

# An Evaluation of Methodologies for Legal Formalization

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# Outline

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# Legal Formalization

- Legal formalization is defined as a translation of the legal (regulatory) text into its logical representation with the preservation of its legal meaning.
- The usual first step to automatic legal reasoning.
- It is a complex task, usually requiring several experts to interpret both the legal and the resulting logical rules.

# Evaluation of Legal Formalization

## – Conrad & Zeleznikow:

- The significance of evaluation in AI and law: a case study re-examining ICAIL proceedings. (ICAIL 2013)
- The role of evaluation in AI and law: an examination of its different forms in the AI and law journal. (ICAIL 2015)

## – Why is evaluation important?

- *„it is a sign of maturity and essential scientific rigour and it supports an empirical assessment of the research efforts in both qualitative and quantitative ways“*

## – 6 types of evaluation:

- Gold Data
- Statistical
- **Manual Assessment**
- Algorithmic
- Operational-Usability
- Other

# Motivation

- Many current approaches and methodologies of legal formalization
- Usually narrowly focused on a specific legislative act, without broader application or use
- Lack of evaluation data on the methodology that would allow evaluation of the quality of the method or comparison with other approaches

# Problem Definiton

**How to recognize a „good“ legal formalization?**

**What and how to evaluate in case of evaluation of legal formalization?**

# Methodology

- Literature overview of current approaches to legal formalization
  - Focused on the evaluation of these approaches
- => Extraction of essential parameters of a „good“ formalization and suggestions on how to evaluate them

# Methodology - Reviewed Works

— 8 recent projects in 15 articles

- Nakamura et al., 2008
- **DAPRECO**
- Palmirani & Governatori, 2018
- De Montety et al., 2019
- Lawsky et al.
- **CATALA**
- **Atkinson et al., 2021**
- NAI editor

— Only 3 of them were subsequently evaluated



# Methodology - Theoretical background

- Karl Branting: Data-centric and logic-based models for automated legal problem solving. (Artificial intelligence and Law, 2017)
  - Fidelity and authoritativeness
  - A gap between legal terms and ordinary language of facts or real-life situations

# Results - 4 Essential Parameters and Their Evaluation

1. Correctness
2. Transparency
3. Comprehensibility
4. Multiple interpretations support

**Proposed evaluation methodology:** Legal experts evaluation  
(manual assessment)

# Results - Main Issues of Legal Experts Evaluation

1. The composition and size of the expert group
2. Non-introducing questions on all parameters (expressiveness, neutrality)
3. Rating scale (an even number of options)
4. Inter-rater agreement measuring

**Thank you for your attention!**