

# Ontology-Based Privacy Compliance Checking for Clinical Workflows



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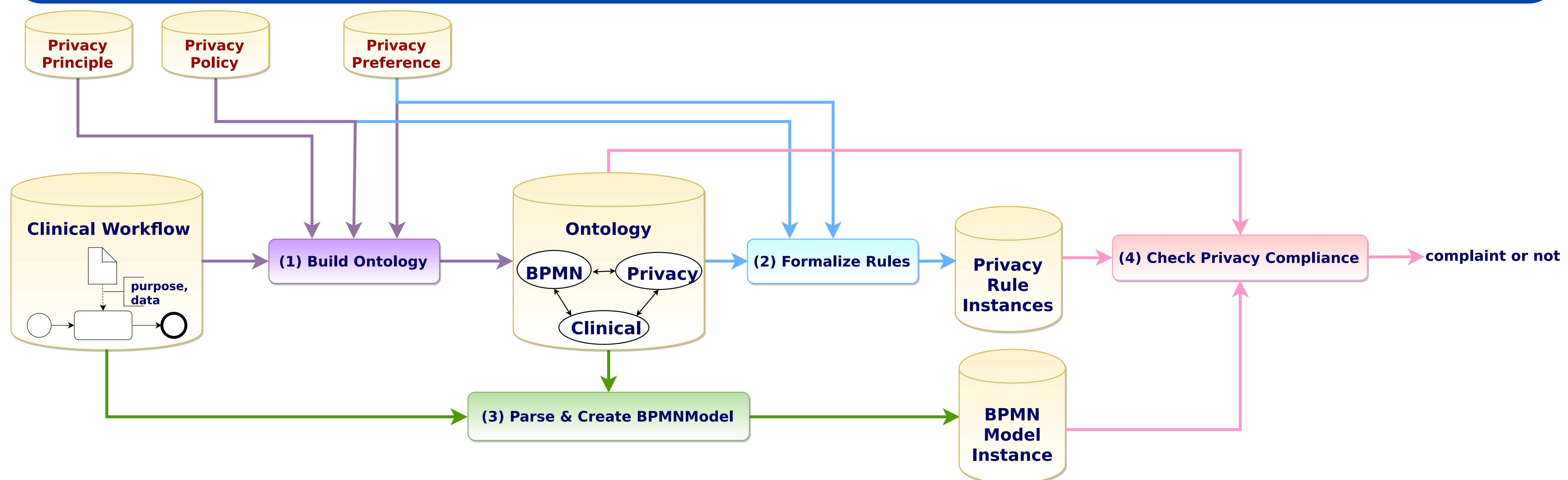
## Problem Statement

A clinical workflow might be vulnerable to privacy violations due to sensitive patient data accessed by multiple healthcare providers. Our research aims to detect the possible privacy violations.

Privacy-aware Workflows are compliant with:

- **privacy principles** based on the European Union General Data Protection Regulation,
- **privacy policies** provided by healthcare providers, and
- **privacy preferences** of data subjects (patients).

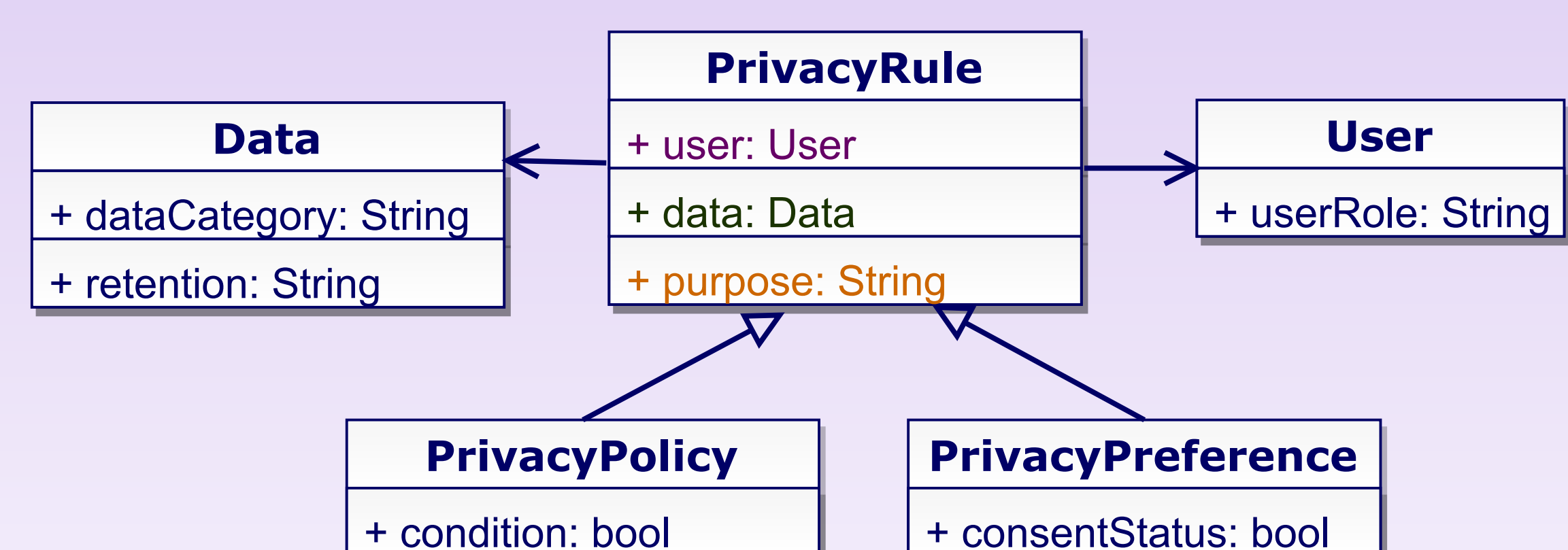
## Approach



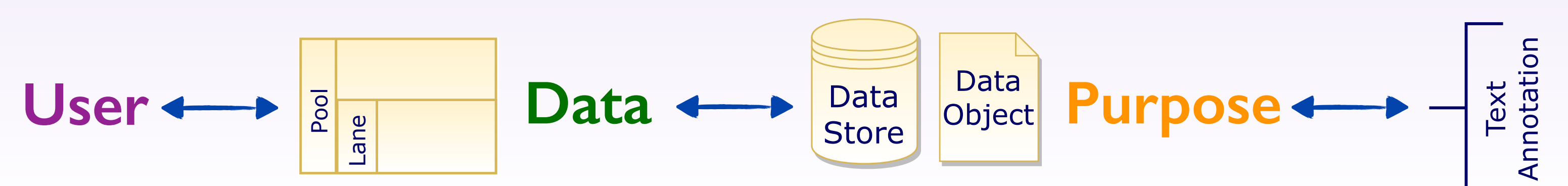
### (I) Build Ontology

- generating the *Privacy Ontology* by examining **privacy principles**, **privacy policies**, and **privacy preferences**
- generating the *BPMN Ontology* by adapting the BPMN 2.0 Ontology<sup>1</sup> with new data-related concepts
- generating the *Clinical Ontology* by examining the clinical workflows
- mapping between *Privacy*, *BPMN*, and *Clinical* Ontologies
- creating Java Classes for each UML ontology class

Ontology for main components of privacy rules:



Mapping between privacy concepts and BPMN elements:



### (2) Formalize Rules

- **Privacy Rules**: Natural language rules from **privacy policies** and **privacy preferences**
- generating **PrivacyRule** Java Instances from the **Privacy Rules** on top of the ontology

### (3) Parse & Create BPMNModel

- parsing BPMN-based Clinical Workflow
- creating **BPMNModel** Java Instance on top of the ontology to prepare it for the privacy compliance check

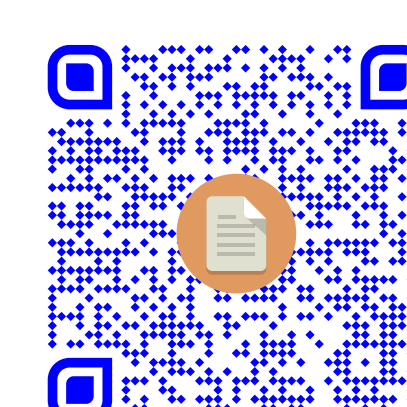
### (4) Check Privacy Compliance

- creating rules with Drools Rule Language (DRL) for each **privacy principles** proposed
- implementing Rule Engine by Drools Business Rule Engine for the privacy compliance check



<sup>1</sup>Natschläger, Christine. "Towards a BPMN 2.0 ontology." Int. Workshop on Business Process Modeling Notation. Springer, Berlin, Heidelberg, 2011.

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