Scenario

Current *Business Process Management technologies* cover all the process life-cycle but still suffer from many *limitations* with respect to

- complexity
- maintainability
- degree of automation

One of the steps that need to overcome those limitations is the *Business Process Analysis*

- that focuses on the delicate phase of *studying, testing and evaluating existing and running systems and processes*
- with the aim of *identifying the current system state*, as well as *pointing out problems and bottlenecks, measuring key performance indicators* and *suggesting potential improvements*

Recent research initiatives aim at overcoming these limitations by *introducing Semantic technologies* in the process life-cycle
Introducing semantics

- We envision the future of **Semantic Business Process Analysis** based on the semantic enhancement of two prominent analysis methodologies:
  - **Reverse Business Engineering**
  - **Process Mining**
- The core of our approach is to **link the data necessary for the analysis with ontological concepts**, to lift the current analysis techniques from a label-based level to a concept-based level and to enable automatic processing and reasoning.
Current Business Process Analysis technologies

- **Process mining** mainly focuses on discovery-like kind of analysis based on *event logs* that contain data about the execution of these processes (How are the processes actually being executed? What is the organizational model for a given process? Where are the bottlenecks in processes?)
  - Control flow mining: discover the real performed processes
  - Organizational mining: find organizational-related information
  - Case-specific mining: auditing, bottlenecks analysis, ...

- **Reverse Business Engineering** targets scenario-based analysis using predefined business questions over *productive ERP systems* (Which parts of the processes are being used? How often? How many requests were received in the analysis period? How many requests were received from which customer/group?)
  - As-Is-Analysis: derive a model of the active and used system elements based on the analysis results
  - Continuous Improvement: gain information about gaps, exceptions or potentials within the system in order to redesign and improve it
Our approach in “semantizing” Business Process Analysis

a. the **creation of ontologies**, by defining an ontology framework that comprises the relevant concepts for events description and business questions formulation (tasks, data fields, performers, etc.)

b. the **semantic annotation of business processes** with the defined ontologies
   - by mapping at design time the business questions onto the concepts they refer to (e.g., processes, tasks and data fields)
   - by assuring that the execution logs will contain the references to those ontology concepts

c. the definition of **semantic versions** of existing PM and RBE techniques
Semantic Extensions

We propose five possible semantic extensions:

1. **Semantic Process Discovery**: the enhancement comes from the subsumption trees for the ontologies in event logs and process models.

2. **Semantic Organizational Model Discovery**: the enhancement comes from the automatic discovery of groups and teams in organizations, based on smarter inferences on tasks similarities.

3. **Semantic Auditing**: the enhancement comes from the ontologization of the validation properties, which can be defined in terms of (sub-)concepts in a log, enabling the re-use of defined properties and making the definition of these properties less technical.
Semantic Extensions (cont)

We propose five possible semantic extensions:

4. **Semantic Performance Analysis**: the enhancement comes from the use of semantic annotations to automatically identify bottlenecks in the system and violations of service level agreements.

5. **Semantic RBE**: the enhancement comes from the business question ontology which allows the generalization and reusability of RBE content and provides semantic analysis.
Conclusions

- Current Business Process Analysis techniques can benefit from the use of semantic information; this is possible by annotating the elements that are relevant for analysis with ontological concepts.

- The benefits are two-fold:
  i. by using ontologies and performing analysis at the concept-level, the proposed solutions reduce the gap between the management and the IT worlds in companies.
  ii. the use of ontologies greatly promote the reuse of analysis queries etc.

- This work is part of the SUPER European project.
Thanks for your attention.

Questions?

Irene Celino
CEFRIEL – Politecnico di Milano
Via Fucini, 2 – 20133 Milano (Italy)
email: Irene.Celino@cefriel.it
web: http://swa.cefriel.it