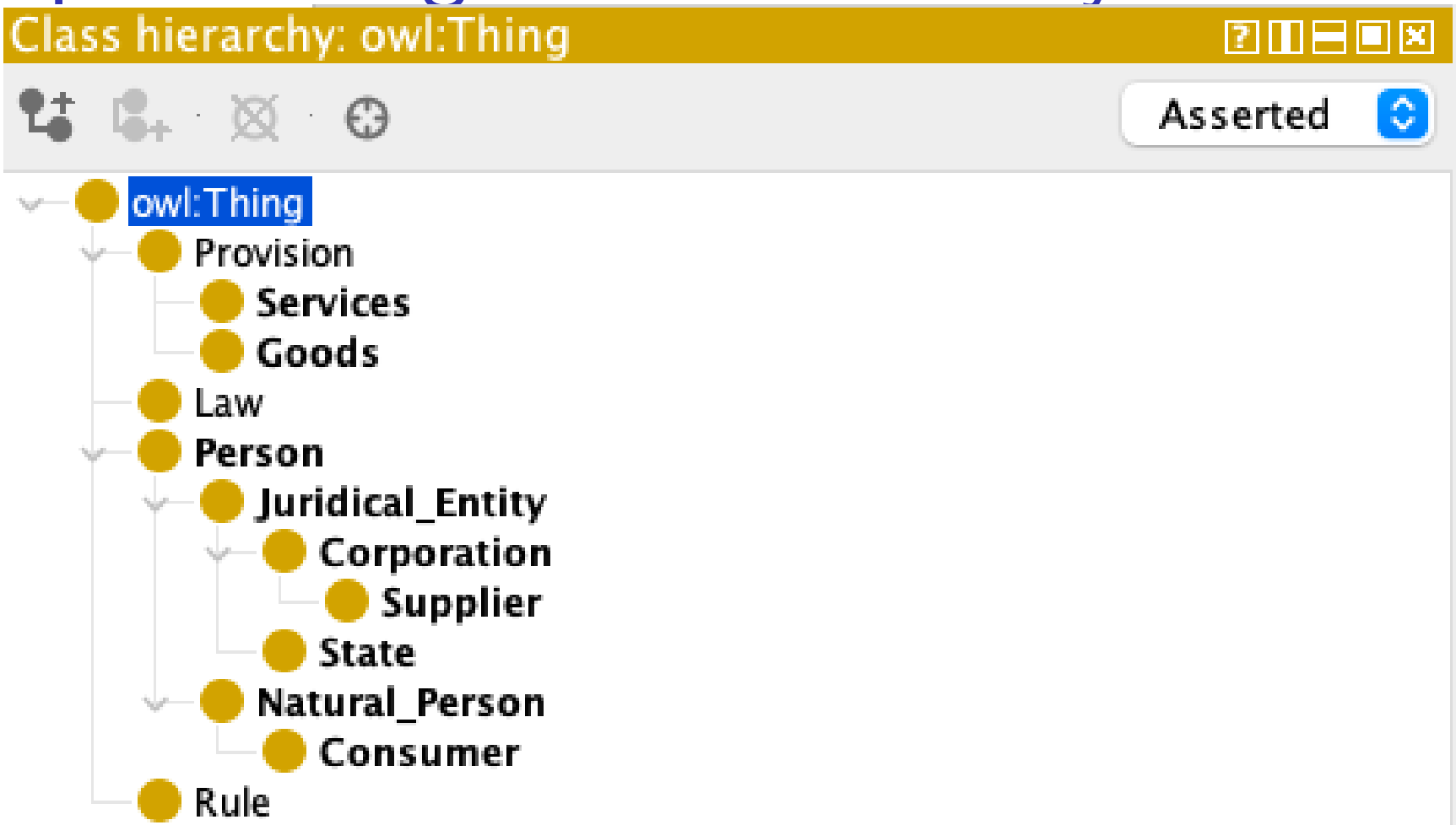
Step 2 - Consider existing ontologies

- Concepts and relationships in the OECD Guidelines - LegalRuleML for concepts related to law
- Concepts and relationships in the digital payments sector - Subset of the Financial Industry Business Ontology

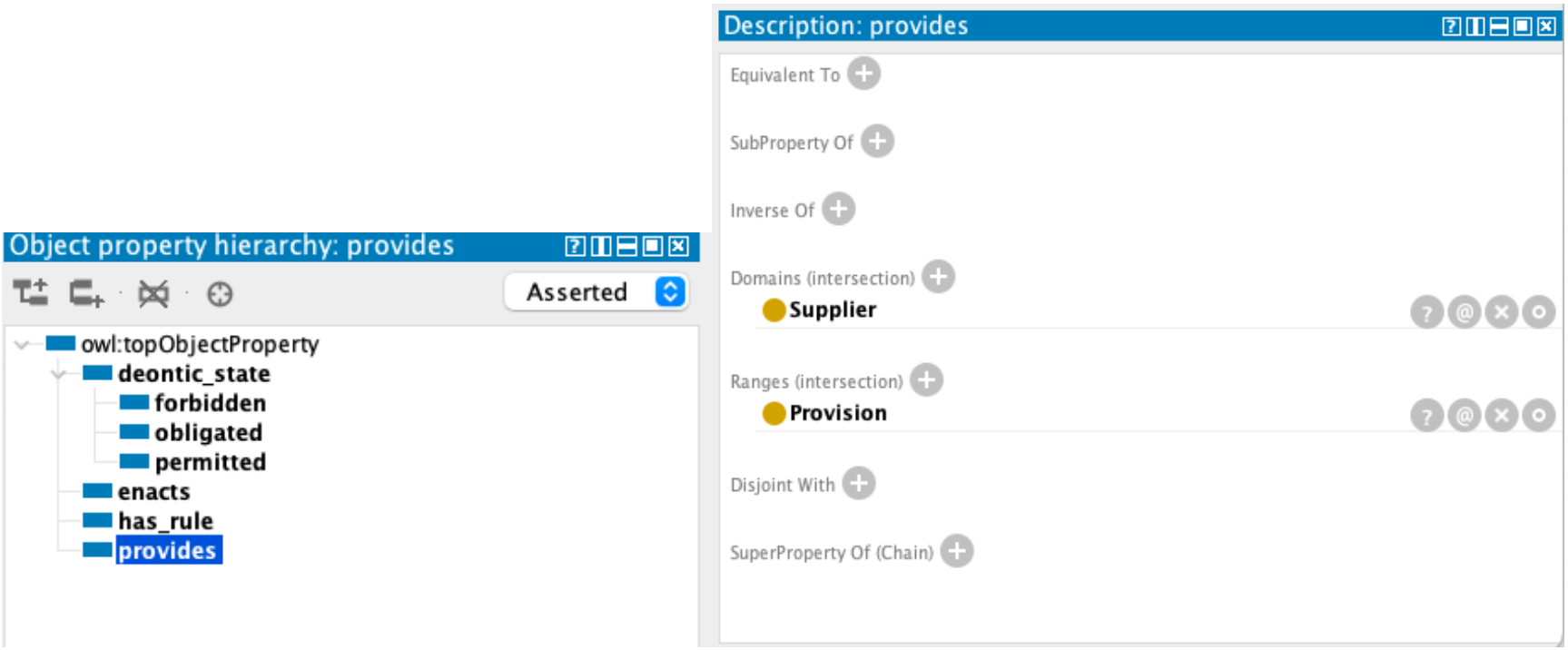
Step 3 - Enumerate Important Terms

Nouns	**Verbs/Adjectives**
Right	limit
Supplier	number
Goods	range
Services	grant
(State)	provides
(Law)	exclusive

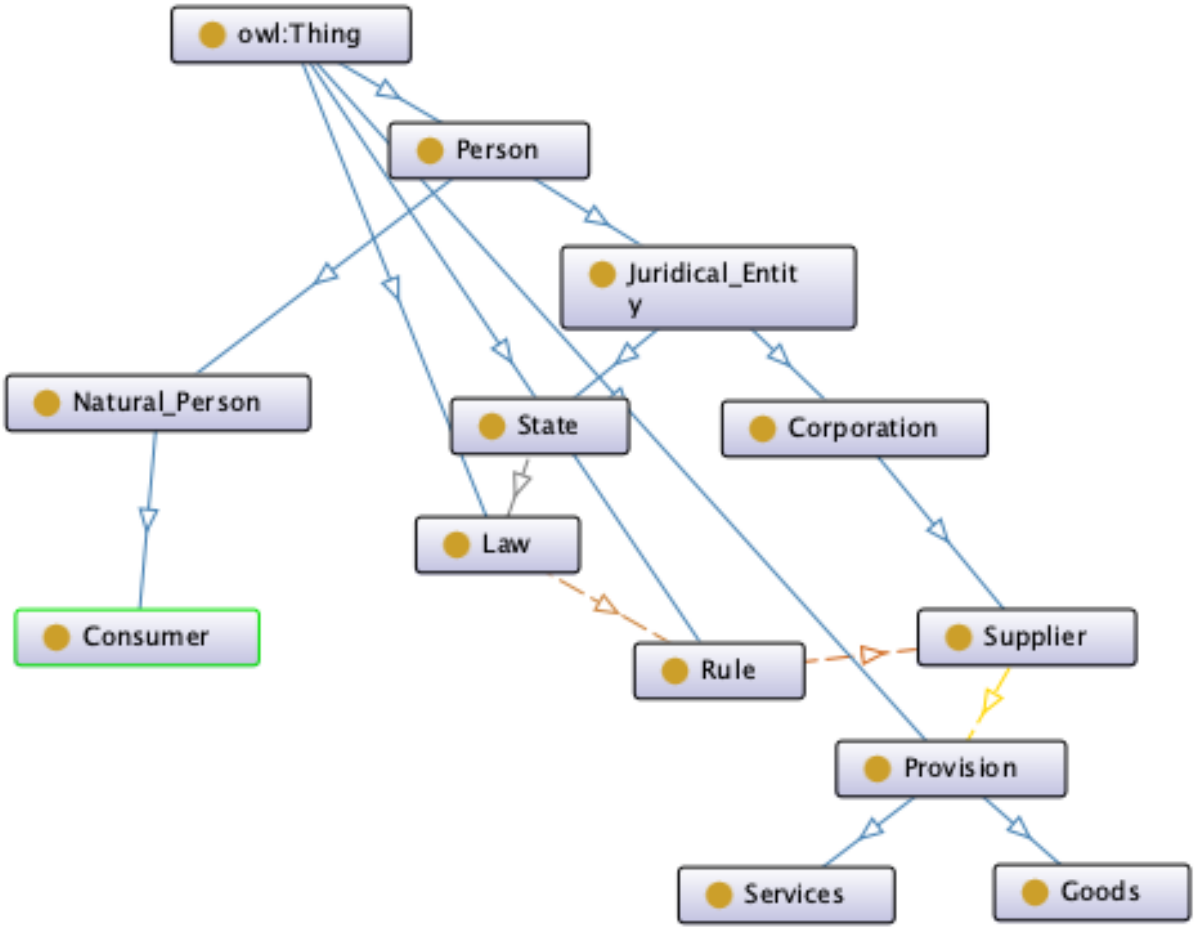
Step 4 - Design Class Hierarchy



Step 5 - Design Internal Structure of Classes



Step 6 - Define Attribute Restrictions



Analysis Preview

Demo: Constraints and Inferences - Who is an Aunt or Uncle?

Analysis Preview

Demo: Querying Facts

Beware

- Thin, Formulaic Simplifications
- Imposed, not negotiated
- Utilitarian, commercial, fiscal
- Monocultural, geometric

Mētis

- Practical, Localized Knowledge
- Experience, Intuition, Improvisation
- “Messier”

“Messy Pathways”

Next Steps

- Document assumptions and constraints
- Ontology as data structure (Python)
- Encoding the deontic logic - as ontological rules

End

Thank You!

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Questions and Answers