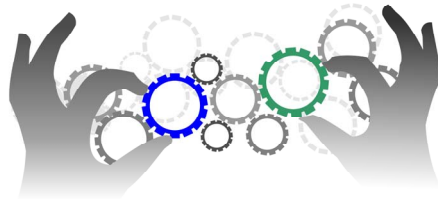**ONTORULE Annual Report**

ONTORULE

Ontologies meet Business Rules

www.ontorule-project.eu

The objective of ONTORULE is to enable users, from business executives over business analysts to IT developers, to interact in their own way with the part of a business application that is relevant to them.

We believe that one essential step towards achieving that objective is the ability to separate cleanly the domain ontology from the actual business rules, on the one hand; and the representation of the knowledge from its operationalization in IT applications, on the other hand.

Leading vendors of knowledge-based and business rules management systems and top research institutions join their efforts, in ONTORULE, to develop the integrated technology that will empower business professionals in the knowledge economy of the future.

Two large industrial companies are the test beds that will ensure the success and business impact of the technology.

Summary of Activities

The first year of the project has been devoted to building firm foundations for ONTORULE : the objectives were to set up the bottom-line, to verify the feasibility of the approach and to develop public demonstrators for the three dimensions of acquisition, management and use of knowledge.

During the second year, we focused on improving the usability of the technology and methodology used and developed in ONTORULE; to demonstrate the feasibility and benefits of the approach – and to learn from the experience; and to extend the demonstrators develop during the first year. Specifically:

- a first version of the use case application has been developed and evaluated. These prototypes have provided a support of choice for the analysis of technical issues and for our work on the platform's usability;

- on the acquisition methodology and tooling side, we have explored extensions of business model validation using the language of the business executives and the extraction of candidate rules from text;

- with respect to knowledge management, the focus has been on managing the interdependency between rules and ontologies, with development regarding the edition of rules grounded in ontologies, consistency maintenance, as well as navigation and documentation across various sources and representations;

- we have pushed further the technology for combined rules and ontology execution and we have started exploring tight coupling;

- and, of course, we have developed a second iteration of all the prototypes, an initial version of the public showcase demonstrator, and we have made progress regarding the architecture of integrated platform

Next year, building on these foundations, we plan to develop the first effective version of the ONTORULE platform, and to implement the initial prototypes of the industrial use case applications.

The prototype of the public showcase

The ONTORULE project has produced a prototype consolidated showcase demonstrator of its technical workpackages. The intention of the demonstrator, at this stage, is to show the potentials of the results of ONTORULE and give an outlook on what can be expected at the end of the project.
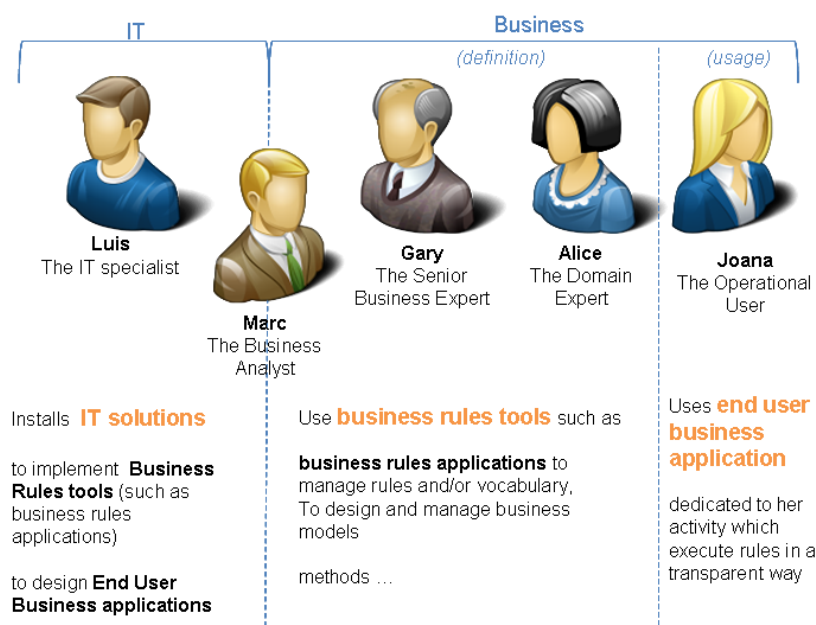
An important input to all the other work done in ONTORULE, be it about methodology, technology or the use cases, is our research on the usability of the platform.

The definition of proto-typical user profiles for the different functions, also known as *personas*, is at the core of our approach to usability. The current set of users personas defined for ONTORULE is presented in the figure, left.

The personas are used, also, to describe the interactions with the showcase demonstrator. Notice that the personas are still evolving, in particular as a result of the evaluation of the use case prototypes.

The demonstrator is built on a scenario from the, so-called, CAx use case, provided by project partner AUDI.

Let us, first, describe the pilot application.

One of the first steps in the development cycle of a new car model is to define attributes, i.e. features that can be experienced by customers, like driving comfort, safety or sportiness that the desired car has to fulfil. These attributes are listed in catalogues, consisting of different detail levels describing the car's requested and mandatory behaviour in various granularities.

At a later stage in the development cycle engineers begin to construct new or modify already existing Computer Aided Design (CAD) models that have to comply with the high expectations. Parts of these models are then used in simulations (Computer Aided Engineering (CAE)) or serve as a model for the physical parts which are tested in Computer Aided Testing (CAT). The different CAx Methods either ensure that the desired attributes are achieved or that legal requirements are fulfilled.

The purpose of the application is to help answer questions regarding the relations between different methods and attributes. An example of the questions of interest is: *"Which tests are*

required to give clearance for some attribute?" (in the demonstrator, this would be an attribute related to the frontal protection). Attributes are linked via a CAx function to different CAx methods that test the desired behaviour.

The overall architecture of the showcase demonstrator is shown below. It contains the prototypes used to demonstrate the benefit of parts of the current status of ONTORULE development. At this stage, the interchange between tools is realised on a file interchange basis, using standards like OWL and RIF. Additionally we are using SBVR for representing business vocabularies and business rules during the modelling stage.

The different users of the platform are represented by the corresponding personas.
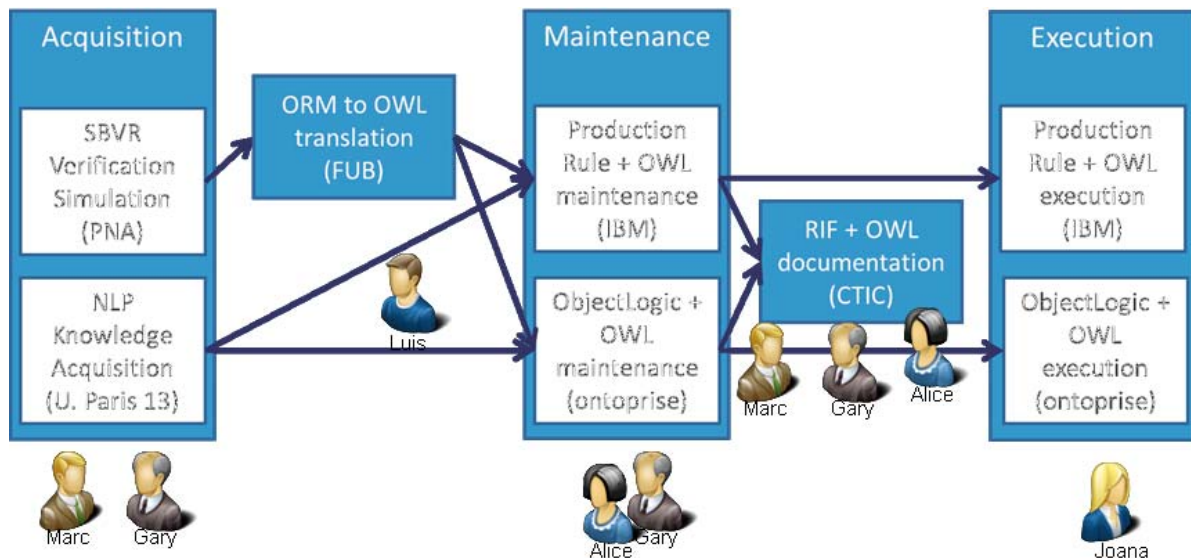
Simplified diagram of the showcase demonstrator, with interacting personas

ONTORULE uses SBVR models and document analysis, using natural language processing (NLP), to extract and acquire knowledge from documents and experts. The result of the acquisition phase will be OWL ontologies that represent the vocabulary, and a complete and validated model of business rules represented in SBVR. In addition, candidate rules are provided as a result of the analysis of policy texts, using NLP technology.

In the next step, the candidate rules extracted from natural language text (in the showcase demonstrator, European regulations) can be further edited, new rules can be authored, grounded in the OWL ontology, consistency of the acquired knowledge can be checked, using the very technology that is developed in the project for combined rule and ontology execution purposes. Notice that Luis, the IT specialist, is still required to deploy the acquired rules into the execution environment, whereas ontologies, being either represented directly in OWL in the acquisition tool, or translated automatically from SBVR to OWL, are consumed in the maintenance and execution components without Luis's mediation. One objective will be to remove Luis as much as possible from the chain.

The demonstrator showcases, also, tools to navigate the dependencies between the different forms of knowledge: rules and ontology, executable knowledge and its textual sources, etc; as well as a toll to document rules and ontologies represented as RIF and OWL files, respectively.

Eventually, the user, in the role of Joana, the operational user, will run the resulting decision-support application. Depending on the properties of the application and of the rules, the developer has a choice between two different technologies: one prototype based on an extension of logic programming, and a prototype based on an extension of a production rule engine can be used to combine rules and ontology for the purpose of decision support.

Like all public deliverables of ONTORULE, the showcase demonstrator and its documentation can be downloaded from the project Web site.

Standardization

Standards are at the core of the ONTORULE vision and they are used everywhere in the ONTORULE architecture: the main deliverable of the ONTORULE project, that is, the specification of the ONTORULE platform, will be specified entirely in terms of open standards.

It is, therefore, essential to the success of ONTORULE that existing standards that might be useful to the project's purpose be identified, as well as areas where ONTORULE will require interchange or interoperability amongst functions or modules, but no open standards exist.

To contribute to that purpose, ONTORULE continued to publish a periodic standards monitor. Moreover, the approach chosen by ONTORULE is to engage actively in standardization efforts, even to take leadership positions, where open standards under development are most likely to be useful and where new standards will be required.

In accordance with the project strategy, project members participated in (and chaired) the W3C rule interchange format (RIF) working group, that published 6 recommendations in 2010, are active members of the OMG SBVR revision task force, and are leading the initiative to specify a standard decision model and notation (DMN) at OMG.

In addition, ONTORULE has specified a superset of SKOS-XL for the purpose of text encoding and linguistic information exchange (TELIX). That specification will be proposed for standardization, if the broader community is interested.

User Involvement, Promotion and Awareness

The ONTORULE project is actively promoted in academic and business conferences, such as the European Semantic Web Conference, Semantic Technologies, or the Business Rule Forum.

In addition, ONTORULE organises tutorial and workshops: the first ONTORULE tutorial was co-located with the 7th Extended Semantic Web Conference (ESWC 2010); the second one was co-located with the Twenty-Fourth Conference on Artificial Intelligence (AAAI-2010). ONTORULE organized, also, a scientific workshop, called BURO2010 (First International Workshop on Business Models, Business Rules and Ontologies□), and co-located with the Fourth International Conference on Web Reasoning and Rule Systems (RR2010).

In 2011, ONTORULE will be present, at least, at SemTech, RuleML and RR.

Future Work

The final year of the project will be focused on integrating the methodology and technology developed in the project, to deliver the specification of an ONTORULE platform, for implementation by the broader community.

Another focus will be on testing and validation, based on the development and the evaluation of extended versions of the pilot applications, in ArcelorMittal's steel use case, and in AUDI's CAx use case. The final public showcase of the project will be based on scenarios excerpted from the pilot applications.

In parallel, and based on the feedback from the use cases, and the broader community, we will continue to improve ONTORULE's underlying technology, with a special focus on distribution and scalability.

Further Information

Stay updated about ONTORULE progresses, on [www.ontorule-project.eu.](www.ontorule-project.eu)