Use of Ontology for Solving Interoperability Problems between Enterprises

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LIU Hui

E-mail: brian_cose@hotmail.com

Directors: Jean-Pierre BOUREY

Anne-Françoise CUTTING-DECELLE

LM²O

Laboratoire de Modélisation et de Management des Organisations
Ecole Centrale de Lille @ France

Agenda

- Introduction
  - PBMEI
  - BizAgi
  - ILOG JRules
- Two variants for PBMEI
- Elaboration of ontologies in PBMEI
- Contribution and future work

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- # Introduction
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- Two variants for the proposed method
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Introduction

- The interoperability problem can take place between distributed and heterogenous information systems (IS) which belong to several enterprises or internally to only one enterprise.

- (Chen *et al.,* 03) : three key domains
  - Enterprise Modelling;
  - Architecture & Platform;
  - Enterprise Ontology.

Data Heterogeneity

- Structural Heterogeneity
  - XML, SOAP, EAI, ESB/SOA

- Semantic Heterogeneity
  - Ontology
    - Role/Architecture of Ontology
    - Ontology representation
    - Ontology mapping (discovery, representation, reasoning)
    - Ontology Engineering

Process-based Method for Enterprise Interoperability (PBMEI)

- – Development mode of IS
- – Limitation of workflows
- – Advantages of web services

For obtaining agility and flexibility, it's better to describe the interoperability business requirements by service-related business process, named collaborative process.
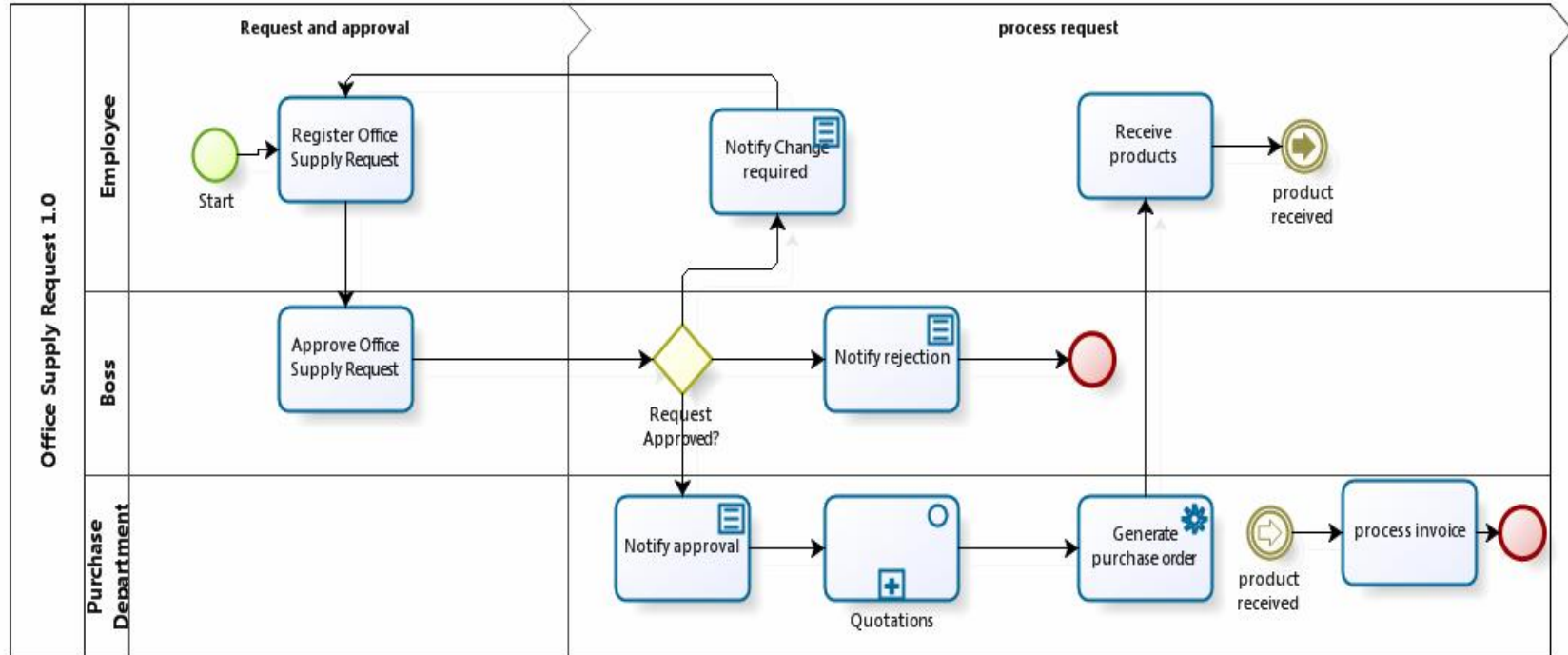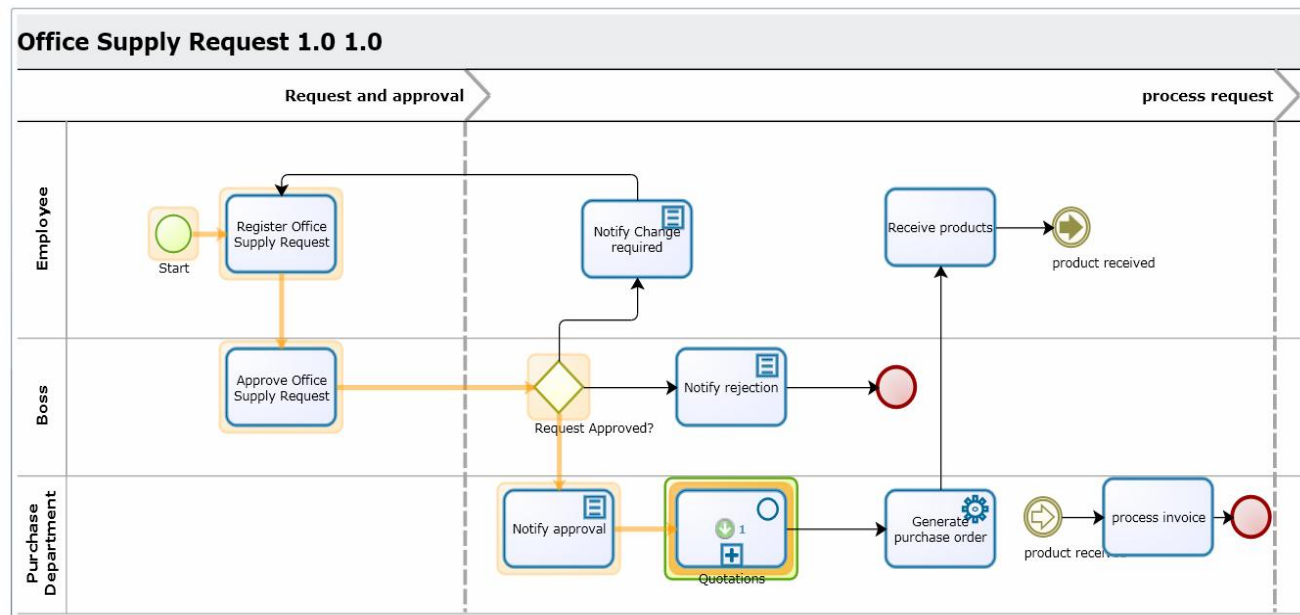
PBMEI
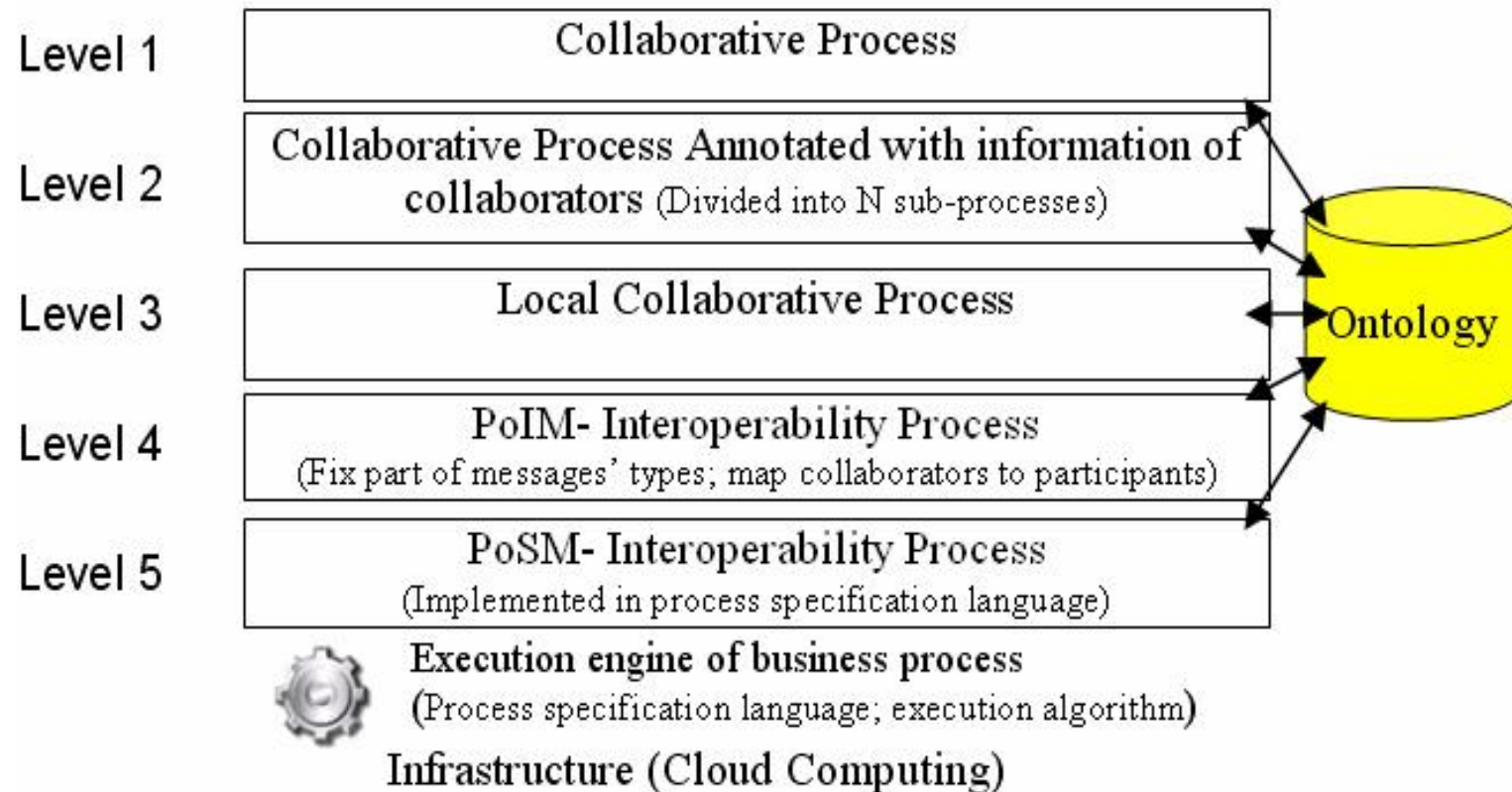
BizAgi

- One of the BPM Solutions;

- Enable to model, execute and improve the business process through a graphic environment and without the need of programming;

- Based on BPMN specification v1.1/1.2

«Office Supply Requirement» in BPMN by BizAgi

Results of the execution of the precedent process

Proposed methode by BizAgi

Edit business process in BPMN

Create data models

Construct forms for normal tasks, user tasks and related events

Create business rules for the gateways; construct assignment expressions and scripts

Assign tasks to performers

Integrate web services

Lessons from BizAgi

- Do the interaction between external users and the execution of business processes

- To make the BPMN business process executable, the information (about data models, forms, business rules, assignment expressions, scripts, performers and web services, ….) are necessary.

Limitations of BizAgi

- Process is executed on **one** server and accessed by several users

- Not based on ontology (can't resolve the semantic differences of exchanged information)

Merge business rules

- In the models of business process, the decisions of enterprises are always encountered and, normally, they will be realized by business rules. Hence, in our proposed method, business rules must be considered.

- After having analysed a widely-used BRMS - ILOG JRules, we have formalized its layer structure
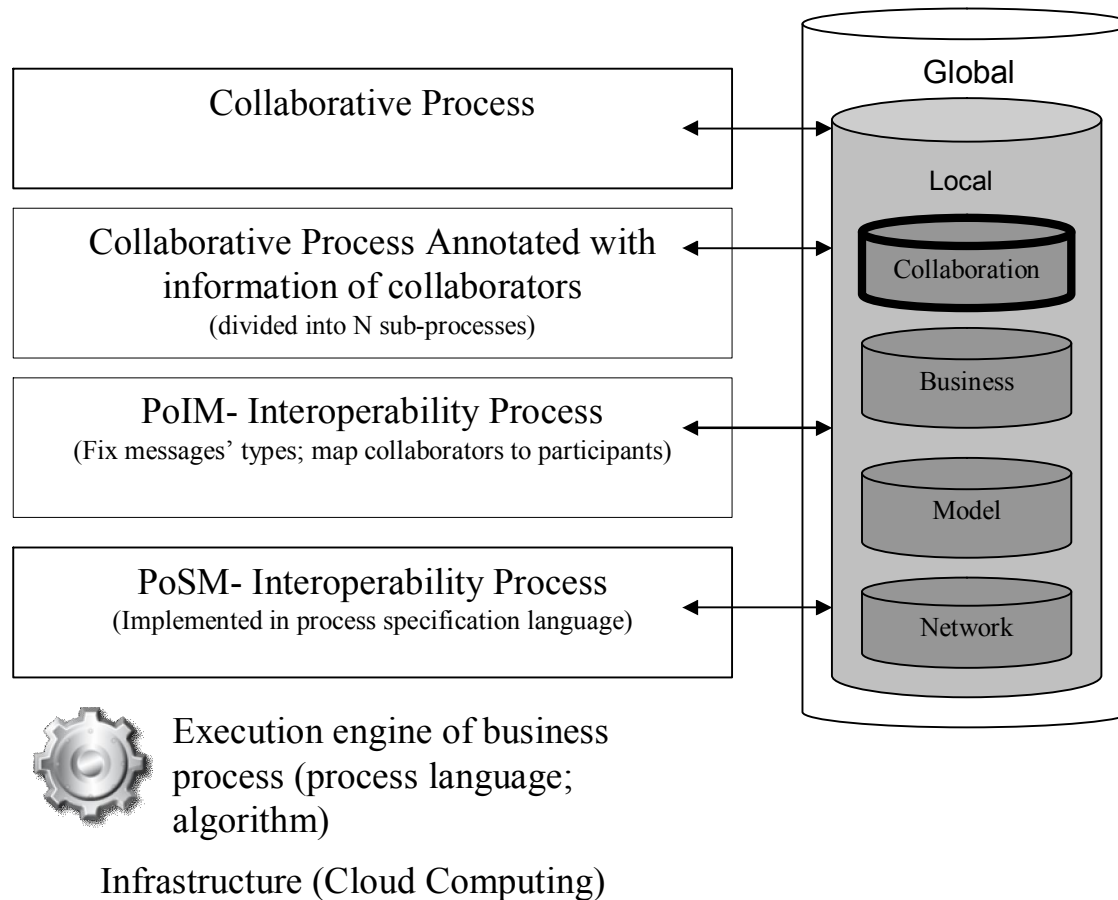
BRMS
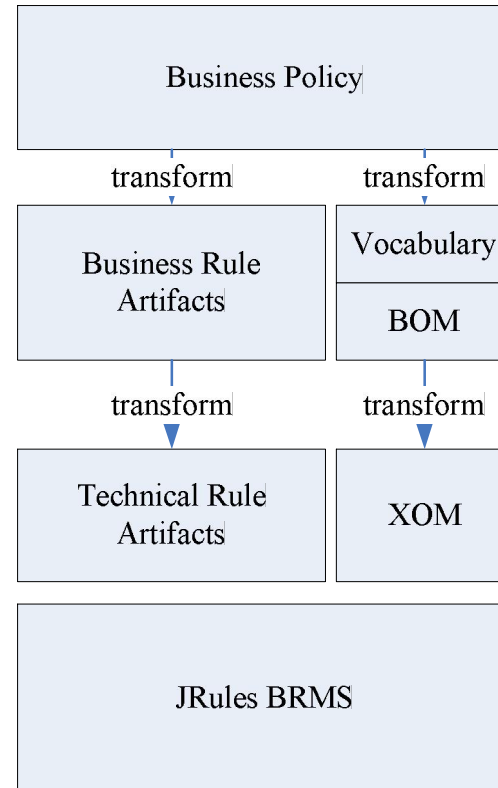
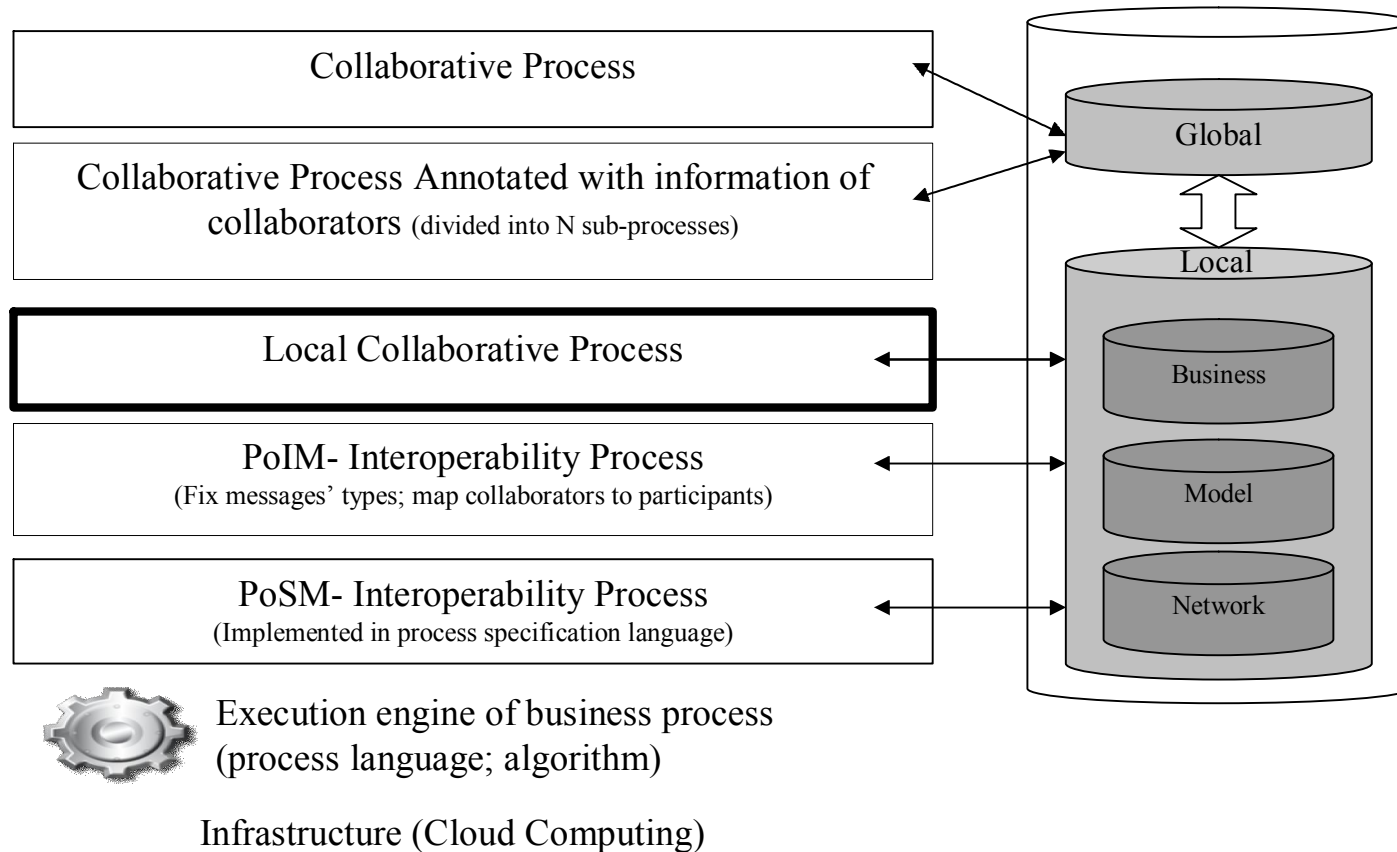Layer Structure of ILOG JRules

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PBMEI for collaboration **with** a core cooperator

Collaborative Process

Collaborative Process Annotated with information of collaborators
(divided into N sub-processes)

PoIM- Interoperability Process
(Fix messages' types; map collaborators to participants)

PoSM- Interoperability Process
(Implemented in process specification language)

Global

Local

Collaboration

Business

Model

Network

Execution engine of business process (process language; algorithm)

Infrastructure (Cloud Computing)

PBMEI for collaboration **without** a core cooperator

Collaborative Process

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Local Collaborative Process

PoIM- Interoperability Process (Fix messages' types; map collaborators to participants)

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Ontology

The mapping is for data in different ontologies.

three levels of mappings:
•between languages (metamodel)
•between concepts (model)
•between data (objects)

Ontology		Content	Mapping
Global		• information about all the collaborators: name, business roles, and postal address, email address, network address, offered business services, published web services and related statistical information about their offered services (e.g., QoS, trust rank), etc • common business object model • specification language for collaborative processes and business policies • collaborative process, collaboration policies	
Local	collaboration	• information about all the collaborators: name, business roles, and postal address, email address, network address, offered business services, published web services and related statistical information about their offered services (e.g., QoS, trust rank), etc • information about services published by other collaborators • collaborative process, collaboration policies	
	business	• all business concepts in its own domain and relationships • local business policies • local collaborative process • organizational information	Mapping to/ from global ontology; Mapping to model ontology;
	model	• formal descriptions of business concepts, their relationships • formal descriptions of business rules and technical rules • formal descriptions at different levels about the architecture of an enterprise information system • formal descriptions about all physical components of enterprise software systems • Interoperability processes at "PoIM" and "PoSM" levels	Mapping to business ontology; Mapping to network ontology;
	network	• deployment information of all software components in an enterprise information system	Mapping to model ontology

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Example of the Global Ontology in PBMEI

Data storage in ontologies

- **Real Storage:** data are expressed in ontology language and stored directly in ontologies;

- Virtuel Storage : real data are expressed in traditionnal language and stored on a **specific** server; however data in ontology **are only the descriptions of data;**

- For example, business rules can be expressed in IRL (ILOG Rule Langage) and stored and managed in a BRMS server, however local ontology just has the ontology-based descriptions for business rules.

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Contribution

- Analyze BizAgi BPM Suite, ILOG JRules

- Add ontologies in PBMEI

- Propose two variants of PBMEI

- Propose an overview of the contents in different ontologies

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PRO-VE

Future work

- Apply our method to a real case of collaborative processes (ASICOM)

- Research in detail how to validate whether a collaborative process is based on a designated ontology

- Research how to support process transformation according to horizontal ontology mapping between collaborators

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Hui Liu, Anne-Françoise Cutting-Decelle, Jean-Pierre Bourey