Fundamentals of Business Process Management

Session 2

Jan Mendling
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<td>15 July</td>
<td>9:00 – 10:30</td>
<td>Introduction to BPM</td>
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<td>15 July</td>
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<td>Process Discovery and Quality Assurance</td>
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<td>MON</td>
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Essentials of BPMN
BPM Lifecycle

- Process identification
- Conformance and performance insights
- Process architecture
- As-is process model
- Process discovery
- Executable process model
- Process monitoring and controlling
- Insights on weaknesses and their impact
- Process analysis
- To-be process model
- Process implementation
- Process redesign
Different Levels of a Process Architecture

Level 1

Process Map

Level 2

Abstract Process Models

Level 3

Detailed Process Models (e.g. BPMN)
Essentials of BPMN
The Vienna Coffeehouse Process

Coffee Lover

Thirsty

Go to cafe

Order coffee

Listen to piano

Read newspaper

Done

Coffee Shop

Coffee Lover

Barrista

Waiter

Take order

Order cancelled

Store open

Make coffee

Hand coffee to waiter

Discard coffee

Coffee is ready

Serve Coffee

Coffee is ready

Pay coffee

Done

Coffee is served
BPMN 2.0 - Business Process Model and Notation

**Aktivitäten**
- Aufgabe
- Transaktion
- Entf. - Prozess
- Auff. - aktivit.

**Konversations**
- Die Kommunikation definiert einen sequenziellen, logisch zusammenhängenden Nachrichtenaustausch.
- Konversationsdiagramm
- Der aufgeführte Kommunikationsschnitt markiert einen Kommunikationsprozess mit mehreren Teilnehmern.

**Choreographien**
- Eine Choreographie-Aufgabe repräsentiert eine Interaktion (Nachrichtenaustausch) zwischen mehreren Beteiligten.
- Choreographie-Diagramm
- Der aufgeführte Teilprozess markiert eine mehrteilige Choreographie mit mehreren Interaktionen.

**Ereignisse**
- Start
- Zwischen
- Ende
- Banker, Unfähigkeiten, Ereignisse, u.a. Äh. am Start oder Ende eines Prozesses.
- Nachricht: Transaktion, Ereignis, Zeitpunkt oder Synchrone Aktion.
- Bedingung: Reaktion auf veränderliche Zustände und Bezug auf Ergebnisse.
- Umsatz: Zwei zusammengehörige Ums-Ereignis repräsentieren einen Prozessabschnitt.
- Fehler: Vollständige oder unvollständige Erteilung.
- Abbruch: Abbruch auf angebotsbasierte Bedingungen, oder Abbruch von Aktionen.
- Regel: Regel oder Regeln der Prozessablauf.
- Aufruf: Aufruf auf definierte Funktionen.
- Parallel: Parallelität auf definierte Funktionen.
- Ablauf: Ablauf von definierten Funktionen.
- Ablauf/Parallel: Eintreten mehrerer Ereignisse.
- Freigabe: Freigabe von definierten Funktionen.
- Freigabe/Parallel: Eintreten mehrerer Freigaben.
- Terminierung: Lösung des Befehls des Prozesses.

**Gateways**
- Exklusiver Gateway
- Ereignis-basierter Gateway
- Parallel Gateway
- Inkludierter Gateway
- Komplexer Gateway

**Datens**
- Ein Datenspeicher ist ein Verhaltens, das die Eigenschaft eines gesamten Prozesses erzeugt wird.
- Ein Datenspeicher repräsentiert eine Gruppe von Informationen, z.B. eine Liste mit Werten von Positionen.

**Poster at Berliner BPM-Offensive http://www.bpmb.de**
Why using BPMN?

Bridging Business and IT

- Process Documentation
- Improvement
- Workflow-Management
- Requirements Elicitation
- Service-oriented Architectures

Easy to Learn

- Via formal training
- Via self-education

camunda services GmbH: BPMN 2008 (127 Participants)
XOR-Gateways

Decision based on Data

Evaluate Credit Risk

Grant Credit

Advanced Credit Check

Reject Credit Request
Wait for Event

Send Invoice [Type Send]

Receive Amount [Type Receive]

Send Reminder [Type Send]

14 days

Fig 4.85. Example of an event-based exclusive or gateway

AND-Gateways

Activates all branches

Synchronizes all branches

Get Order → Update Inventory

Ship Goods

Send Invoice
OR-Gateways

Activates multiple branches (1 or more)

Synchronizes all active branches

Fig 4.86. Example of an inclusive or gateway
OR-Gateways: Dead-Path-Elimination

Activates all branches (positive or negative)

Synchronizes all branches (positive or negative)
Artifacts in BPMN

Data association

Data Object

Data store
One Pool and Several Lanes
Collaboration between Pools

Message Flow
Decomposition: How big is too big?

Decompose if more than 30 elements
Advanced Repetition Patterns
Reusing of Sub-processes
Structured versus unstructured loops

Diagram:
- Ministerial enquiry received
- Assign ministerial enquiry
- Investigate ministerial enquiry
- Finalize ministerial response
  - Until response approved
  - Ministerial correspondence addressed
- Prepare ministerial response
- Review ministerial response
- Response reviewed

Diagram:
- Credit application received
- Check credit history
- Assess application
- Make credit offer
  - Notify rejection
  - Receive customer feedback
  - Credit application processed
- Check income sources
- Decision review requested
- Exit point
- Entry point
A List of Quotes

1. Retrieve suppliers list
2. Obtain quote from supplier
3. Select best quote
4. Emit order

Suppliers database

Order emitted

Note: Complete when 5 quotes obtained
Multiple Instantiation
Temporal Events
Racing between two pools
Boundary Events

- Purchase order received
- Check stock availability
- New customer details received
- Order cancelation request received
- Register new customer details
- Handle order cancelation
- New customer details registered
- Order canceled
- Product not in stock
- Product in stock
Summary

- BPMN is a standardized process modeling language
- Rich set of symbols
- Control flow is defined using gateways
- Artifacts show data flow
- Pools and lanes depict resources
Process Discovery
BPM Lifecycle

1. Process identification
2. Process architecture
3. Process discovery
4. As-is process model
5. Process monitoring and controlling
6. Executable process model
7. Process implementation
8. To-be process model
9. Process redesign
10. Process analysis
11. Insights on weaknesses and their impact

Conformance and performance insights
1. Defining the setting: This phase is dedicated to assembling a team in a company that will be responsible for working on the process.

2. Gathering information: This phase is concerned with building an understanding of the process. Different discovery methods can be used to acquire information on a process.

3. Conducting the modeling task: This phase deals with organizing the creation of the process model. The modeling method gives guidance for mapping out the process in a systematic way.

4. Assuring process model quality: This phase aims to guarantee that the resulting process models meet different quality criteria. This phase is important for establishing trust in the process model.
Who is involved?

Domain Expert

Process Analyst
Challenge 1: Fragmented Process Knowledge

Why can’t I directly provide cash after approval?

I make a photocopy before handing over the application.

We bundle refinancing to get better interest rates.
Challenge 2: Domain Experts think on Instance Level

"Every trip is different."

"You cannot really compare. Our customers go to different places in different seasons using different modes of transportation."

"We can never do anything exactly in the same way. There are so many special conditions."
Challenge 3: Knowledge about Process Modelling is rare

"Could you please tell me, whether this diagram correctly shows your process?“
Expertise of Process Analysts

Problem understanding
- Episodic knowledge available to get to root of problem
- Knowledge organisation helps to structure problem

Problem solving
- Trigger identification (problem-related cues)
- Hypothesis management (formulation and testing of hypotheses)
- Goal setting (what needs to be achieved next)
- Top-down strategy driven by analysis goals

Modelling skills
- Well-structured and laid out
- Systematically labelled
- Explicit start and end points of a process
- Appropriate granularity and decomposition
Process Discovery Techniques

Evidence-based
   Document analysis
   Observation
   Process mining

Interview-based

Workshop-based
Document Analysis

Documents point to existing roles, activities and business objects

Formal documentation in terms of
- Organization chart
- Employment plan
- Quality certificate report
- Internal policies
- Glossaries and handbooks

Forms

Work instructions
Observation

Observe what people do at their workplace
Trace business objects in the course of their lifecycle
Inspect the work environment
Process Mining

"world" (people, machines, components, organizations) supports/controls software system (records events, e.g., messages, transactions, etc.)

specifies configures implements analyzes

models analyzes

(process) model

event logs

discovery

conformance

enhancement
Structured vs. unstructured interviews
Assumption: analyst and stakeholder share terminology
Then, questions target at identifying deviations from standard processing
Workshops

Gather all key stakeholders together
One process analyst, multiple domain experts
Participants interact to create shared understanding
Often: software-supported, a model is directly created during the workshop (separate role)
Model is reference point for discussions
Alternative: brown-paper workshops
# Strengths and Weaknesses

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<th>Strength</th>
<th>Weakness</th>
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| Document Analysis   | • Structured information  
                      • Independent from availability of stakeholders | • Outdated material  
                      • Wrong level of abstraction                                              |
| Observation         | • Context-rich insight into process                                       | • Potentially intrusive  
                      • Stakeholders likely to behave differently  
                      • Only few cases                                                       |
| Automatic Discovery | • Extensive set of cases  
                        • Objective data                                                      | • Potential issue with data quality                                       |
| Interview           | • Detailed inquiry into process                                           | • Requires sparse time of process stakeholders  
                        • Several iterations required before sign-off                           |
| Workshop            | • Direct resolution of conflicting views                                  | • Synchronous availability of several stakeholders                       |
Effort of Process Discovery

Consider that the order process of your favorite online book retailer has ten major activities that are conducted by different persons. How much time do you need approximately for creating a process model that is validated and approved by the process owner? Make appropriate assumptions.
Consider the following two companies.

- Company A is young, founded three years ago, and has grown rapidly to a current toll of one hundred employees.
- Company B is owned by the state and operates in a domain with extensive health and security regulations.

How might these different characteristics influence a workshop-based discovery approach?
Organizing the Gathered Material

1. Identify the process boundaries
2. Identify activities and events
3. Identify resources and their handovers
4. Identify the control flow
5. Identify additional elements.
Process Boundaries

- Under which condition does the process start?
- With which result does it end?
- Which perspective do you assume?
Identify Activities and Events

- Check stock availability
- Check raw materials availability
- Retrieve product from warehouse
- Request raw materials
- Obtain raw materials
- Manufacture product
- Get shipping address
- Ship product
- Confirm order
- Emit invoice
- Receive payment
- Archive order

Order fulfilled
Identify Resources and Handovers

Warehouse & Distribution - ERP System

Seller

Warehouse & Distribution

- Purchase order received
- Check stock availability
- Check raw materials availability
- Retrieve product from warehouse
- Request raw materials
- Obtain raw materials
- Manufacture product
- Get shipping address
- Ship product

Sales

- Confirm order
- Emit invoice
- Receive payment
- Archive order

Order fulfilled
Quality Assurance

Validation

Certification

Semantic Quality

Pragmatic Quality

Syntactic Quality

Verification

Model

assess risk

sign loan contract

archive application
Is this process model of good quality?

Deadlock
Syntactic Quality: Verification
Is this process model of good quality?

Deadlock

Labeling

**Synchronization of both completed branches**
Formulate Labels Adequately

- Activities as Verb-Object
- Events as Object-Passive-Participle
- Conditions with reference to Object
Semantic Quality: Validation

- Validity and
- Completeness

Domain Expert

Process Analyst
Pragmatic Quality: Layout

Models must look nice
Seven Process Modeling Guidelines (7PMG)

G1 Use as few elements in the model as possible
G2 Minimize the routing paths per element
G3 Use one start and one end event
G4 Model as structured as possible
G5 Avoid OR routing elements
G6 Use verb-object activity labels
G7 Decompose a model with more than 50 elements
How to remodel this process?
The reworked process
Summary

- Domain expert and process analyst have different strengths and limitations in process discovery
- There are various discovery methods
- Quality Assurance is important