

# PICTURE – A new Approach for Domain-Specific Process Modelling

Jörg Becker, Daniel Pfeiffer, Michael Räckers

European Research Center for Information Systems, Leonardo-Campus 3,  
48149 Münster, Germany  
{becker, pfeiffer, raeckers}@ercis.de

**Abstract.** In this paper a new process modelling method especially for public administrations is presented. With established generic process modelling methods reorganisation projects in this domain could only identify limited reorganization potential and just led to small local improvements [1]. Therefore, we have created the domain specific modelling approach PICTURE. The PICTURE-method applies the domain vocabulary to efficiently capture the process landscape of a public organisation.

**Keywords:** Domain Specific Modelling, E-Government, Process Building Blocks, Public Administration, Process Landscape.

## 1 Process Modelling in Public Administrations

*So far process modelling in public administrations has mainly been performed with generic (general-purpose) languages [1, 2]. These modelling languages, such as Activity Diagrams (AD) [3], Business Process Modelling Notation (BPMN) [4], or Event Driven Process Chains (EPC) [5], are flexible instruments to describe diverse processes in many different domains. However, they do not consider in particular public administration [6] and reorganisation specific questions [7] like: (1) what processes, activities, or products depend on legal regulations or (2) how can a very large number of processes be acquired efficiently?*

*In this paper we present the process modelling method PICTURE. The PICTURE-method consists of a modelling language and a procedure model which guides the application of the language. Both parts are implemented in a web-based tool. PICTURE allows for an efficient modelling of the entire process landscape of an organisation. As it is based on a simple, domain specific language, not only isolated processes can be represented but a complete overview on the practices of an organisation is accomplished. This overall view allows for reorganisation decisions that are based on the consideration of structural analogies, potential synergy effects, and economies of scale. PICTURE takes the specific legal and political constraints within public administrations into account and indicates technical and organisational measures to improve the efficiency of the process landscape.*

## 2 The PICTURE-Method

The first step during an application of the PICTURE-method is to define the objectives of the project. Based on these goals the PICTURE-method can be customised for the specific properties of the situation. The second step of the PICTURE-approach is to model the entire process landscape. PICTURE focuses on a strong involvement of the officials of an administration in the modelling project. With the PICTURE-approach the modelling is performed in a distributed manner and the acquisition of process models is done in a coarse granular form to reduce time and effort for modelling. The third step is to analyse and use the process models.

Basic construct of the PICTURE modelling language is the so called process building block. A process building block represents a certain set of activities within an administrative process [8]. The PICTURE-method contains altogether 29 different process building blocks. Some examples of process building blocks are “Incoming Document”, “Create Document” or “Formal Assessment”.

Process building blocks have been specifically developed for public administrations and apply the vocabulary of this domain. As they are domain specific the meaning of a process building block is characterised by a corresponding domain statement [9]. Contrary to constructs of traditional process modelling approaches like activities in an AD or functions in an EPC, process building blocks in PICTURE reside at a particular level of abstraction. For example a function in an EPC can be instantiated as: “Waiting for document”, “Receiving application form via letter”, or “Signing the labour contract”. These functions stand for differently abstract phenomenon in the real world. However, an instance of a process building block, for example “Incoming Document” has always a specific meaning, in this case that a document arrives. The meaning is inherently pre-defined for this building block and is not specified by the modeller.

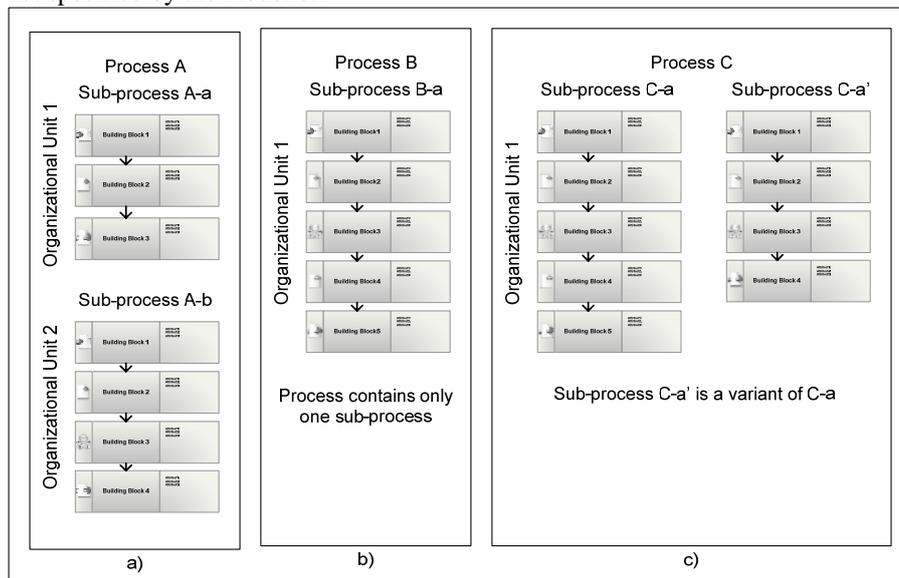


Fig. 1. Processes, sub-processes and process variants.

In PICTURE the process building blocks are the only way to describe the administrative processes. This simple syntax makes the modelling easy for the method's users. Furthermore, processes are represented as a sequential flow of building blocks. Also this syntactical restriction guides the method's user and simultaneously promotes the construction of structurally comparable models. Since only process building blocks can be used, the type of each model element is not just syntactically but also semantically fixed. Problems like *naming conflicts* [10] in a model comparison are avoided, because the name of a process building block is specified by the language designer rather than the modeller.

Additional facts about the processes can be collected with the help of attributes assigned to the process building blocks. For example possible attributes for the process building block "Enter Data into IT" are "Source", "Source Medium", or "Processing Time". Altogether, PICTURE contains nearly 50 different attributes. Attributes provide the core information for a subsequent process analysis, in which, according to predetermined goals, corresponding weaknesses and potentials are detected.

In PICTURE a process can consist of several sub-processes (cf.

Fig. 1 a)). A sub-process is a process section being carried out by a responsible official or a position within a single organisational unit. Sub-processes can be linked together to visualise a whole process. The majority of the modelling activities take place on the sub-process level. Within the scope of the sub-process the responsible official can collect all relevant information and represent them in form of process building blocks and attributes. However, some processes contain only one sub-process (cf.

Fig. 1 b)). An example is the process "Notification on fees for a motor vehicle". The modelling with the PICTURE-language is strictly sequential. PICTURE offers no language constructs to represent forks in the course of process building blocks. It is also not possible to model iterations. To describe technically important ramifications in the process flow, PICTURE offers two different ways: On the one hand attributes can be used to specify different cases with percentage values. For example an incoming document can arrive in 50% of the cases through the communication medium mail, in 30% per email, and in 20% per fax. On the other hand it is possible to specify process variants (cf. Fig. 1 c)). A process variant defines an alternative sequence within a sub-process. The frequency of a process variant can be weighted by percentage values.

### 3 Evaluation of the PICTURE-method

In two case studies in the City of Münster and the University of Münster, the PICTURE-method has proved to be viable and efficient. We collected altogether 340 process models in the two case studies. In comparison in the Regio@KomM project processes of a municipal administration have been acquired with the modelling language EPC [1]. In this project the collection of 22 administrative processes took six person hours on average. The paper based modelling of a single process with the PICTURE-method required only half of that time. With the tool based modelling the

time could be further reduced to a fourth. The participants at University of Münster and City of Münster who had previous experiences with EPC modelling evaluated the PICTURE-approach as faster to learn and its models as easier to understand in comparison to EPC.

Currently, the PICTURE-method is applied in the cities of Bielefeld and Hamm. It is an objective of the project to compare the different processes of the cities and consolidate them if significant variations are recognised.

**Acknowledgements.** The work published in this paper is partly funded by the European Commission through the STREP PICTURE. It does not represent the view of European Commission or the PICTURE consortium, and the authors are solely responsible for the paper's content.

## References

- [1]Algermissen, L., Delfmann, P., Niehaves, B.: Experiences in Process-oriented Reorganisation through Reference Modelling in Public Administrations - The Case Study Regio@KomM. In: Proc. 13th European Conference on Information Systems (ECIS 2005) (2005)
- [2]Janssen, M.: Modeling for Accountability: The Case of the Virtual Business Counter. In: Proc. 11th Americas Conference on Information Systems (AMCIS 2005) (2005) 2021-2029
- [3]Object Management Group. UML 2.0 Superstructure Specification.[Online]. Available: <http://www.omg.org/cgi-bin/doc?formal/05-07-04>
- [4]Object Management Group. BPMN Final Adopted Specification 1.0.[Online]. Available: <http://www.bpmn.org/Documents/OMG%20Final%20Adopted%20BPMN%201-0%20Spec%2006-02-01.pdf>
- [5]Scheer, A.-W.: ARIS - Business Process Modeling. 3 edn. Springer Publishing, Heidelberg et al. (2000)
- [6]Bretschneider, S.: Management Information Systems in Public and Private Organizations: An Empirical Test. *Public Administration Review* 50 (1990) 536-545
- [7]Maier, R., Remus, U.: Towards a Framework for Knowledge Management Strategies: Process Orientation as Strategic Starting Point. In: Proc. 34th Hawaii International Conference on System Sciences (HICSS2001) (2001) 1-10
- [8]Rupprecht, C., Funffinger, M., Knublauch, H., Rose, T.: Capture and Dissemination of Experience about the Construction of Engineering Processes. In: Proc. 12th International Conference on Advanced Information Systems Engineering (CAiSE2000) (2000) 294-308
- [9]Guizzardi, G., Pires, L. F., Sinderen, M. J. v.: On the role of Domain Ontologies in the design of Domain-Specific Visual Modeling Languages. In: Proc. 2nd Workshop on Domain-Specific Visual Languages (2002)
- [10]Pfeiffer, D., Gehlert, A.: A framework for comparing conceptual models. In: Proc. Workshop on Enterprise Modelling and Information Systems Architectures (EMISA 2005) (2005) 108-122