Business Process Modeling and Analysis in Banks

Burkhard Weiß

10.3.2011, Brisbane
Business Process Modeling and Analysis in Banks

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Relevance of Process Modeling & Analysis in BPM

... a simplified view on the BPM lifecycle [Becker, Kugeler, Rosemann 2008]
Motivation: Initial Situation and Problem Statement

Initial situation:

a) banks face increased competition, pressure to reduce costs, financial crisis, cherry-picking by customers, …

b) as a response, banks try to optimize and reorganize or even industrialize their business,

c) and in doing so, banks model their business processes and analyze these [Spath et al. 2007]

Problem statement:

d) according to a BPM study in the financial sector [Becker et al. 2010], banks, however, have high modeling efforts [Mendling, J.; Reckers, J.; Reijers, H. A. 2009] and fail to unlock the value of their models (utility), which primarily comes from process analysis that leads to optimization

e) thus, there is a need to model and analyze processes more effectively and efficiently in banks, in order to identify process weaknesses
Research Questions

What is the status quo of BPM in banks?
Do banks face problems within their business process modeling projects, and if yes, which?

How can banks
a) model their business processes efficiently and effectively,
b) while at the same time being efficient and effective in analyzing their business processes with regards to identifying process weaknesses, operational risks and compliance issues, and thus enabling them to optimize their process landscape?

How can obtained knowledge on efficient and effective business process modeling and analysis be disseminated into academia and industry alike?
Related Work and Theoretical Background

- Research on Evaluation of SBBL in Public Administrations [Räckers 2010]
- Research on Semantic Process Analysis in Public Administrations [Räckers 2010]
- Theory on Semantic Process Analysis in Public Administrations [Räckers 2010]
- New Domain-Specific Approach to Process Modeling and Analysis – PICTURE Approach
- Theory on Semantic Building Block-Based Languages (SBBL) [Pfeiffer 2008]
- Business Process Modeling and Analysis in Banks

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For public administrations a solution to effective and efficient process modeling and analysis has already been found. For banks this is not the case yet!

However, banks and public administrations have many similarities:

a) both largely offer services and almost no physical products to their customers
b) both largely deal with information
c) both have high personnel costs and depend upon human labour
d) nevertheless, both also make use of IT to a large extent
e) both have highly standardized business processes for most of their products / offered services
f) both are under high cost pressure (banks largely due to competition / globalization and public administrations largely due to household deficits and insufficient tax income)
g) …
Theoretical Background for Igniting the Research Process

Evaluation of SBPML for Banks in Terms of Process Modeling and Analysis

Demonstration of Process Modeling Approach in and for Banks

Demonstration of Process Analysis Approach in and for Banks

Design & Development of Process Modeling Approach for Banks

Design & Development of Process Analysis Approach for Banks

Problem Setting + Objective of a Solution:
Transferability of Domain-Specific SBBL from Public Sector to Banking Sector

Theory on Method Engineering + Design Science + …


Business Process Modeling and Analysis in Banks

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## Agenda

### Business Process Modeling and Analysis

1. On Effort and Utility of Process Modeling in Banks
2. Semantic BPML for Modeling
3. Semantic BPML for Analysis
4. Semantic BPML for Operational Risk Management
5. Semantic BPML for Business Process Compliance
6. Outlook
Goal Setting: Need for A New Approach to BPM?

Lack of Studies: Currently there have not been sufficient studies on the effort and utility of process modeling and analysis in the financial sector.

A New BPM Approach: Recently, however, a new approach to efficient and effective process modeling and analysis was developed for public administrations with a high potential to be also useful to the financial sector.

Goal: Exploratory investigation of the effort and utility of process modeling and analysis in the financial sector to identify need for new BPM approach for banks.
Studying BPM from a Process Model Lifecycle Perspective

How much effort, without direct utility creation, is spent for process modeling?

How much utility is gained by „using“ process models for different purposes?

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Investigating BPM in the Financial Sector – Database

1. Data Retrieval and Aggregation Process
   - Database
   - 2467 email contacts in German, Austrian and Swiss banks

2. Aggregation
   - Response rate of 4%
   - 97 Responses
   - 72 Respondents with BPM initiatives
   - One instance per bank

3. Final Dataset
   - Final dataset: n = 60 banks (2.7%)
Banks invested 61% of the maximum possible efforts.

Banks only got a return of 45% of the maximum possible utility.

Thus, the 60 banks participating in our study seemed to be investing more on the effort side than they actually got back as a possible benefit from their business process modeling effort.
Question: What may be the factor that influences, if a bank has a positive or a negative effort-utility-ratio?

Idea: Is there an item in our survey, which can be used to explain why banks have a positive or negative effort-utility-ratio?
Data Analysis: Idea of Discriminating Variable

- a) the usage of individual (enhanced) modeling methods compared to standard modeling methods (without any enhancements)
- b) the satisfaction with the cost-effectiveness of creating business process models (modeling and validation) with respect to a certain used process modeling method
- c) the satisfaction with the cost-benefit-ratio of process model maintenance with respect to a certain used process modeling method
- d) the satisfaction with analysis possibilities offered by the used process modeling method

4 items with respect to business process modeling languages that could possibly explain the difference of banks having a positive or negative effort-utility-ratio were analyzed from the original set of the questionnaire.
Data Analysis: Standard vs. Specialized BPML

Usage of Individual vs. Standardized Modeling Methods

Not good for explaining satisfaction with process modeling initiatives.

However, using standardized modeling methods without any extensions often seems to have a negative influence on overall satisfaction with process modeling initiative.

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Data Analysis: Cost-Effectiveness of Model Creation Due to BPML

Cost-Effectiveness of Creating Process Models

Not good for explaining satisfaction with process modeling initiatives.

However, many costs invested during initial process model creation seems to reflect negatively on overall satisfaction with process modeling initiative.

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Data Analysis: Cost-Benefit-Ratio of Process Model Maintenance Due to BPML

Cost-Benefit-Ratio of Process Model Maintenance

Not good for explaining satisfaction with process modeling initiatives.

However, low cost-benefit-ratio regarding process model maintenance seems to reflect negatively on overall satisfaction with process modeling initiative.
Analysis possibilities of applied modeling method seems to be a fairly good indicator (with a few exceptions) for explaining or detecting satisfaction or dissatisfaction with overall process modeling projects and especially positive or negative effort-utility-ratios.
Existing BPM languages are not ideal: 51% of banks were not satisfied with available methods and partially even willing to create own methods.

Many general purpose modeling languages (e.g. EPC, UML AD, BPMN) support automated analysis only to a very limited degree and consume many human resources for modeling.

Combining both ease of modeling and analysis and integrating these aspects into the methods used and tools seems to be a promising approach.
1. On Effort and Utility of Process Modeling in Banks

2. Semantic BPML for Modeling

3. Semantic BPML for Analysis

4. Semantic BPML for Operational Risk Management

5. Semantic BPML for Business Process Compliance

6. Outlook

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Problems of Traditional Approaches

Universal Business Process Modeling Languages

Problems of traditional approaches

- hard to understand
  (domain neutral)
- hard to compare
  (high freedom degrees)
- hard to explain
  (expert knowledge necessary for modeling)
- hardly affordable
  (very detailed modeling / not economically)
- hardly usable
  (missing semantic analysis capabilities)

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Requirements for Solving the Process Modeling Dilemma

Universal Business Process Modeling Languages

Solution

Modeling
- predefined building blocks
- domain-specific languages
- decentralized and distributed modeling activities
- direct interaction with business specialists
- simple syntactical rules

Use / Analysis
- comparison of models
- goal-focused modeling
  (relevance / economically)

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Solution: Domain-Specific Semantic BPML

Universal Business Process Modeling Language

- Document/Information Comes In
- Enter Data into IT
- Verification of Document/Information
- Forward Document/Information

Semantic BPML

Domain-specific process building blocks for public sector which resembles banking sector in many ways

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Comparison of SBPML and EPC

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Sample Process from a Bank Using SBPML Method

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Views of the SBPML Method

Organizational View

„Who carries out an activity?“
Organizational Model

Business Object View

„What is being processed / produced?“
Business Object Model

Process View

„What is being done how?“
Process Building Block

Resource View

„What is being used / required?“
Resource Model

Organizational Model

Business Unit
Dep. 1
Dep. 2
Office 10
Role
Decedent’s Estate Specialist
carried out by

Process View

Process
Enter credit application data into IT system
Input
Output

Resource View

Uses / requires

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Modeling Using Views of the SBPML Method

Business Process View

"What is edited/created?"

Application

Credit Application

Business object model

is Input

Process building block

Enter credit application data into IT system

Carried out by

Who carries something out?"

Organisation View

Head

Org. 1

Org. 2

Org. 3

Div. 10

Unit 101

Unit 102

Resource model

With what is something carried out?"

IT System

SAP

Resource View

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Concept of a Process Building Block

- **Type**
  - Define amount of types (building block set)
  - Evaluable semantic
  - Association of a definite symbol

- **Free short name**
  - Free vocabulary / higher readability
  - Open meaning

- **Attribute types**
  - Configurative attributes
    - Definite semantic / details of the building blocks
  - Operational attributes
    - Evaluability / measurement of model evidence
  - Descriptive attributes
    - Free additions like comments and notes

- **Relationship types**
  - Organisation (internal/external)
  - Business objects
  - Resources
Introduction of Configurative Attributes

- Precise description of activities with regards to content

- Reduction of the number of process building blocks

- Unchanged analyzability
  - E.g. „Where in the present process does the integrity check take place?“
■ Facilitation of the evaluation of process elements

■ Allowance of complex analysis across multiple processes
  □ E.g. comparison of input- and output channels in different organisational units

■ Dependent on the modeling objective modifications are needed
  □ E.g. capturing of time or of information about the degree of utilisation
  □ It has to be checked if it is possible to capture data in advance
Integration of Information about the Control Flow by the Use of Attributes

Documents have to be checked for completeness. Missing documents were handed in.

Determine channel of additional claim.

Verification Components

Completeness

Reasonability

Data Reconciliation

Responsibility

Deadline

Completeness of documents

XOR

Verify documents.

Request documents via mail.

Request documents via fax.

Request documents via phone.

Perform a formal verification.

Verification Results

Request Channel

Completeness

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Element Types in the Process View

- **Process**
  - Atomic (entirely or not at all) utilised by the client
  - Basis: product documentations of the organization
  - Concerning inner (support processes) and outer tasks (core processes)

- **Sub-process**
  - Specific for a process (no reutilisation)
  - Basically within one organisational unit (e.g. one functional area)

- **Alternative sub-process**
  - Relevant differences in the used building blocks with valuable amount of occurrences

- **Process building blocks**
  - Encapsulates the type of activity
  - Charged with several attributes
  - Basically sequential chain
### Problem Identification

<table>
<thead>
<tr>
<th>Objective of a Solution</th>
<th>Design and Development of Artefact</th>
<th>Demonstration of Artefact’s Application</th>
<th>Evaluation of Artefact</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Case 1: Specialised Bank</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Case 2: Universal Bank</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specialized Bank:
- 34 banking processes with
- 84 subprocesses,
- 258 process variants and
- 693 activities in the form of PBBs

- specialised bank, focusing only on instalment credits (1 product)
- bank was operating in Germany and Austria with 60 subsidiary credit shops in different cities
- it employed over 1,000 people in 2008,
- who altogether as a bank served 443,000 customers,
- totalling a credit volume of 4.9 billion euros.

### Universal Bank:
- 227 process models, which comprised
- 334 subprocesses,
- 813 variants and documented
- 2,897 activities in the form of PBBs

- universal bank from Russia, offering a wide range of products, including cash services, credits, deposits, cards and payments
- banking activities spread over multiple regional branch offices
- it employed over 2,000 people in 2008 in 132 subsidiary offices in South Russia,
- who served 37,000 small and medium enterprises, had over 160,000 depositors and
- issued credits in a volume of 94.2 billion roubles

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**Business Process Modeling and Analysis in Banks**

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5 key changes

- Necessity to model system activities
- Necessity to construct domain-specific process building blocks and corresponding attributes for financial service providers including possibility to model system activities.
- Necessity to construct domain-specific process building blocks and corresponding attributes for financial service providers including possibility to enhance the original control flow on the subprocess but variant or process building block level.
- Necessity to construct domain-specific process building blocks and corresponding attributes for financial service providers including possibility to enhance the original control flow on the subprocess but variant or process building block level.
- Necessity to construct domain-specific process building blocks and corresponding attributes for financial service providers including possibility to enhance the original control flow on the subprocess but variant or process building block level.
- Necessity to model subprocess bundles for purpose of offering not only complete processes to external service providers (e.g. other banks), but also partial processes in terms of finegranular business services (coherent parts of processes with a well-defined economic input and output).
- Necessity to model subprocess bundles for purpose of offering not only complete processes to external service providers (e.g. other banks), but also partial processes in terms of finegranular business services (coherent parts of processes with a well-defined economic input and output).
- Necessity to model process maps / frameworks for managerial view on process landscape.
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Introducing the Concept of Process Maps to SBPML

Process Map

Business Area

Steering Bank
- Control Credit Risk Portfolio
- Develop New Credit Product

Sales Bank
- Perform Credit Consulting
- Sell Credit

Production Bank
- Process Credit Application
- Perform Credit Workout
- Close Credit

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Introducing the Concept of Value Creating Subprocess Bundles

Abstraction and Aggregation Levels

Value Creating (Sub)process Bundle

Control Flow

External Process

Subprocess

Subprocess Variant

Process Building Block

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Introducing the Extended Control Flow Concept

Old Control Flow Concept

Subprocess I
- Variant A
- Variant B
- Variant C

Subprocess II
- Variant A
- Variant B

New Control Flow Concept

Subprocess I
- Variant A
- Variant B
- Variant C

Subprocess II
- Variant A
- Variant B
Introducing New Semantics to SBPML

SBPML Process Building Blocks and their Sets for Banks

From originally 24 PBBs from public administration sector 8 were merged into 4 PBBs, 1 PBB was eliminated (as it was not used in banks) and 5 PBBs were added (as these described frequent activities in banks).

Original PICTURE specification included 163 attributes. In new SBPML specification 11 attributes were changed, 17 attributes (specific to public administrations) were removed and 149 attributes were added. This resulted in 304 analyzable attributes.

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Potential Process-Based Weakness Identification?

How can potential process weaknesses be detected in an automatic way?

First idea: by systematically analyzing well-structured information that business process models contain – esp. those that are semantically enriched.
## Typical Process Weaknesses in Banks

<table>
<thead>
<tr>
<th>Process Weaknesses</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media break</td>
<td>Change in medium or channel, e.g. from electronic format to paper</td>
</tr>
<tr>
<td>Redundant use of documents</td>
<td>Creation of various copies of a document</td>
</tr>
<tr>
<td>Lack of standard templates</td>
<td>Availability of different templates for same document</td>
</tr>
<tr>
<td>Unclear storage location for documents</td>
<td>Place for storage of original document is not defined and leads to increased search time</td>
</tr>
<tr>
<td>Inefficient output channels</td>
<td>Transport of documents e.g. via postal services may result in long transport times and media breaks</td>
</tr>
<tr>
<td>Inefficient input channels</td>
<td>Incoming documents and information come in through inefficient channels such as postal mail</td>
</tr>
<tr>
<td>Lack of integration of different channels</td>
<td>Incoming and outgoing channels are not integrated. As a result, documents get lost or media breaks occur</td>
</tr>
<tr>
<td>Lack of transparency and traceability</td>
<td>Process progress is not transparent. Too much time is spent on waiting times, etc.</td>
</tr>
<tr>
<td>Redundant use of IT</td>
<td>Different IT systems are used for the same process by different departments/people</td>
</tr>
<tr>
<td>Lack of system integration</td>
<td>The usage of many systems that are baldy integrated leads to inconsistent data, outdated information, etc.</td>
</tr>
<tr>
<td>Redundant data sets</td>
<td>Unclear specification of competency in master data management can lead e.g. to an overwriting of data</td>
</tr>
<tr>
<td>Multiple formats</td>
<td>The same information is stored on multiple formats/media</td>
</tr>
<tr>
<td>Needless checks and signatures</td>
<td>Many checks and document signatures are there for historic reasons but do not have a function anymore</td>
</tr>
</tbody>
</table>
Process Weakness Types Formalized in SBPML Notation

Patterns indicating Media Breaks

Patterns indicating Information Deficits

Patterns indicating Manual Activities with Automatization Potentials

Simple Pattern

Complex Pattern

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Lab Experiment Design for Automating Process Analysis

Goal of Lab Experiment:
Demonstrate that process weakness analysis is easy using SBPML and gather data as proof for effectiveness and efficiency.

Phases of the Laboratory Experiment for Demonstrating and Evaluating the Weakness Detection Approach Based on PICTURE PBB Patterns

Phase 0: Preparation
- Banking case selection: a bank institute was chosen, as well as a process to study.
- Process case selection and preparation: a typical banking process was chosen and translated into the PICTURE notation since the process was given in the EPC notation.
- Participant selection: participants for analysis of process models were chosen and allocated to three groups, as well as experts from bank for validation of analysis results.
- Experiment setup: instructions for all participants were developed, as well as the laboratory environment and materials to be given to each participant were prepared.

Phase 1: Individual Process Model Analysis
- Group A: "Manual EPC Analysis": probands from this group (4 BPM experts) each individually and manually analyzed the given EPC process model and tried to detect textually predefined process weaknesses in the process model.
- Group B: "Manual PICTURE Analysis": probands from this group (4 BPM experts) each individually and manually analyzed the given PICTURE process model and tried to detect textually predefined process weaknesses in the process model without knowing about weakness patterns.
- Group C: "Automatic PICTURE Analysis": the proband from this group (BPM expert) used a computer to automatically detect our predefined weakness patterns formalized in the PICTURE notation within the digitally available PICTURE process model.

Phase 2a: Group Consensus
- Group A: "Manual EPC Analysis": probands from the group teamed to find a consensus on the weaknesses they detected.
- Group B: "Manual PICTURE Analysis": probands from the group teamed to find a consensus on the weaknesses they detected.

Phase 2b: Consolidation
- Consolidation of Weakness Detection Results for Validation: all weakness results from previous group phases of each group were consolidated into a final EPC process model to allow the bank to validate which of all the detected weaknesses were actually detected correctly by the different groups and even probands.

Phase 3: Validation of Detected Weaknesses
- Validation of Weakness Detection Results: the BPM department manager in conjunction with the head of the production department from the participating bank, who was responsible for the everyday execution of the business process, validated each detected weakness and gave a feedback if it was correctly identified as a process weakness, as well as gave a reason for each validation result regarding each weakness (i.e., why a weakness was actually a weakness according to the bank or not).
Demonstration: Results of Lab Experiment – EPC

Intermediate results of Lab Experiment:
- Process weakness analysis with EPCs is manually possible but time-consuming

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Intermediate results of Lab Experiment:

Process weakness analysis with Semantic BPML is manually and automatically possible and less time-consuming.
## Evaluation: Effectivity of Process Weakness Analysis

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Types</td>
<td>Weakness Types</td>
<td>Weakness Patterns</td>
<td>Detected “Potential” Weaknesses</td>
</tr>
<tr>
<td>Simple Patterns</td>
<td>Information Deficit</td>
<td>Request Document / Information</td>
<td>(15), 19</td>
</tr>
<tr>
<td>Unnecessary Control Activities</td>
<td>Perform Investigation</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Automation Potential</td>
<td>Request Document / Information</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Enter Data into IT</td>
<td>(10)</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Formal Verification of Document / Information</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Archive Document / Information</td>
<td>12/13, 23</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Create New Document / Information</td>
<td>11, 20</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Document / Information Goes Out (triggered manually)</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Document / Information Goes Out (not 100% electronically)</td>
<td>17</td>
<td>100%</td>
</tr>
<tr>
<td>Complex Patterns</td>
<td>Organizational Breaks</td>
<td>Change in Executing Organizational Unit for Process</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Media Breaks</td>
<td>Two different IT systems in a process flow</td>
<td>8</td>
</tr>
<tr>
<td>Sum for Simple and Complex Patterns</td>
<td></td>
<td></td>
<td>11= 9+(2)</td>
</tr>
<tr>
<td>Correctly + (Incorrectly) Detected Weaknesses for Simple Patterns</td>
<td></td>
<td></td>
<td>10= 8+(2)</td>
</tr>
<tr>
<td>Correctly + (Incorrectly) Detected Weaknesses for Complex Patterns</td>
<td></td>
<td></td>
<td>1= 1</td>
</tr>
</tbody>
</table>

**Correctness:** % of correctly identified weaknesses of detected “potential” weaknesses  
**Completeness:** % of all “actual” weaknesses that were also detected  

**Detected “Potential” Weaknesses:** The numbers correspond to the numbers from the potential weaknesses (results from phase 2a of the laboratory experiment) as depicted in the process models in Figures 6, 7, 8 and 9. Numbers in parentheses indicate detected weaknesses, which the bank did not see as actual weaknesses. Numbers without parentheses indicate detected weaknesses, which the bank did see as actual weaknesses.
## Evaluation: Efficiency of Process Weakness Analysis

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Phase 1: Individual Process Model Analysis</th>
<th>Average</th>
<th>Phase 2a: Group Consensus</th>
<th>Sum (of Phase 1 and Phase 2a)</th>
<th>Phase 3: Validation of Detected Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Proband B (BPM Student) 11:53 Min.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Proband C (BPM Student) 29:34 Min.</td>
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<tr>
<td></td>
<td>Proband D (BPM Student) 20:05 Min.</td>
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<td></td>
<td>Proband E (BPM Student) 25:00 Min.</td>
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<tr>
<td></td>
<td>Proband F (BPM Student) 26:06 Min.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Group B: “Manual PICTURE Analysis”</strong></td>
<td>Proband G (BPM Student) 35:45 Min.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Proband H (BPM Student) 18:30 Min.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Group C: “Automatic PICTURE Analysis”</strong></td>
<td>Proband I (BPM Research Assistant) ~ 0:10 Min.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Group D: “Validators”</strong></td>
<td>Proband J (Head of BPM Department of Bank) ~ 60:00 Min.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Proband K (Head of Production Department of Bank) ~ 20:00 Min.</td>
<td></td>
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</tbody>
</table>
Evaluation: Findings & Limitations

**Modeling:**
- Identification of a stable set of building blocks for core banking processes
- Simple modeling due to the limited set of building block alternatives
- Fast modeling compared to traditional modeling

**Analysis:**
- Process models useful for analyzing IT investment decisions, for process comparisons, and for IT implementation analyses (esp. for WFMS and DMS because building blocks focus on information and document flows).
- Automatically identifying weaknesses in business processes possible

**Limitations:**
- SBPML method focuses on core banking processes (mainly “production banks”). Not yet proven in “sales banks” (upcoming case study this year) or “steering banks”.
- Typical (domain-neutral) supporting processes like HR, accounting, IT department etc. not tested for modeling
## Business Process Modeling and Analysis

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4. Semantic BPML for Operational Risk Management
5. Semantic BPML for Business Process Compliance
6. Outlook
Integrating a Risk View into SBPML

Organizational View
- „Who carries out an activity?“
  - Organizational Model

Business Object View
- „What is being processed / produced?“
  - Business Object Model

Process View
- „What is being done how?“
  - Process Building Blocks
  - Process Variants
  - Subprocesses
  - Processes

Risk View
- „Which risk is inherent?“
  - Risk Model with hierarchical Risk Types (Basel II) and Attributes

Resource View
- „What is being used / required?“
  - Resource Model

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Operational Risks Building Blocks and Attributes

Risk Character

Risk Attribute

Likelihood of Occurrence

Average Damage

Risk Manager

Risk Type dependent attribute (e.g. 4 eyes principle)

Risk Type

Execution, delivery and process management

Risk Pictogram

Risk Description

Entering wrong credit limit

Risk Attributes

Manager credit process

Autom. plaus. check

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Business Process Modeling and Analysis in Banks
Risk Type Annotation Related to Basel II Risk Categories

**External fraudulent actions**

- Business objects (e.g., document falsification), activities, sub processes, processes, process landscapes

**Internal fraudulent actions**

- Resources (job positions), activities, sub processes, processes, process landscapes

**Business interruptions/ system failures**

- Resources (Systems: IT and communication), activities, sub processes, processes

**Safety in the workplace**

- Resources (job positions), activities, sub processes, processes, process landscapes

**Material damage**

- Resources (systems, assets), activities, sub processes, processes, process landscapes

**Customers, products, business conventions**

- Resources (job positions), process output, activities, external stakeholders (customers)

**Execution, delivery, process management**

- Activities, sub processes, processes, process landscapes, external stakeholders (suppliers, customers)
Relating Risk Types to SBPML Constructs

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Operational Risk Modeling in Banks

Risk View

Separation of Duties

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<thead>
<tr>
<th>Operation</th>
<th>Controlling Officer</th>
<th>Approving Officer</th>
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</thead>
<tbody>
<tr>
<td>Initial Credit Approval</td>
<td>Document Completeness Check</td>
<td>Final Credit Approval</td>
</tr>
<tr>
<td>Credit Booking</td>
<td>Credit Payout</td>
<td>Credit Payout Control</td>
</tr>
</tbody>
</table>

Internet Credit Process

- Document Completeness Check
- Initial Credit Approval
- Credit Booking
- Final Credit Approval
- Credit Payout
- Credit Payout Control

Risk View

Transaction Capture, Execution and Maintenance

- Incorrect data entered
- No insurance against fraud
- No business strategy

Fraud and Manipulation

- Cheque fraud
- Bank fraud
- Payment officer

Systems Failure

- System failure
- User error
- Credit system failure

Business Process Modeling and Analysis in Banks

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Kernprozess 
"Nachlassbearbeitung" 
Teilprozess "Nachlassunterlagen sichten"

Beispielprozess in PICTURE-Notation

Attribute

Operational Risk Analysis in Banks

Teilprozess "Erben ermitteln"
Variante "Erbe ermittelbar"

Variante "Erbe nicht ermittelbar"

Teilprozess "Nachlassunterlagen sichten"
Dokument/Information geht ein
Nachlassfall liegt vor
Dateneingabe in die EDV
Profil des Kunden auf "verstorben" setzen
Dokument/Information anfordern
Beglaubigte Kopie der Sterbeurkunde anfordern
Dokument archivieren
Kopie der beglaubigten Sterbeurkunde archivieren

Likelihood of Occurrence

Risk Map

Operational Risk Category

Extent of Loss

Eingangskanäle

Transport- und Liegezeit Dauer
2 Tage

Fallzahl p. a.
2.500

Stelle Nachlass-Bearbeiter

Ausgangskanäle

Operational Risk Category

Eingangskanäle

Operational Risk Category

Eingangskanäle

Operational Risk Category

Eingangskanäle

Operational Risk Category

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Operational Risk Category

Eingangskanäle
1. On Effort and Utility of Process Modeling in Banks
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Control Flow Compliance Business Rules

Process (Control Flow) Compliance Business Rules

Global Scope

(a) leads to (b)

Activity A

Before Scope

(c) precedes (d)

Activity B

Legend

- Process Start
- Process End
- leads to
- precedes
- Successor Constraint
- Predecessor Constraint
- Not Existant Constraint

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Temporal Compliance Business Rules

Process (Control Flow) Compliance Business Rules

Legend:
- Temporal Constraint
- Time / Duration
- Time / Duration Attribute

Temporal Rules:
- Activity A
- 2 Days
- Activity B

(r)
Organizational Compliance Business Rules

Separation of Duties

(t) Process A

(u) Subprocess A

(v) Variant A

Four-Eyes-Principle

Legend

- Four-Eyes-Principle
- Separation of Duties
Tool-Support for Business Process Compliance Checks

Business Process Modeling and Analysis in Banks

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Business Process Modeling and Analysis

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Contribution, Limitations and Outlook

BPM Study: contributed to research on status quo of BPM in banking sector through research study

Process Modeling: created and evaluated a purposeful semantic business process modeling language designed to the needs of the banking sector

Process Analysis: defined and evaluated a method to systematically and automatically identify process weaknesses in business process models using semantic patterns

Risk Modeling: created and evaluated a new approach to automatically analyze business process models using semantic patterns

Risk Analysis: suggested first operational risk analysis reports enabled by an integrated approach to BPM and operational risk management

Compliance Modeling: defined semantic business rules for process-oriented modeling of compliance-related business rules

Compliance Analysis: evaluated an IT artifact with regard to automatic evaluation of business process model compliance

Design Science Research Method: Validated the design science research methodology in a series of research projects to engineer purposeful artifacts for business process modeling and analysis

Limitations

BPM Study: limited number of banks and countries were analyzed

Process Modeling: limited types of banking processes analyzed and more financial services processes may be necessary for further refinement

Process Analysis: Semantic process weakness patterns are only first step, detailed catalogue needs to be made

Risk Modeling: approach is limited to modeling of operational risks in relation to Basel II

Risk Analysis: information need for risk analysis reports still needs to be explored

Compliance Modeling: business rules may not yet be complete and efficiency of modeling approach remains to be tested

Compliance Analysis: more processes with expert knowledge on compliance rules need to be evaluated

Engineering and Behavioural Research: Research coming from design science could inspire new theories on information modeling and analysis

Outlook

Business Process Modeling and Analysis in Banks

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Summing Up – Overview of Research Areas for Joint Research

- Risk Modeling
- Process-oriented Operational Risk Management
- Business Process Modeling and Analysis in Banks
- BPM in Banks Status Quo Study
- Compliance Modeling
- Business Process Compliance Management
- Competence Center “BPM in Financial Industries”
- Analysis
- Process Analysis
- Compliance Analysis
- Risk Analysis
- Dissemination

Business Process Modeling and Analysis in Banks

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Business Process Modeling and Analysis in Banks