A Framework to Evaluate Business Process Modelling Methods

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Agenda

- Definitions
- Research motivation + scope
- Research questions + more scoping
- Research approach
- Research design
- On evaluation criteria
- Publications and next steps
Preamble

Currently fighting with research questions and scope
Acronyms

- BP Business Process
- BPMM Business Process Modelling Method
- DS Design Science
- IS Information Systems
Definitions

- Research motivation + scope
- Research questions + more scoping
- Research approach
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Definitions

- **Process**
  
  Set of interrelated or interacting activities which transforms inputs into outputs [ISO 9000]
  
  - We adopted this definition because it is
  - Agreed upon by many practitioners
  - Broad
  - It includes all kinds of “Business Processes” for which people may say “We (want to) model our business processes”
  - Entails intentional specifications, case based specifications, Petri nets like specifications

- **Business Process (BP)**

  A business process is a process intended to achieve a business outcome
Definitions

- **Process Model**
  - Formal description of the process
  - Encompasses graphical and non graphical models
  - As-is, to be, etc.

<table>
<thead>
<tr>
<th>Level</th>
<th>Mental representation (think it!)</th>
<th>Model (document it!)</th>
<th>Action (perform it!)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Definition</td>
<td>Process</td>
<td>Process model</td>
<td>Process performance</td>
</tr>
<tr>
<td>1 Instantiation</td>
<td>Mental representation of a process instance</td>
<td>Process model instance + Process performance trace</td>
<td>Process instance performance</td>
</tr>
</tbody>
</table>
Business Process Modelling Method (BPMM)

= our “evaluand”

Context

• BPMMs are usually referred to in the IS domain or in the context of Enterprise Engineering.

Definition

• Various IS related method definitions exist. For our study:
  – BPMMs are “methods” that are used to model business processes.
  – Affordance oriented definition: we consider something as a BPMM because people say they use it as a BPMM.
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Research motivation
to evaluate Business Process Modelling Methods (BPMMs)
Research motivation: two perspectives

- Perspective 1: Stakeholders need to know what can be expected from a BPMM + its scope and limits
  "in general", not bearing in mind a specific problem
  E.g. Employees are required to use a BPMM in their organisation (corporate)
  E.g. Method promoters want to improve their communication based on more adequate information

**Stakeholders**: People who are interested by BPMM evaluation results (evaluation beneficiaries). Stakeholders include **BPMMs users**, who

- Model with
- Choose
- Promote/Sponsor
- BPMMs
Research motivation: two perspectives

- Perspective 1: Stakeholders need to know what can be expected from a BPMM + its scope and limits
  Stakeholders want practical information
Research motivation: two perspectives

- Perspective 1: Stakeholders need to know what can be expected from a BPMM + its scope and limits
  Stakeholders want practical information
  - Understandable without knowing beforehand evaluated BPMM’s concepts
Research motivation: two perspectives

- Perspective 1: Stakeholders need to know what can be expected from a BPMM + its scope and limits
  
  Stakeholders want practical information
  - Independent from tool vendors

Stakeholders

Don’t judge a book by its cover
Research motivation: two perspectives

- Perspective 1: Stakeholders need to know what can be expected from a BPMM + its scope and limits
  Stakeholders want practical information
  - Stating BPMM Value in Use
Research motivation: two perspectives

- **Perspective 1:** Stakeholders need to know what can be expected from a BPMM + its scope and limits
  
  Stakeholders want practical information
  - Stating BPMM Value in Use

  **Class of problems**
  - BPMM appropriateness to classes of problems from users’ perspective
Research motivation: two perspectives

- Perspective 2: Stakeholders need to choose a BPMM for a specific problem

Stakeholders

Which BPMM is most appropriate for my problem?

Single problem
Research motivation: two perspectives

- Perspective 2: Stakeholders need to choose a BPMM for a specific problem

  Well...
  - People often choose amongst BPMMs they know
  - People may not be aware of BPMMs differences
  - Usually, no appropriateness evaluation is performed when selecting a BPMM
Motivation: two perspectives

- Perspective 2: Stakeholders need to choose a BPMM for a specific problem.
  - Stakeholders may want to compare BPMMs.
    - Here again they need practical and understandable information.
Motivation: two perspectives

- Perspective 2: Stakeholders need to choose a BPMM for a specific problem
  - Stakeholders may want to compare BPMMs
    - Here again they need practical and understandable information

Stakeholders

Which BPMM is most appropriate for my problem?

- Single problem
  - Class of problems
  - Class of problems
  - Class of problems

BPMM appropriateness to classes of problems from users’ perspective

- BPMM
- BPMM 2
- BPMM 3
Research scope

We partially address users’ problems that are stated in the « motivation » section
Research scope: evaluate BPMMs value in use

BPMM authors

BPMM design and engineering

BPMM expected value

BPMM use

BPMM value in use

Value for BPMM users’ actual goals

BPMM users: people who
Model with
Choose
Promote/Sponsor
Benefit from
BPMMs

BPMM users

Affordance

Classes of problems

Goal and context of use (classes of problems)

Implementation (use in projects)

Requirements engineering

Design

Evaluation

Implementation (use in projects)

Evaluation

Evaluation

Evaluation
Motivation to focus on users’ perspective

People model BP with BPMMs according to people’s goals

People are involved in BP

BP models are read (at least) by people

People are central in BP modelling

We choose to focus on users’ perspective
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Still unstable Research questions

From BPMM users’ perspective, for which purposes and in which contexts does a given BPMM bring its highest value?

For which classes of problems is a BPMM value highest?

What classes of problems are addressed in practice by a BPMM?

What is a BPMM value for these classes of problems?

What is a BPMM value in use from users’ perspective?

What strategies and criteria can we use to evaluate BPMMs value in use from users’ perspective?

Presentation’ focus
BPMM evaluation: research scope

- **what for**
  
  Increase knowledge about BPMMs value in use
  
  ...to build a future framework to recommend the use of a BPMM for a specific problem?

- **what**
  
  - Evaluate BPMM value in use towards BPMM value as intended by BPMM authors
  
  Evaluate BPMMs’ value in use towards users’ purposes
  
  Criteria: from DS literature (Fit for purpose, Effectiveness, Efficiency, Ease of use)
  
  Context: problem + goal

- **when**
  
  Ex post evaluation
  
  - Ex ante evaluation

- **where**
  
  In projects where BP modelling happened

- **how**
  
  Naturalistic evaluation
  
  - Case studies: evaluated BPMMs are selected so that they are dissimilar according to a BPMM typology (Winter)
  
  - Experimental evaluation

- **who**
  
  Sources of information: BPMMs users
  
  Evaluators: Researchers
  
  Evaluation beneficiaries: BPMMs stakeholders (including users)
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Research approach: Design Science approach

Concerns:
- Design and Engineering
- Evaluation
  - Evaluation criteria
  - Evaluation frameworks
  - Evaluation methods

Source:
- Literature about Design science
- Method engineering
- Affordance: Goal-Value / BPMM

A BPMM is a design artefact, it addresses classes of problems

Class of (similar) problems = typical context + typical goal
Research approach: Design Science approach

- Research questions should guide the selection of an appropriate research method
- DS paradigm fits our research questions

<table>
<thead>
<tr>
<th>Design Science (DS)</th>
<th>Routine Design (RD)</th>
</tr>
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<tbody>
<tr>
<td>General solution</td>
<td>Specific solution</td>
</tr>
<tr>
<td>Produces new knowledge (novelty)</td>
<td>Uses the current/existing knowledge</td>
</tr>
<tr>
<td>Unknowns (not known) things in the planned design</td>
<td>Design is known (replication)</td>
</tr>
<tr>
<td>Contributes to the knowledge base (a development of</td>
<td>Does not contribute to the knowledge base</td>
</tr>
<tr>
<td>scientific knowledge)</td>
<td>(An application of scientific knowledge)</td>
</tr>
<tr>
<td>Solve unaddressed important problems in a new and</td>
<td>Solve problems using existing knowledge</td>
</tr>
<tr>
<td>effective way</td>
<td></td>
</tr>
<tr>
<td>Technology Invention</td>
<td>Technology Application</td>
</tr>
<tr>
<td>Addresses abstract or a class of problems for a class of</td>
<td>Addresses a particular problem for a specific</td>
</tr>
<tr>
<td>organizations and stakeholders</td>
<td>organization and stakeholders</td>
</tr>
<tr>
<td>How to resolve a type of problems</td>
<td>Solve one case only</td>
</tr>
</tbody>
</table>

- Comparison between DSR and Routine Design (Alturki et al., 2012)

The design science paradigm explores the art of building and evaluating artefacts
equally information systems related artefacts
with a strong importance given to the behavioural aspects (Hevner et al., 2004)
Design science research cycles

Build the BPMM evaluation framework

Evaluate the BPMM evaluation framework

(Hevner 2004)
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Research design

- Literature review
  - BPMMs evaluation criteria
  - Expected classes of problems addressed by BPMMs
  - Design cycle to design frameworks

- Design BPMM evaluation framework
  - Evaluation output: descriptions, from users’ perspective, of achieved BPMM value in use in their projects + expected value in use for classes of problems
  - Ex post naturalistic evaluation

- Case studies
  - Evaluate several BPMMs (DEMO is one of these) on several projects with framework 1
  - Collect data about BPMM use and addressed problems

- Case studies analysis
  - Focus 1: evaluation of framework limits + need for modifications
  - Focus 2: typology of users’ classes of problems in the projects
  - Focus 3: BPMMs evaluation results regarding users’ classes of problems

- Conclusions
  - About case studies analysis
  - About requirements on a typology of classes of problems to support the prediction of BPMMs degree of appropriateness towards specific problems (ex ante naturalistic evaluation)
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Evaluation criteria: evaluate BPMMs as generic artefacts with a focus on methods aspects

BPMMs are designed to solve classes of (similar) problems

BPMMs are “generic methods”

Methods are artefacts

Generic methods are generic artefacts

BPMMs are **generic artefacts**

“A generic artefact consists of language aspects (*construct*) aspects referring to result recommendations (*model*) and aspects referring to activity recommendations (*method*) as well as instantiations thereof (instantiation).”

- We want to evaluate artefacts that
  - Are used to solve classes of problems (generic)
  - Are used to model business processes (goal = BPM)
  - Are called BPMMs by their users

- Evaluation criteria = generic artefacts evaluation criteria with a focus on method aspects
Evaluation criteria

Inspired and adapted from

Criteria of Progress of DS IS theories
(Aier and Fischer 2010)
Evaluation criteria

- Ease of use
- Effectiveness
- Efficiency, Return on modelling effort
- Impact on the environment and on BPMMs users
- Operationality
- Fidelity with real world phenomena
- Generality
Evaluation criteria

- **Ease of use**
  - Learning curve
  - Users profiles

- **Effectiveness**
  - the degree to which the BPMM meets its goal and achieve its desired benefit in practice (Venable, Pries-Heje, and Baskerville 2012)
Evaluation criteria

- **Efficiency, Return on modelling effort**
  
  The degree to which the modelling process utilises resources such as time and people (March and Smith 1995)

  A quotient of output and input (Aier and Fischer 2010).

  "If an artefact resulting from a design theory is used very often, its efficiency might be the best criterion for measuring its utility." (Aier and Fischer 2010)

  Note: Evaluation criteria (or at least their weight) may be context dependent
Evaluation criteria

- Impact on the environment and on BPMM users
  A side effect
  "Side effects can increase or decrease utility" (Aier and Fischer 2010)

- Operationality
  "the ability to perform the intended task or the ability of humans to effectively use the method if it is not algorithmic" (March and Smith 1995; Aier and Fischer 2010)
Evaluation criteria

- **Fidelity with real world phenomena (external consistency):**
  To what extent do the constructs of the BPMM under evaluation reflect business concepts that stakeholders have an interest to model.

- **Generality**
  i.e. “*broad purpose and scope*” (Aier and Fischer 2010)
  Possibility to tailor a BPMM to specific business context
  List of classes of problems that a BPMM addresses
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Exploratory study to gain insights about DEMO: 13 qualitative interviews (2012)

Two related papers


Next steps

- Refine research questions
- Structure PhD effort
- Structure literature review results
- Design BPMM evaluation framework
- Evaluate BPMM evaluation framework
- Conclude
Thank you very much for your attention

Remarks and questions are welcome