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# Design Software Systems from Business Process Modeling

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**KEYWORDS**
Business Process Management (BPM), Business Process Modeling, BPMN, UML.

**ABSTRACT**

The increase in size, complexity and demands of organizations has driven an increasing number of organizations that opt for business process management (BPM). The BPM enables measurement and optimization of business processes, and therefore facilitates the implementation of necessary changes in organizations. At the same time, the software development industry is still facing serious problems on the definition of software requirements. Understanding the business process is appointed by several information systems researchers and professionals as being the key for the development of business supporting software applications.
The main research objective is to reduce the gap between the Business Process Modeling and the software development through the generation of software models from business process models.

## INTRODUCTION

In the present, companies have to deal with a large number of processes involving different domains, organizations, and tasks. This has driven to the use of Business Process Management (BPM) which enables the optimization of business process activities. BPM includes methods, techniques, and tools to support the design, enactment, management, and analysis of such operational business processes [van der Aalst2004].
There are lots of languages and tools that can be used for modeling business process like Petri Nets, IDEF (Integrated Definition Methods), EPC (Event-driven Process Chains), BPMN (Business Process Modeling Notation) and some extensions to UML (Unified Modeling Language) like Eriksson e Penker extension.
The BPMN is a standard created by the OMG, one of the best known and actually used in this area. BPMN has a graphic notation easy to understand. This notation captures the business process by defining the business process diagram (BPD - Business Process Diagrams) [Lam2009].
As referred by P. Jalote [Jalote2008] about software quality: “The software often does not do what it is supposed to do or does something it is not supposed to do”.
For one hand the business process management and modeling is increasing its relevance, on the other hand the software development teams still have serious difficulties in defining the applications requirements properly. This drive us to the question: “How can we use Business Process Modeling to design software applications?”.
Researchers and professionals in information systems management have recognized that understanding the business process is the key to identifying the needs of users of the software that supports it [Mili et al.2003]. The true cost-benefits can only occur when software processes are aligned with organizational processes [Russell et al.2006]. Like Van der Aalst wrote in [van der Aalst2004] about Business Process support: “To support business processes an enterprise information system needs to be aware of these processes and their organizational context.”
Ideally, and in the context of model based software development, some aspects of the software model should then be derived from existing features in the model of the business process of an organization.
The UML (Unified Modeling Language) is a standard for software modeling and designing, adopted by OMG in 1997 [Olivé2010], which is being seen as the default language for that purpose and is actually used in companies. The 4SRS (4-step rule set) is a technique that enables the generation of UML object diagrams from the UML use case diagrams [Machado et al.2005].

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## RESEARCH QUESTION

There are several questions that can be posed for justifying the proposed research, some of them are listed next: How can software development become closer to business process modeling? How can we generate software models from business process models? Can we generate an Entity-Relationship model from a business process model? How can we be sure that the application requirement really meets the organization needs?

## EXPECTED RESULTS

An expected result is a method for generating software models from business process models. This way it will be easy to: Be sure that the software application does what it has to do, in other words, that the software application really meets the company needs; Ensure that the software application is aligned with the business processes and it is easy to adapt to necessary changes; Resources optimization by joining efforts between the BPM analysis and the requirements definition of software applications that support the business.

## RESEARCH DESIGN - WORK PLAN

The PhD research work plan is scheduled to proceed as follows:
**2011/2012** - Write the PhD proposal and prepare the presentation: Study the state of the art concerning business process management and modeling and the approach (approximation) between business process modeling and software modeling. Explore the first approach: generation of the UML use cases and sequence diagram from BPMN;
**2012/2013** - Integration of BPMN and 4SRS: BPMN - USE CASES diagram and sequence diagram - object diagram - class diagram;
**2013/2014** - Complete all steps from BPMN to database design (ERD - Entity-Relationship Diagram);
**2014/2015** - Write the PhD thesis report and prepare the final presentation.
During the research work, we are planning to produce some published results, in the following topics: From Business Process Models to Use Case Diagrams; From Business Process Models to UML Sequence Diagrams; From BPMN to UML Activities Diagram; From Business Process Models to Entity-Relationship Diagram.

## CURRENT WORK

The author is preparing the state of the art of the following subjects: Business process management and modeling; BPMN; UML; Existing approaches for obtaining use cases and sequence diagram from the business process; Existing approaches for obtaining the design of the database from the business process;

## CONCLUSION

The Business Process Management and Modeling is nowadays well-established and well-known in companies. At the same time software development still has serious difficulties on requirements definition. So it is natural to think that BPM and software development should work together or, at least, very closer. As a result we could have software applications that really match organizations needs and reduce resources and time by joining efforts.

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