INTEGRATING A PATTERN CATALOGUE IN A BUSINESS PROCESS MODEL

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Abstract: This paper proposes the Transactional Model of Business Process (TMBP), an extension of the Transactional Model of Workflow Processes (TMWP) proposed in the context of the Workflow on Intelligent Distributed database Environment (WIDE). The TMBP mainly includes elements, such as, a Pattern Catalogue that make possible to create business sub-processes (BSP) from the reuse of BSP patterns based on structural aspects.

1 INTRODUCTION

According to (Davis, 1996), the overall organization should be structured according to the Business Process (BP) it wants to carry out. The task of structuring an organization involves the assignment of specific values to a set of structural aspects (e.g.: differentiation, communication structure, scalar chain, decision-making structure and coordination mechanism).

Once the organization's origin is in its BP, its structural aspects are present in its BP. Thus, in order to understand a BP it is useful to know the structural aspects of the organization which performs it (Iochpe, 2002).

Organizations reach their business objectives (products and services) by executing their BP. Basically, a BP can be understood as a partial order ($<_{pn}$) of tasks (T_i, i=1, ...n), where each of these tasks contribute in a stage of the process.

In Workflow systems, a workflow process (WP) automates the BP, which employs a WP model to represent all singularities of BP needed for their automation. There are many WP models (Grefen, 1999), (Casati, 1995), (Leyman, 2000). However, these modes present little support for the structure aspects of an organization. This commits the workflow project accuracy, once such WP may not reflect the reality of BP performed in the organization.

We have noticed the fact above mentioned mainly during the accomplishment of a case study with a Brazilian Governmental Organization (BGO) (Thom, 2003). In that case study, we have identified a set of workflow patterns where each pattern is based on the relationship among one or more structural aspects of the BGO and its workflow sub-processes.

The lack of a BP model with support to organizational structure aspects (such as the ones above mentioned) as well as the lack of a BP model that enable the reuse of Business-Subprocess (BSP) patterns were the major motivations for the development of the Transactional Model of Business Processes (TMBP) proposed in this paper. TMBP is mainly an extension of the Transactional Model of Workflow Processes (TMWP) – developed in the context of the Workflow on Intelligent Distributed database Environment (WIDE) project (Grefen, 1999) – with support to structural aspects of the organization. We have opted to extend TMWP because, from models we studied, the Workflow Management Coalition (WfMC) (WMC, 1995) and WIDE (Grefen, 1999) models are the ones that mostly take into consideration structural aspects of the organization. WfMC model, however, was created with the aim of being a reference model that makes feasible the interchanging of process definitions among different workflow products.

The TMBP can be employed as a reference model for BP modeling. Trough the integration of a Pattern Catalogue of BSP, it enables the construction of BSP from the reuse of BSP patterns based on structural aspects organization. The BP designer would not be compelled to begin the BP modeling from scratch,

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once the patterns are solutions that were already tested and used, whose efficacy was proved by domain experts (Gamma, 1995).

The present paper is organized as it follows: Section 2 presents the TMBP and also its integration with a Pattern Catalogue of BSP. Section 3 describes how the TMBP can be used in practice. Last, but no least, Section 4 brings conclusions as well the future works.

2 EXTENSION OF TMWP

The original TMWP can be found in (Grefen, 1999). We opted to describe the TMBP (Figure 1) through the Unified Modeling Language (UML) notation (Fowler, 2000) and not through the Enhanced-Entity-Relationship (EER) notation, originally used in the TMWP because UML has modeling resources (OMG, 2003) necessary to represents the BMBP in a fine-grained level.

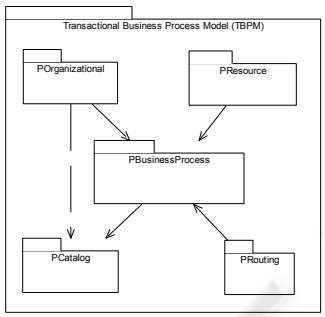

Figure 1: TMBP Package

2.1 Business Process Package

In the PBusinessProcess (Figure 2), each BP transforms an item (see Section 2.3) from an initial state into a final state. Transformation of an item may be decomposed in smaller transformations, where each of them corresponds to a change in the item state. When there are no more transformations to be done, the item reaches its final state.

Due to its possible high complexity, a BP can be recursively decomposed in BSP, up to the business transaction level (BT). The BT is the smallest work logic unit of a BP. One can imagine that each BT is responsible for one of the item transformations. A BT can be decomposed in a partial order of atomic tasks. Each BT is under the responsibility of an actor and can receive as inputs several resources used during the tasks execution.

Each BSP can involve several BTs and different kinds of actors. However, the set of structural aspects of the organization and their values should remain constant in the BSP. Each BSP can involve one or more Organizational Units (OU), since their structural aspects do not vary. A BSP must have only one responsible. A simple task in TMBP is associated to skills class, once in certain stages of the BP it may be necessary to identify which are the minimal skills the actor responsible for the task should have.

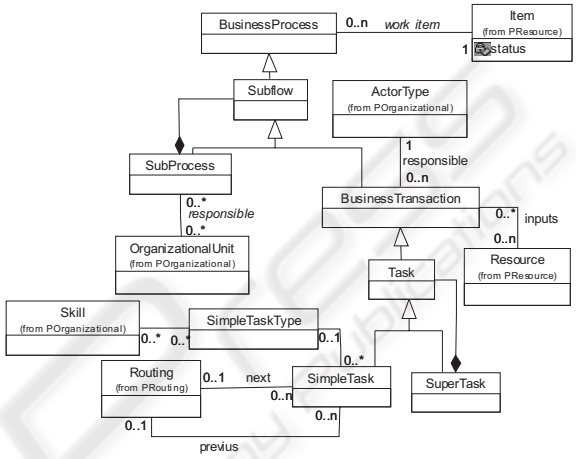

Figure 2: Classes of the PBusinessProcess

2.2 Organizational Package

In the POrganization package (Figure 3) an actor is the one that performs a task. A human actor has a position in the organization that identifies his/her role. Each actor is of one type and is associated to an OU. The type of actor identifies abstractly a certain skill, needed for the execution of a task. Each type can be assigned to a set of actors. Note that an actor may be of different types yet it occupies the same post.

An organization is an aggregate of OUs. Each OU may be related to other OUs, where such relationships may help in the identification of the organization's organizational chart. Every OU has a set of structural aspects, such as the ones described in (Thom, 2003).

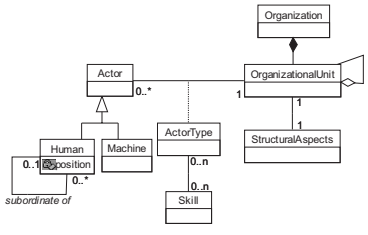

Figure 3: Classes Diagram of the POrganizational

2.3 Resource Package

A resource is involved in the execution of a task. PResource (Figure 4) distinguishes three kinds of resources: Raw material - all that is used in the performance of a task; Tool - an instrument the actor uses in the task execution and; Item - while a "work item" is a business object.

An item may be of a kind and may have a structure (Product Structure). In the case it has a structure, the item is recursively composed of sub-items. For example, if the BP's final objective is to build a chair, the chair, per se, is the final product, and its pieces (back, sit and legs) the items.

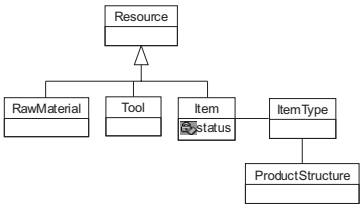

Figure 4: Classes Diagram of the PResources

2.4 Routing Package

Routing along particular branches determines which task needs to be performed and in which order (Aalst, 2002). The routings presented in the PRouting are based on the WfMC (WfMC, 1995).

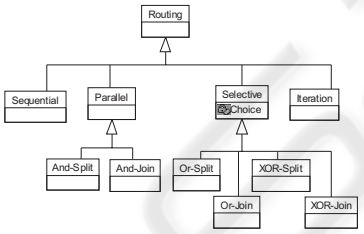

Figure 5 : Classes Diagram of the PRouting

2.5 Catalogue Package

PCatalogue package (Figure 6) describes the main classes involved in the selection of the best design pattern from a Catalogue of BSP patterns, as basis to model a certain BSP one wants to accomplish. The Catalogue manager selects a BSP pattern based on a set of parameters (which may vary according to the kind of BSP) that can be obtained from the TMBP.

After the pattern selection, a BSP builder would extend that pattern with information on the partial order of BT and, for each BT would include: the work item it manipulates, the input resources its internal tasks uses, the kind of actor responsible for tasks execution and the partial order among them. We highlight that, in order to extend the BSP pattern the builder would need some input parameters.

Semantically, the PatternCatalogue class uses a possibility of UML that is modeling "dynamic tasks" in static diagrams such as the classes diagram. Classes like "dynamic task" represent processes that receive the set of input parameters and generate output data. The PatterCatalogue class receives a sub-process as inputs and an organizational unity involved in its execution.

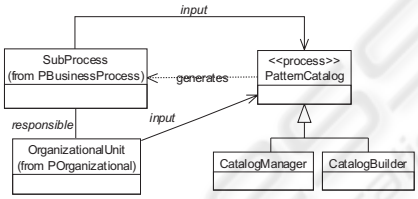

Figure 6: Classes Diagram of PCatalogue

3 USING THE CATALOGUE PAKAGE IN PRACTICE

To describes how the PCatalogue package can be used in practice let's imagine that the patterns Catalogue contains the Approval BSP such as the one detailed in (Thom, 2003). Additionally, lets consider the RUP method - Rational Unified Process (Kruchten, 2001) to demonstrate how it can be instantiated.

Initially the use cases that define the main activities necessary to build BSP from the reuse of BSP patterns are described.

The activities with actions diagram of UML 2.0 (OMG, 2003) was used to represent the patterns that are expanded (contemplated) by use cases. We opted to use this diagram mainly because it gives more emphasis to the semantics definition rather than to the syntax. Consequently, it makes easier future implementation in almost every programming language. Last, but not least, the diagram allows the specification of the BP in a fine-grained level.

3.1 Modeling of the Approval Sub-process Base on Design Patterns

Creation of a BSP from the reuse of approval patterns involves the use cases Figure 7 shows. The Catalogue manager selects the approval pattern according to the value of the decision-making structure (Davis, 1996). As input parameters it receives the kind of sub-process (e.g.: approval), the value of the decision-making structure (e.g.: centralized) and the kind of work item (e.g.: document).

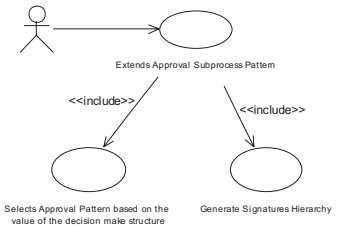

Figure 7: Uses Cases Diagrams for the Creation of BSP Based On Approval Patterns Reuse

Based on the pattern selected the pattern builder expands the BSP pattern. It uses as input parameters: the pattern selected; the organizational unit and; the kind of work item. As output parameter it presents the complete pattern (expansion) of BSP with transactions (Figure 8).

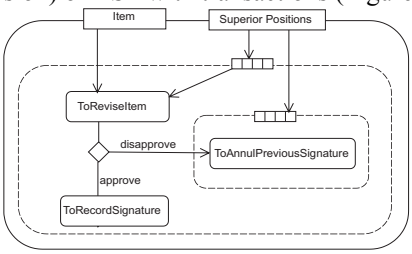

Figure 8: Approval Pattern for the Organizational Unit with Centralized "decision-making structure"

4 CONCLUSIONS AND FUTURE WORKS

The organization of work, both within and between companies, is becoming more and more complex. This is why information systems have been developed to support the management of process and their automation (Aalst, 2002). Workflow systems associated to other technologies (e.g.: internet, electronic documents management and database systems) make such automation feasible.

One of the most important stages in the development of a workflow system is modeling of BP executed in the organization. In this paper we observed that the existents models for WP design do not have enough support for the structural aspects of the organization. This constraint may commit the accuracy and efficiency of the Workflow Project.

Aiming at approaching this constraint, we proposed the TMBP an extension of TMWP to support the structural aspects of the organization and the reuse of BSP patterns.

The paper has shown that the patterns stored in the Pattern Catalogue are selected by a Catalogue manager and expanded by a BSP builder.

Future works could preview the development of a wizard to support BSP modeling, based on the semantics of the PCatalogue package. For example, the FORO-WF (Foro, 2002) tool, based on the WIDE model could be modified to support TMWP extension. Last, but not least, new extensions to the TMBP may come to be necessary, as new patterns are identified. Patterns that would need other modeling elements for their expansion in a BP model, besides those proposed in the TMBP. This flexibility of TMBP if fundamental, once as mentions in (Aalst, 2002), there are many kinds of BPs performed in organizations, which may be related to different structural aspects.

REFERENCES

Aalst, W. V. H., Hee, K. V. 2002. *Workflow Management*: Models, Methods, and Systems. The MIT Press, London.

Casati, F. et al. 1995. Conceptual Modeling of Workflows. In: 14th OOER, *International Object-Oriented And Entity-Relationship Modeling Conference.* Australia. 341-354.

Davis, M. R., Weckler, D. A.1996. *A Practical Guide To Organization Design*. Crisp Publications, Boston.

FORO. 2002. *Foro-WF*: A White Paper. SchlumbergerSema Spain.

Fowler, M. Scott, K. 2000. *UML Distilled* : a brief guide to the standard object modeling language.Addison-Wesley, 2nd edition. 185 p. : il.

Gamma, H. E., Johnson, R., Vlissides, J. 1995. *Design Patterns*: Elements of Reusable Object-Oriented Software. Addison-Wesley.

Grefen,P., Pernici, B., Sánchez G., 1999. *Database Support for Workflow Mangement*: The WIDE Project. Kluwer Academic Publishers, Boston.

Iochpe, C., Thom, L. H. Inferring Aspects Of The Organizational Structure Through Workflow Process Analysis. 2002. In 4th *International Conference On Enterprise Information Systems.* ICEIS Press, Ciudad Real.

Kruchten, P. 2003. *What is the Rational Unified Process*?

Leyman, F., Roller, D. 2000. *Production Workflow*: concepts and techniques. 2nd edition. Prentice-Hall, New Jersey.

Mintzberg, H. 1995, *Criando Organizações Eficazes: estruturas em cinco configurações*. Atlas, São Paulo.

Object Management Group. 2003. *UML 2.0 Superstructure Specification*. OMG Final Adopted Especification.

Thom, L. H., Iochpe, C. 2003. Identifying Patterns o Workflow Design Relying on Organizational Structure Aspects. *5th International Conference On Enterprise Information Systems*. ICEIS Press Angers.

Workflow Management Coalition. 1995. *The Workflow Reference Model*.