BPAL: A Platform for Managing Business Process Knowledge Bases via Logic Programming

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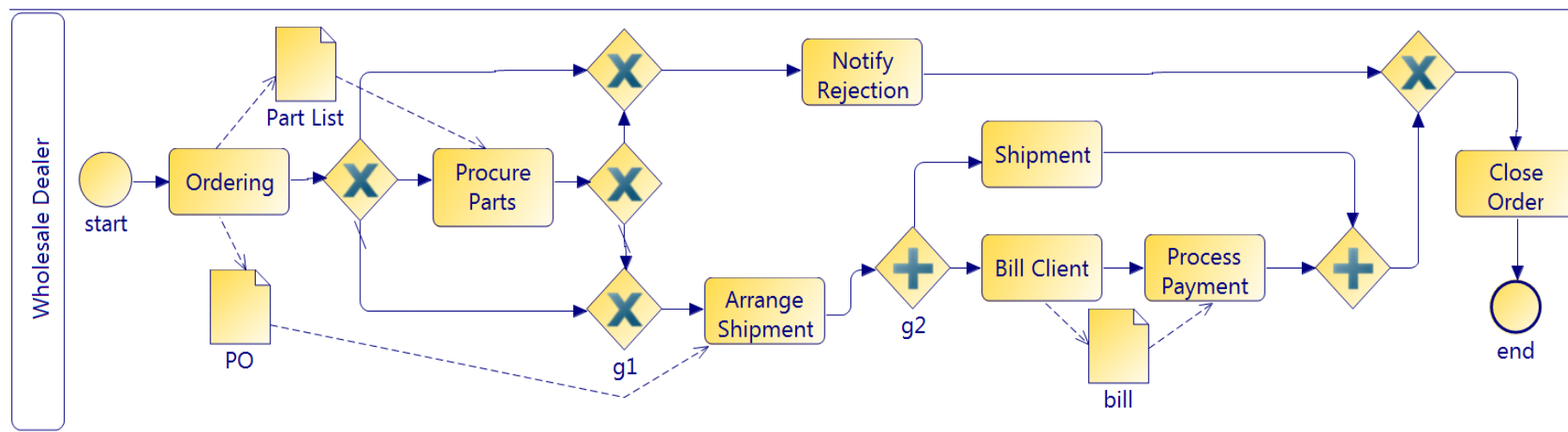
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Business Processes

- *A **Business Process** (BP) consists of a set of **coordinated activities** that are performed by an organization in order to achieve a **business goal**.*

- Graph-based notations to represent **activity workflows**
  - E.g., **BPMN**, EPC, UML Activity Diagrams

Semantic Lacks in BP Models

- Notations used in practice lack a formal **behavioral semantics**
  - ambiguities in the interpretation of models
  - translation into formal models needed to enable automated analysis

- The **domain knowledge** about activities, actors, and objects is not modeled
  - no adequate specification of the domain-related terminology
  - behavior of individual activities given in terms of input/output only

1. Analysts have to take into account **implicit/informal knowledge** to
   - consistently interpret and (re-)use BP models
   - verify that a BP actually behaves as expected

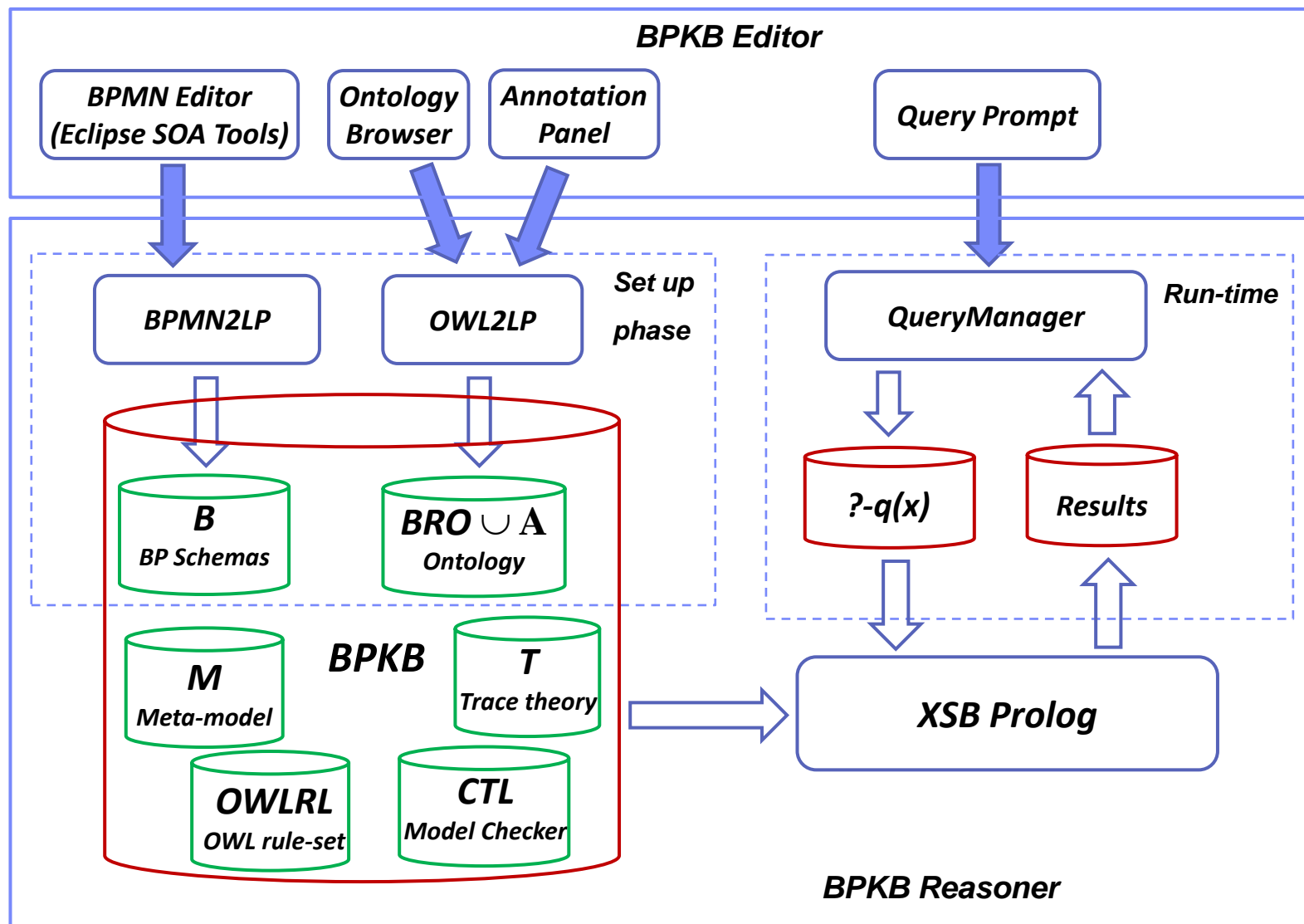2. Semantic **interoperability issues**

LP-based Uniform Framework

- An LP language for representing a relevant fragment of BPMN
  - Representation of the **workflow** graph as a set of **LP facts**.
  - Representation of the **meta-model** as a set of **LP rules**.
- **Behavioral semantics** formalized via a specialized **Fluent Calculus** (an LP-based action language).
- **Semantic annotations** w.r.t. an **OWL-RL** ontology (which has an LP translation)
  - ontology-based definition of **terminology**
  - **preconditions** and **effects** of activities within a BP
- **Reasoning** services
  - **CTL temporal reasoning** formalized in **LP**
  - Composite **reasoning tasks** (involving workflow graph, behavior, ontology) specified as **LP queries**

Platform Functionalities

@ Business Process Knowledge Base Management

- BP modeling and annotation

@ Enactment

- Trace generation and compliance

@ Verification

- Checking properties of operational behavior *and* semantic annotation

@ Compliance

- Checking domain specific business rules

@ Retrieval

- Querying process fragments described in a declarative way

@ Composition

- Completion of a BP *skeleton* by subprocesses specified via *local* and *global* constraints

Software Platform

Applications of the Platform

◉ BPAL is being used as the main component of the BP knowledge management system in the following projects:

- EU FP7 *Business Innovation and Virtual Enterprise Environment* (BIVEE): modeling of production processes in manufacturing oriented networked-enterprises

- Joint CNR – SOGEI project for modeling processes that implement norms in the tax domain

Demo….