ATHENE Modelling environment

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Abstract: This paper introduces the graphical modelling environment ATHENE. It describes the basic idea of modelling ontologies by means of domain specific model types and generating a central repository. Further more, the implementation approach, experiences and potentials are emphasised.

1 Introduction

This paper introduces ATHENE, a graphical modelling environment that allows to model ontologies using domain-specific modelling notations.

Semantic models offer a great potential to support knowledge management in companies. Important application examples are information retrieval from weakly structured sources and the management of business processes. [HT06] provides an overview on approaches for the first, [HR07] an introduction in the latter area. To create semantic models (i.e. ontologies) with existing tools is a difficult task which requires in-depth knowledge on semantic formalisms. This is the first challenge, ATHENE addresses: Domain experts should use methodologies they are familiar with. For example a business process or an IT infrastructure can be modelled with a common notation whilst ATHENE internally generates an ontology instead of having business people struggling with it.

A second challenge is the implementation of a central repository and the integration of modelling and model-type definition. ATHENE allows for defining new types of models and their instances. All specified elements may be used or referred to in several types of models but all possibly interrelated models are stored in a common database. Thereby a large and rather complex knowledge structure arises that should allow for creating an integrated enterprise ontology.

The next section describes basic principles of ATHENE's implementation. Afterwards, present results and experiences are presented. Finally, the last section shows potentials and future works.

2 Implementation approaches

To facilitate customised model types for different domains ATHENE implements a meta-modelling approach as described in many sources [e.g. KK02, GKP98]. The top level of abstraction is an explicit meta-meta-model (meta^2 model), represented as ontology [HNT07], defining the meta-modelling language. With the meta-modelling language, meta-models can be defined which in turn represent a specific modelling language. In contrast to other meta-modelling approaches, ATHENE does not generate program code to build a domain specific modelling environment out of meta-models but interprets the meta-model specification. Therefore meta-models can be applied to create models immediately once they are defined.

Additionally, the approach allows to use the elements of a meta-model in several types of models. This is a first step towards interrelation of models: each element in the model is interpreted as an instance of the corresponding meta-model element and thus, two apparently independent models relate to the same concept. For example a process diagram may use the model-object organisation unit as well as an organisational diagram, whereby corresponding elements in these models will refer to the same concept.

By the described relation and also by explicitly referencing between elements of different models, besides the isolated view on a single model, also one large model becomes computable. Activities of a process model may for instance refer to IT-infrastructure elements, documents, organisational concepts or even to a subprocess model.

This may be used for analysing dependencies and relations and, considered as enterprise knowledge repository, serve as input for other tools supporting knowledge management.

3 Present work and results

The current implementation of ATHENE allows for defining simple meta-models and their elements regarding their visual representation and content. Beneath a hierarchical structure of elements each element may have attributes, textual or numerical values for example.

For specifying the visualisation of elements, a set of properties are available. It is possible to select geometric primitives like rectangles or circles and properties for colours and line styles. Also images may be used as representation.

Experiments with ATHENE have shown the possibility to model processes using an easy to use graphical user interface (e.g. representing the BPML) whereas in the background – hidden from the business user – all components (instances) are stored in OWL.

However, these experiences have shown that the integration of abstract syntax (concepts) and concrete syntax (notation) leads to several disadvantages. Information on visualisation is not substantial part of the concepts which are represented by an element in a model. For example, the size or position of an image for the concept "task" have no bearing on the element's meaning. If several models point at the same element, integrated information on e.g. the size or position require a separate instance which actually means the same thing. Thus it is even not possible to have an element which represents a class on model level. In particular for these reasons we are currently implementing a new concept by mapping the abstract and visual elements.

4 Future works

One of the most fundamental goals of ATHENE, which is to generate ontologies based on domain specific models, has rudimentarily been reached. Even though, ATHENE gives ample scope regarding semantic development as for example in the area of modelling rules, import and mapping of domain ontologies and regarding the support of different expressivity levels. Also the possibilities of defining visualisations may be improved.

Another major objective is to provide the basis for an enterprise repository, a large company-wide ontology. Future research will therefore deal with requirements and contents as well as exploring analytical possibilities within and outside the modelling environment.

Literature

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