USING OF THE ONTOLOGY IN BUSINESS PROCESS MODELLING DOMAIN

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ABSTRACT

The Business Process Modelling is a relative new discipline or technology that provides a suitable tool for managing and simulating processes. It usually denotes the first step (initial phase) of the software development process. Next phases of software development processes are requirements specification, analysis, design, etc. And just BPM is a critical place of the whole process, because there is not any general foundation and manner how model and describe business processes from different application areas and different aspects, yet. One of the possibilities is applying of Ontology analysis and engineering manners to find or create of a suitable universal model for representation of business process, that will be able to capture the essence of the different aspect of business process modelling, first of all constructs, elements, properties, attributes and relations of business processes with take into consideration specific conditions of each part of business domain. The main goal of this work is to draw attention to an importance of ontologies for Business process domain and point out a way how we can apply it to manage software development processes, also, with allowance to their special requirements.

In this context is appropriate to point the fact out, that there is no common formalism of elements or constructs of business processes, too. Many of ontologies are formalized by UML class diagrams showing the different concepts and their relations. Besides a nice graphical illustration of the ontology, the use of UML provides a technical basis for defining interfaces that must be met by concrete formalisms in order to implement a particular aspect. Thus the second output of this submission is a practical demonstration how we are able to model business processes with application of ontology. Concretely the illustrative case will be found just on UML class diagrams and will be presented in conclusion of this work.

1 ONTOLOGY AND ONTOLOGICAL ENGINEERING

A term *Ontology* in IS domain is only a bit relate to philosophy term of Ontology. In philosophy the Ontology is perceived as a science about existence, possibly as universal knowledge system describing objects, phenomenons and natural relations of world in his actual form. That means no more than dependence on human judgment about it. Ontology as a subject of a practical Ontological engineering describes something what exist and thus it can

be represented in information/knowledge system. For example T. Gruber, one of the ontology founders, perceives ontology as *„a specification of conceptualization*“ [3] or according to modification of W.Borstem: *„…formal specification of sharing conceptualisation*“ [1]. By the first mentioned definition is the main requirement on conceptualization to specify it explicit. (e.g. system of subjects modeling specific domain of world). By the second one is more important using of formalisation, e.g. language using with strictly specified syntax or semantics and on shareability, too, because ontology is not an individual thing, but it is a result of consensus of some interest people group.

Wickedly knowledge engineering is possibly ontology used in development process of knowledge application to understand it as knowledge models, thus abstract descriptions of some knowledge system, which are relatively independent on final representation and implementation of knowledge. The main is, it is concerned on models sharable with more processes (e.g. software agents) in scope one application and reusable for different applications, which can be separate in time, space and personal, too.

Ontologies and ontological engineering have received much attention in the business systems analysis and design literature over the last decade. Ontology is a well-established theoretical domain within philosophy dealing with identifying and understanding of the real world elements and their meaning. The usefulness of ontology as a theoretical foundation for knowledge representation and natural language processing is a fervently debated topic at the present time in the artificial intelligence research community.

The main purpose of the *Ontology* and *Ontology engineering* is a formally correct specification of concept of a representative subject domain at first, but it is important in domain of general languages development, methodologies and software tools. It means the summary of notions and relations among (mutually) them, expressed in formal language, thus ensure appropriate structure and data content. Previously was ontology one of lots orientations (directions) of knowledge engineering, but primarily on theoretical level. Real applications were seldom and very simplified.

In brief ontologies are targeted on support of understanding between people (e.g. experts and knowledge engineers), support of communication - interoperability between computer systems and proposal facilitation of knowledge oriented applications. In these roles is ontology applied to wide scope of problem domains and tasks.

Ontology has a lot of similar properties to ER (Entity Relationship) modelling and OO (Object Oriented) approach, however there is an array of specific properties. First of all ontology does not give evidence of a data structure, but of objects of the real world. Using formal languages guarantee the correct derivation of construct defining affiliation to classes/concepts with arbitrary level of abstraction. Further in comparison with Object models place emphasis on more faithful semantics comprehend of real world, and in reverse lesser on efficiency of data processing. The application of machine has formula character derive with precisely defined logic calculus. For object oriented developer is ontology formation relate with surprise features.

Ontology focuses on development of general languages, methods, methodologies and software tools, on the other side on construction of the own ontology describing different subject domains and applications, which will use those. An essentials interest accumulation in ontology occurred in connection with enlargement www in commerce domain.

2 ONTOLOGY IN BUSINESS DOMAIN

The modelling and formulation of business processes has received considerable attention in the research community. More and more researchers are interested in ontology theories application as a basis for their work in the conceptual modelling domain. A grow number of them continue in research phase, but only on theoretical background. The main purpose of it is to find a correct way how to model real world, which is able to reach of interoperability IS. In fact this IS domain is still in its foundations and await its growth – boom [3].

One of the possibilities how we can apply an ontology in Business modelling domain is verifying of business process models, or more general said using of it in IS development domain – especially of conceptual models of some specific application domain. Further ontology offers a set of concepts to system modelling and causes of their behaviour – characteristics.

2.1 FOUNDATIONAL ONTOLOGY

A foundational ontology allows design basic concepts for building any domain-specific ontology. It defines a range of top-level domain-independent ontological categories, which form a general foundation for more elaborated domain-specific ontologies. Foundational ontologies can be used to evaluate conceptual modelling languages and to develop guidelines for their use. Business modelling can be viewed as the main application domain of conceptual modelling languages and methods. In the model-driven architecture approach of the Object Management Group (OMG), a business model is called a “computation-independent mode” because it must not be expressed in terms of IT concepts, bud solely in terms of business language. The business domain, since it contains so many different kinds of things, poses many challenges to foundational ontologies [3].

2.2 A UNIFIED FOUNDATIONAL ONTOLOGY (UFO – A, B, C)

First of all is necessary to give notice that these problems are very extensive and complicated, that is why the next text only in brief describes the main points and remarks of this approach with reference to needed bibliography. In conclusion this part is shown an example of UFO Ontology application.

This ontology was created on basis of two significant ontologies, GFO/GOL, which is the general formal ontology and OntoClean/DOLCE, which is an ontology of particulars, in the sense that its domain of discourse is restricted to them, see [4]. This two ontologies offer more construct that are relevant to conceptual modelling than the other foundational ontologies.

While their main areas of application are natural sciences and linguistics/cognitive engineering, respectively, the main purpose of UFO is to provide a foundation for conceptual modelling, including business modelling.

An UFO represents a synthesis of a selection of foundational ontologies. It was designed to obtain a foundational ontology that is tailored towards applications in conceptual modelling. For this is necessary to capture the ontological categories underlying natural language and human cognition that are also reflected in conceptual modelling languages such as ER diagrams or UML class diagrams.

UFO is divided into three incrementally layered compliance sets: 1) UFO-A defines the core of UFO, excluding terms related to perdurants and terms related to the spheres of intentional and social things; 2) UFO-B defines, as an increment to UFO-A, terms related to perdurants; and 3) UFO-C defines, as an increment to UFO-B, terms related to the spheres of intentional and social things, including linguistic thing [3].

2.3 AN INSURANCE EXAMPLE IN UFO-A ONTOLOGY

In many business information systems, both individual products and product types have to be represented. In this case, their product individual type, whose instance are identified with the help of consecutive numbers, is classified by the corresponding product model type, which is a second order classification type, whose instance are subtypes of the product individual type.

As an example was chosen an insurance process, on which is presented UFO-A Application. There are used an insurance and insurance different types (a simplified model). How you can see on the picture, there is one basic individual product, in this case *Insurance*, and five basic product types, which are represented here as: *Automobile*, *Life*, *Property*, *Travel* and *Liability.*

Each of this product types can be furthermore specified by classification type, e.g. 541MH : Insurance, InsuredSubject = Car (in the case of Automobile type).

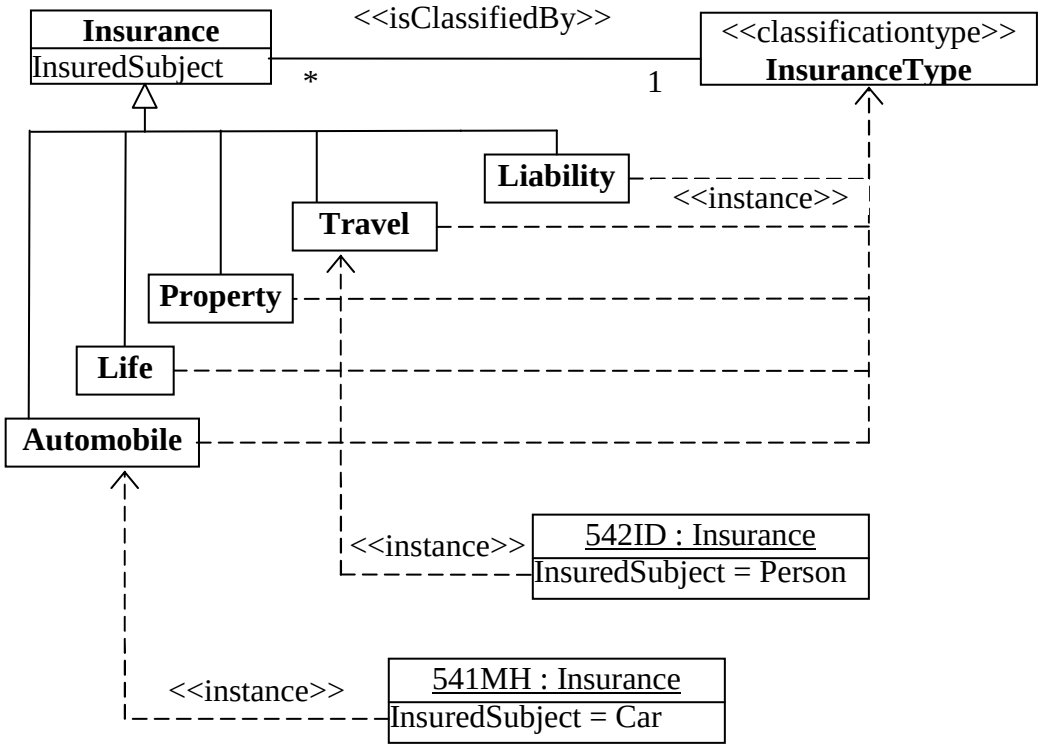

Fig. 1: *UML product modeling with UFO-based stereotypes*

As mentioned above UFO-A Ontology is able to describe to all intents and purposes whatever product of a business process, with using of a graphical friendly modelling language UML, especially of class diagrams. Of course, the reality of this case can be much more complicated, but the main aspects of this ontology-driven model are apparent.

3 SUMMARY AND CONCLUSION

In this paper was presented one of the possibilities of ontology application in Business process modelling domain. In concrete there was presented UFO-A ontology in Insurance example. There is much more cases how we can use UFO Ontology in business systems, but for an illustration was chosen above mentioned problem of product modelling.

This is an appropriate tool for business process modelling domain, because of many constructs conventionalized the complexity of different business processes. And that is why UFO was selected to this purpose.

The next work will be targeted to more concrete and detailed proposals of applicability to UFO ontology, not only to UFO-A in business systems and verification of this models.

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