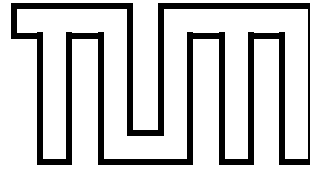# FAKULTÄT FÜR INFORMATIK

DER TECHNISCHEN UNIVERSITÄT MÜNCHEN

Bachelor's Thesis in Information Systems

Guideline for combining and differentiating between CMMN, DMN and BPMN: An indicator-based use case study

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FAKULTÄT FÜR INFORMATIK

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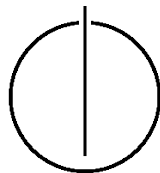## Guideline for combining and differentiating between CMMN, DMN and BPMN: An indicator-based use case study

Richtlinie zur Kombination und Differenzierung zwischen CMMN, DMN und BPMN: Eine indikatorbasierte Falluntersuchung

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Date:	November 15, 2016

Ich versichere, dass ich diese Bachelor-Thesis selbständig verfasst und nur die angegebenen Quellen und Hilfsmittel verwendet habe.

I confirm that this bachelor's thesis is my own work and I have documented all sources and material used.

Munich, November 15, 2016   Dominik Gerbershagen

Abstract

Acknowledgements

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Part I.

Introduction

1. Introduction

1.1. Motivation

1.2. Problem Statement

The Business Model and Notation (BPMN) modeling language and technique has
become a quasi-standard for modeling business processes, logical steps in software-
systems or align companies along the process chains. BPMN was standardized
in 2005 by the Objective Management Group (OMG), but had a long list of pre-
decessors including the *Event-driven Process Chain* (EPC), the *Swimlane Visualiza-
tion*, *Business Process Re-engineering* to mention only a few. Despite the inheritance
of these languages, BPMN has some major downsizes which will be discussed.
BPMN suits best when it comes to processes that incorporate the *Value Chain Model*
by Michael E. Porter [2]. Every company needs these strict processes to optimize
the value chain, for the value creation and to separate the hierarchies between em-
ployees and departments.

By 2016 these processes have been largely automated. For this automation, the
BPMN syntax suited very well due to the strict processes that could be automated
more or less easily. The next challenge is to support processes that cannot be sim-
ply automated: decisions and case management. At this point, *Case Management
Model and Notation* (CMMN) and *Decision Model and Notation* (DMN) come into
play. Both are were highly anticipated by people working in modeling depart-
ments. This thesis will investigate the benefits of separating the decision logic
and case management into these new standards as well as combining them into
a macro model. Additionally, every language has its own indicators and way of
modeling. The weaknesses and strengthens of BPMN, CMMN and DMN will be
presented in detail in order form indicators for when to use which language best.
Both modeling languages are relatively new to the market as they were standard-
ized in 2014 (CMMN) and 2015 (DMN). The goal of this thesis is to provide a
guideline helping modelers to differentiate between the languages, to help com-
bining each language and to provide information about the historical background

of these new standards. Another key aspect in this thesis is the use case study to prove the indicators by real process models taken from the eKulturPortal GmbH. An evaluation will show how the indicators applied on a model work and how they can work for the reader's own models.

Summing up the preceding paragraph leads to three research questions:

- Investigation of the new Decision Model and Notation specification published by the Object Management Group, extracting the downsides and advantages especially concerning the vast modeling of gateways in BPMN. Is DMN the solution to simplify decision-modeling?

- Investigation of the Case Management Model and Notation specification by the Object Management Group, particularly how case modeling can be applied in a model-driven software development project.

- How do CMMN, DMN and BPMN work together in a model-driven software project? Is there a valid possibility to combine all three specifications in one model? Is it possible to improve the process and information flow, readability and eventually implementation of the model by the developer?

1.3. Approach

To start the analysis of each modeling language, a brief background information about the demand for standardization by people working in modeling departments or researchers will be provided. On this account a thorough literature research suits best, presenting the results in the Background chapter.

In chapter 2 we will examine the specifications provided by the OMG and have a look at each modeling language. What are the strengthens and weaknesses, what has been standardized and when do the standards suit best. These questions will be answered for each CMMN and DMN. BPMN will not be analyzed in detail, but is a key element to do the comparison between the standards. The goal is to carve out the scope, requirements which were met and indicators of each language. In the following chapter, the ability to combine each standard with BPMN will be presented. At first, the modularity of each standard will be determined. Is each language able to stand for its own or does it need to be implemented in a larger model to work properly? Afterwards, the results are taken in order to compare the combination aspect of BPMN, DMN and CMMN. The questions are directed on how to combine each language, whether a model with all three languages is

possible or if there are any downsides that prohibit combining the languages. Additionally, the connectors of each model will be carved out.

With these findings obtained we will do the use case study in order to demonstrate the robustness of the indicators. Process models from the eKulturPortal GmbH will be analyzed with regard to the indicators and remodeled to show the working concept of each standard. A demonstration of the connectors, the scope of each language and the requirements which were met will be presented in this chapter.

Closing up this thesis a chapter of evaluation and discussion is succeeding and the conclusion with a summary of the findings and proposals for future work.

1.4. Contributions

1.5. Organization

Part II.

Related Work

2. Related Work

2.1. BPMN

– todo

   Geplant: Am Ende der Ausarbeitung

2.2. CMMN

Case Management and knowledge work are not brand new inventions that have been created in the past few years. "Peter F. Drucker made the first reference to knowledge work in (...) 1959 (...)" [3]. A current "overview and research challenges" provide [3] who explain the difference between business process management and adaptive case management. They briefly sum up the state of the art in case management technology and the next generation solutions. Mentioning technology and tools for Case Management, CMMN and Adaptive Case Management, there are many articles dealing with these topics. [4] describe how adaptive case management can be implemented in businesses and integrated in Enterprise Resource Planing systems (ERP). Additionally they approach a new architecture which decouples decision logic, knowledge work and process flows. All this leads to a better handling of information and an optimization of business modeling. Another practical example provide [5] explaining the company's approach towards an implementation of the CMMN paradigm. This includes the ability to change requirements or orders during run-time, which is one of the major aspects in their system. To achieve this goal, they first set up a meta model of their order-based system and enhanced it afterwards. These practical examples are important in order to evaluate the compatibility with the CMMN specification and other modeling languages, specifically BPMN. They also provide a good overview of how to combine modeling techniques and how they are realized as a system in companies. A more theoretical approach to case management and CMMN particularly provide [6] and [7]. They both do research on transforming CMMN into different

languages. [6] do model-to-model transformation from CMMN to DDML (DEVS-driven Modeling Language) which is used to formalize CMMN and analyze it afterwards. [7] have a similar approach, but a different goal. Due to weaknesses of CMMN, the language cannot be used to create a platform for both agile and route processes. They describe agile processes as the ones "(...) of which the exact flow cannot be determined completely a priori" [7], which is a fundamental characteristic of knowledge work and the reason why case management is so important for many industries. Coping with CMMN's downsides they build their platform on a "rule-based cross-perspective and model intermediate language on textual basis, (...) called *Declarative Process Intermediate Language (DPIL)*" [7].

A useful source for evaluating CMMN as a standardization for adaptive case management is [8]. The subtitle *Examining the applicability of a new OMG standard for adaptive case management* is a good foundation to see how OMG met the expectations from the industry and researchers. This paper sets up requirements deriving from different sources described in detail in section two [8]. At the end of their paper, they evaluate how good the requirements were fulfilled by the CMMN standardization and provide feedback for future improvements.

2.3. DMN

The Decision Model and Notation standardization was meant to improve the *separation of concerns* [9] which is the decoupling of decision logic and the control-flow. Biard et al. investigate how the new standard DMN can be used for decoupling BPMN and the decisions modeled as gateways. Decision-modeling is not typically included in control-flow oriented modeling languages. BPMN has not the power to model vast decision-trees due to the gateway restrictions. [10] even calls it a "(...) [misuse] for modeling decision logic". They found an autonomous way of separating the concerns. After averaging more than 900 models from different industries they introduced a "(...) semi-automatic approach to identify decision logic in business processes (...)" [10]. This semi-automatic approach incorporates the 900+ models they used to identify patterns in decision modeling. Formalization is not one of the key issues in this thesis, but the translation of BPMN to DMN or the link between them definitely is. Evaluating the compatibility of DMN with different modeling languages has been the objective of [11]. They approached a combined solution for knowledge-intensive work modeling and extracting the decision logic, what lead them to a new language called *Declare-R-DMN*. Although the Declare language is not part of this thesis, the combination of it with DMN is

useful to evaluate the compatibility with BPMN and CMMN.

Part III.

The Evolution from BPMN to CMMN and DMN

3. The Evolution from BPMN to CMMN and DMN

3.1. Evolution of BPMN

The evolution of business processes and process thinking dates back to the 1980s when Michael Porter developed the *Value Chain* making a first proposal on how to align companies along the business processes [2]. This major step initiated consecutive research and improvements in the field of business process engineering and re-engineering. The latter has been a very popular technique for companies to strip down their legacy processes, optimize and

Appendix

List of Figures

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