UMM Add-In: A UML Extension for UN/CEFACT's Modeling Methodology

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1 Introduction

In recent years a change took place in the area of business process modeling. Modeling inter-organizational processes became more and more popular. This requires a new methodology especially designed for modeling inter-organizational business processes. The United Nation's Centre for Trade Facilitation and Electronic Business (UN/CEFACT), known for its standardization work in the field of UN/EDIFACT and ebXML took up the challenge and started to develop such a methodology. The research efforts became known as UN/CEFACT's Modeling Methodology (UMM) [1]. UMM enables the business modeler to capture the business knowledge independent of the underlying implementation technology such as Web Services or ebXML.

Due to the popularity of the Unified Modeling Language (UML) [2] it was already decided in 1998 to build the UMM on top of the UML. Using UML makes it easy for new users to get acquainted to the UMM standard and increases its acceptance. UMM defines a UML profile-i.e. a set of *stereotypes*, *tagged values* and *constraints* - in order to customize the UML meta model for the special purpose of modeling the collaborative space in B2B

Although the standard is well developed and documented, its complexity and mightiness make it difficult to perceive from scratch for the novice user. Therefore a tool, supporting the modeler in creating a valid UMM model would help those inexperienced with UMM. The University of Vienna in collaboration with the Research Studios Austria has developed a plug-in for the UML tool Enterprise Architect called "UMM Add-In" [3] [4]. We highlight the main features of the Add-In and show how the tool facilitates the use of the methodology.

2 UMM at a glance

The UMM comprises three different views: *business domain view* (BDV), *business requirements view* (BRV) and the *business transaction view* (BTV). Within the BDV the existing knowledge is collected from stakeholders and business domain experts. The process analyst tries to get a basic understanding of the

business processes within the domain. The business processes which were identified in the BDV and provide a chance for a collaboration are then elaborated within the BRV. Use cases are used to capture the requirements for exchanging business documents between organizations. The BTV is build upon the results of the BRV and defines the global choreography of document exchanges between the prospective business partners. Within the BTV re-usable patterns are used, facilitating the construction and transformation of the constructed models. Furthermore the structure of the business documents exchange is described by re-usable building blocks called core components.

3   The UMM Add-In

Since UMM is a UML profile, any UML tool on the market may be used for creating UMM *business collaboration models*. However, UMM does not use all UML features and diagrams offered by the UML standard. The artifacts of a UMM *business collaboration model* are based on a specific subset of UML elements. Furthermore, certain dependencies and constraints exist between these artifacts. A regular UML tool will not enforce these dependencies and constraints. In addition, it will not prevent the modeler from using modeling elements outside of UMM's subset. Thus, a modeling tool considering the UMM-specifics is needed. Instead of developing a UMM tool from scratch we decided to use the UML functionality from the commercial UMM tool Enterprise Architect and to implement an Add-In for the UMM-specifics on top of it. The remainder of this section outlines the main features of the UMM Add-In.

3.1   UMM specific toolbar

In order to create a UMM model it is convenient to drag and drop UMM stereotypes from a toolbar onto the modeling canvas. Thus, the stereotypes as defined in the UML profile for UMM are integrated into Enterprise Architect and provided in a toolbar. The toolbar itself is organized in sections that correspond to the UMM views. This helps the user to use the right stereotypes in a certain UMM step. In order to prevent the user from using UML elements not part of the UMM subset, the toolbar is restricted to the UMM stereotypes and UML standard elements required by UMM.

3.2   UMM Requirements Engineering support

Supporting B2B requirements engineering is another feature of the UMM Add-In. Business knowledge is collected during interviews between the business domain experts and the business analysts. The gathered information is captured in so-called UMM worksheets. Traditionally, worksheets were completed by using a word processor. Since most of the worksheet information is captured later on in *tagged values*, this results in duplication of efforts and a danger of inconsistency. Thus, the worksheet approach is integrated into the UMM Add-In. Figure

1 shows an example of a UMM Worksheet Editor. UMM specifies a set of pre-defined worksheets. Additionally, self-defined worksheets may be created using an XML based worksheet definition language that is processed by the UMM Add-In. This guarantees a flexible adaptation of worksheets to special business needs and to changes due to the update of the UMM meta model.
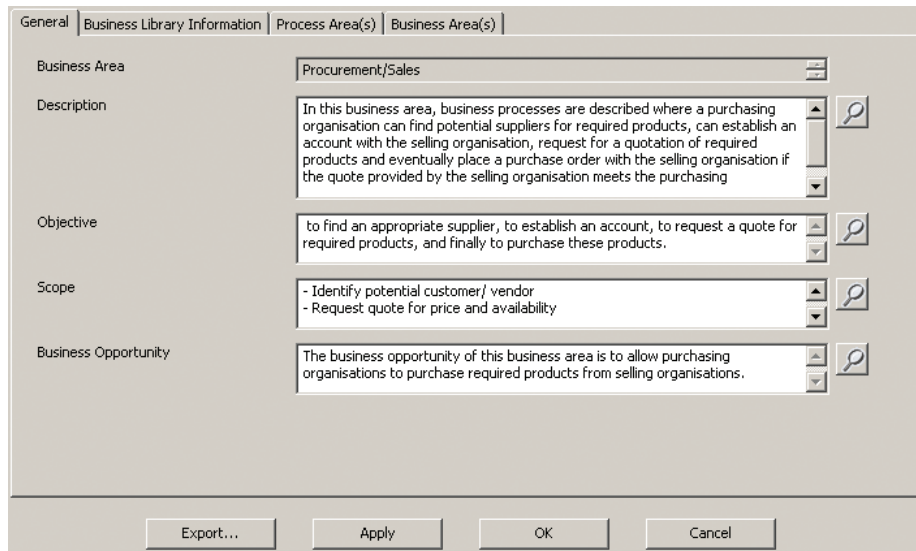

Fig. 1. UMM Requirements Engineering Support

3.3 Semi-automatic generation of UMM artifacts

It is a goal of the UMM Add-In to release the modeler from some routine tasks by semi-automatically generating some UMM artifacts. For example, the modelers first task is the creation of an initial UMM model structure. This process can be performed automatically by the UMM Add-In. The structure of *business areas* and *process areas* - which may follow a matrix predefined by UN/CEFACT [5] - is transformed into a tree-structure of packages. Instead of manually creating this tree-structure, the modeler simply checks the relevant cells in the pre-defined matrix and the tree-structure is created. Figure 2 depicts this feature.

3.4 Validation of the UMM model

A key feature of the UMM Add-In is checking a *business collaboration model* for UMM compliance. The validation engine of the UMM Add-In verifies whether all constraints defined in the UMM profile are satisfied or not. Validation is not only supported for the entire model, but for any UMM view or even sub-view.
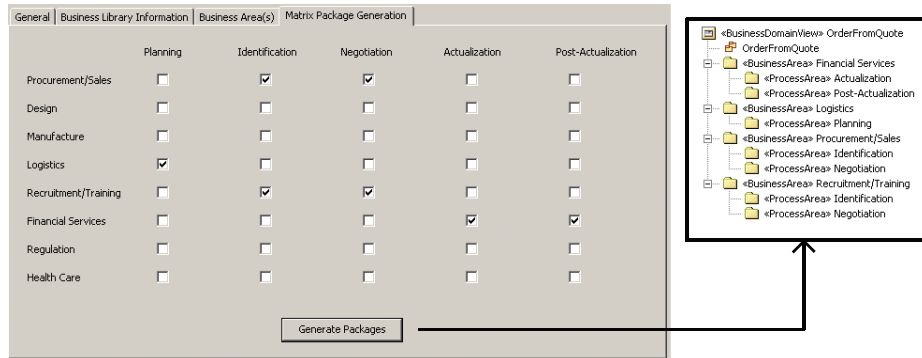
Fig. 2. Semi-automatic generation of UMM artifacts

Validation is started for a certain view and includes all content beneath it. This enables the modeler to scrutinize specific parts of the model before continuing with the next UMM step. In case of incompliance with the UMM profile the validation engine reports an error message containing the origin of the flaw and references for corrections. In figure 3 the validator is shown after an error has been detected. The validator supports both, the inexperienced users and the UMM professionals. Whereas novice users will prefer to check whether a created diagram is valid or not the professional users will prefer to check whether a whole model is valid or not. Even the most experienced user can not guarantee the validity of a model if the model size has passed a certain threshold.
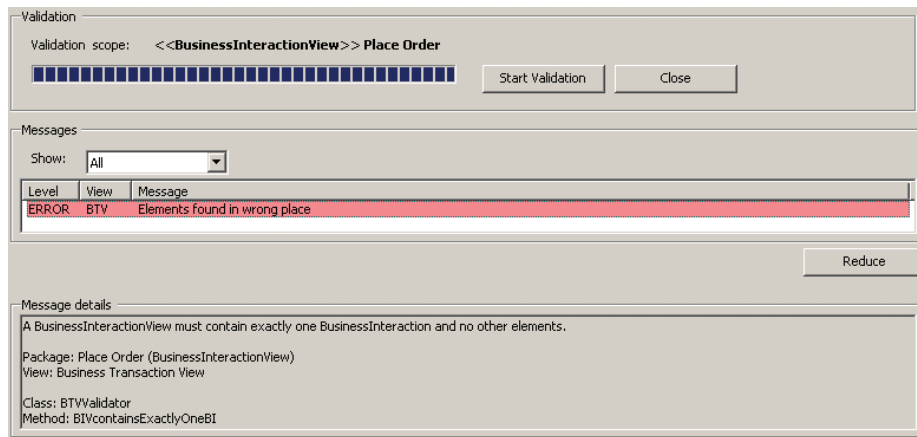
Fig. 3. UMM Valdiator

3.5 Transformation to chorography languages

Once a valid UMM model is created, it is envisioned to transform the business logic defined into IT-platform specifics. Currently, we support the mapping of the inter-organizational process definitions to choreography languages as used in service oriented architectures [6] [7]. In particular, we support the generation to global choreographies defined in ebXML's Business Process Specification Schema (BPSS) [8] as well as to local choreographies in Web Services' Business Process Execution Language (BPEL) [9]. Process definitions in these choreography languages are processed by software components in order to track and/or execute the B2B partnership.

3.6 Modeling business documents using UN/CEFACT's Core Components

Apart from the business process specific features, the UMM Add-In also offers functionalities to model the business data exchanged in a business process. It uses the concept of a Business Collaboration Specification Schema (BCSS) [10], a representation of the core components standard implemented as UML profile. Hence the user has the possibility to model the data exchanged by using reusable core components. Furthermore an XML schema can be generated out of the core components model according to predefined naming and design rules.

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