International Business Process Management

Systematic Use of Knowledge in Business Processes

Dipl. - Kfm. Carsten Brockmann
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Motivation for launch of process oriented knowledge management

PROMOTE

Business Process Oriented Knowledge management (GPO-WM®)

Modelbased knowledge management

KMDL - Knowledge Modelling and Description Language
Motivation for launch of process oriented knowledge management
Motivation for launch of Process Oriented knowledge management

Concentration on processes and IT systems by the process consideration

Business organizational point of view

Are all parameters considered?

Business processes

IT based point of view
Competitive factor knowledge

- Challenges
  - Appearance of expensive errors through not available information
  - Loss of critical knowledge through cutting-out of particular persons
  - Rising decentralization of business - > rising decentralization of knowledge
  - Alongside traditionally knowledge intensive activities, e.g. Product Development or Consultancy, strongly standardized processes as order processing became more and more flexible

- Investigation and improvement of business processes in terms of effective knowledge processing
  - Consideration of documented (explicit) knowledge and knowledge of employees (implicit)

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Allweyer, 1998
## Perceptions in knowledge management

### Technology - Knowledge management as knowledge representation
- Procedures to administrate particular "knowledge objects"
- Reproduction of knowledge in the form of linked knowledge objects inside of information systems

### Organization - Knowledge management as organization composition
- Complete recording of knowledge is possible only in few application areas
- Composition object of knowledge management are processes in which knowledge processing occurs

### People - Knowledge management as learn process
- Processing of knowledge occurs in the internal learning processes of individuals and groups
- Only indirect influence through composition of supporting factors
### Knowledge management in practice - problems

<table>
<thead>
<tr>
<th>Assignement of KM projects in IT area</th>
<th>Consequence: knowledge management = launch of new software application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration on &quot;right&quot; definition of knowledge</td>
<td>Consequence: high time loss with project execution or unsatisfying results</td>
</tr>
<tr>
<td>No integration of KM activities in real life</td>
<td>Consequence: existence of knowledge management solutions parallel to &quot;daily work&quot;</td>
</tr>
<tr>
<td>Concept of the knowledge exchange primarily from the employee's point of view</td>
<td>Consequence: no demand-oriented knowledge management</td>
</tr>
</tbody>
</table>
## Perspective change in knowledge management

### Approach
- Analysis of existing environment = recognition of demand at value adding place

### Challenges
- Boundary of considered processes
- Difficulties by process identification
- Disability of existing BP tools to model processes
- Absence of consideration of special requirements
Knowledge intensity and process complexity

Motivation for launch of Process Oriented knowledge management

- Process complexity
- Wissensintensität

- Product innovation
- Planning
- Information management
- Appeal management
- Leasing
- System development
- Law
- Field analysis
- Promotion
- Law

<table>
<thead>
<tr>
<th>Attribute classes</th>
<th>Dimension</th>
<th>Attributes for ki-BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrative attributes</td>
<td>Organization and culture</td>
<td>Open business structure, e.g. Lattice Structure</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>Area with high R&amp;D dependency</td>
</tr>
<tr>
<td>Process related attributes</td>
<td>Complexity</td>
<td>High amount of process branches</td>
</tr>
<tr>
<td></td>
<td>Variability</td>
<td>High amount of exceptions</td>
</tr>
<tr>
<td></td>
<td>Level of structuring</td>
<td>Low structuring</td>
</tr>
<tr>
<td>Task related attributes</td>
<td>Controlling</td>
<td>Not exact objectives and measurement</td>
</tr>
<tr>
<td></td>
<td>Learning time</td>
<td>Long learning times</td>
</tr>
<tr>
<td>Employee related attributes</td>
<td>Decision latitude</td>
<td>Small decision latitude</td>
</tr>
<tr>
<td></td>
<td>Expertise</td>
<td>High employee expertise</td>
</tr>
<tr>
<td>Resource related attributes</td>
<td>Complexity</td>
<td>complex, strong context dependancy</td>
</tr>
<tr>
<td></td>
<td>Access</td>
<td>Knowledge not easily accessible</td>
</tr>
<tr>
<td></td>
<td>Knowledge kind</td>
<td>Process knowledge</td>
</tr>
<tr>
<td></td>
<td>Knowledge exchange</td>
<td>informal</td>
</tr>
</tbody>
</table>
Use of integrative consideration

- Connection (= integrative consideration) of
  - Business Process Management
  - Knowledge

- Orientation on knowledge intensive business processes means KM measures on the value adding chain
- Change from offer oriented to demand oriented knowledge management requests user acceptance
- Assurance of exact placing of KM projects
- Improved revision and evaluation of KM measures because of direct process relation
- Decrease of complexity in KM projects
Approaches for Business Process oriented knowledge management

Motivation for launch of Process Oriented knowledge management

- Business Process support
- Business Process execution
- Business Process composition

ARIS
KMDL
GPO-WM
PROMOTE
KMDL

according to Strohmaier 2005
PROMOTE
Assumption of PROMOTE

- Business process = the Know-How-Plattform of business

Potentials through integrated knowledge management

- Quality improvement
- Prevention of work duplication through experience transfer
- Time saving through targeted Information-/Knowledge access
- Reduction of interfaces through broad task design
- Elimination of control layers through advanced decision competence

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Karagiannis (2002), p. 65
Differentiation between two knowledge characteristics

- Function knowledge covers the knowledge in process (flows in and between the business processes)
- Process knowledge covers the knowledge about the process

Karagiannis (2002), p. 76f
## Meaning of knowledge flow

### Starting point
- Knowledge intensive task (KIT)

### Core task of business process oriented knowledge management
- Allow optimal knowledge flows between KIT

### Realization of knowledge flow through knowledge processes
- Record and localize
- Transfer and separation
- Generate

> Relevant knowledge processes and their implementation result from business process requirements.

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Examples of knowledge flows

a. Inside of processes
b. Between several equal processes (entity)
c. Between different processes
d. From external
# Possible knowledge processes

## Find contact person
- Search in Yellow Pages
- Search for authors of expert's reports in same cases

## Knowledge spreading
- Mailing Lists or Frequently Asked Questions
- Workshops

## Knowledge storage
- Storage of Lessons Learned

## Knowledge management processes
- Can be modelled as business processes
- Consist of operational KM activities

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Modelling with PROMOTE by example of knowledge searching

Business process

Information

Accumulation

Selection of relevant knowledge

Identification KIT

Knowledge process

Assignment of knowledge management process to business process

Execution of knowledge process in business knowledge context

Organizational Memory
Tool: ADONIS - From Process knowledge to function knowledge

Definition of knowledge intensive activities

Definition of knowledge bearer

Definition of knowledge kinds and form in which the knowledge exist

Analysis of knowledge flows (inside and between processes and persons)
Business Process-oriented Knowledge Management
(GPO-WM®)
Motivation of GPO-WM

- Absence of explicit connection between suggested knowledge management approach and business process
- Adjustment on classical business process modelling but advanced through knowledge aspects
- Consideration of implicit and explicit knowledge
- Process specific deduction of knowledge management actions, which consist of previously identified KM Best-Practices
GPO-WM approach: Integrated business modeling

IUM object classes

<table>
<thead>
<tr>
<th>IUM-class “product”</th>
<th>IUM-class “order”</th>
<th>IUM-class “resource”</th>
</tr>
</thead>
<tbody>
<tr>
<td>passed attributes</td>
<td>passed attributes</td>
<td>passed attributes</td>
</tr>
<tr>
<td>- Ident.</td>
<td>- Ident.</td>
<td>- Ident.</td>
</tr>
<tr>
<td>- Structure (is part of, composed of)</td>
<td>- Structure (is part of, composed of)</td>
<td>- Structure (is part of, composed of)</td>
</tr>
<tr>
<td>- Relations to other objects</td>
<td>- Relations to other objects</td>
<td>- Relations to other objects</td>
</tr>
<tr>
<td>- Functions executed on product</td>
<td>- Functions executed on order</td>
<td>- Functions executed on resource</td>
</tr>
<tr>
<td>- Status in product life cycle</td>
<td>- Status in order life cycle</td>
<td>- Status in resource life cycle</td>
</tr>
<tr>
<td>product-specific attributes</td>
<td>product-specific attributes</td>
<td>product-specific attributes</td>
</tr>
</tbody>
</table>

Generic activity model

"Objects which are processed" (e.g. “Products”)

- Order: stimulates activity
- Action
- Resource: executes the activity

Connectors

- Sequential
- Parallel
- Case differentiation
- Consolidation
- Loops

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Heisig (2002), p. 50f
GPO-WM approach: knowledge activities

- Create knowledge
- Save knowledge
- Spread knowledge
- Apply knowledge

Core process:
- Apply knowledge
- Create knowledge
- Save knowledge
- Spread knowledge
Closed knowledge circuit

Goal & Processing

- Control of proximity of knowledge circuit
- Composition of existing knowledge circuits (formal support)
- If necessary concept of new knowledge circuits on the basis of earlier identified Best-Practices of KM (Mertins et al. 2001)
GPO-KM Composition object

- Process organization
- Information technology
- Controlling
- Guidance system
- Corporate culture

- Apply knowledge
- Create knowledge
- Spread knowledge
- Save knowledge

Value adding

Business processes

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Heisig (2002), S.55
Business process oriented knowledge management (GPO-WM ®)

Tool: Mo²Go

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Heisig, 2002
Model based Knowledge Management
Central point of contact is a business process
Consideration of knowledge intensive operative business process and specific knowledge process
used knowledge term
Knowledge is context specific
Explicit representation of knowledge
Implicit knowledge is represented by knowledge cards

Knowledge processing

Knowledge management

Provide knowledge
- Provide external knowledge
- Create knowledge
- Develop knowledge further
- Update knowledge

Represent knowledge
- Document knowledge
- Prepare knowledge
- Arrange knowledge
- Connect knowledge
- Document meta structure

Transfer knowledge
- Transfer knowledge
- Allocate knowledge
- Search & find knowledge
- Find bearer of knowledge
- Transfer knowledge directly from person to person

Use knowledge
- Apply knowledge in business processes

Delete knowledge
- Identify old, irrelevant knowledge
- delete knowledge from active asset
- Archive knowledge

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Model based knowledge management

Definition

- Systematic approach for planning, analysis and rearrangement of knowledge processing
- Enhancement of 4 level architecture model with knowledge management activities

Implementation

- Launch of knowledge management specific model types
- Representation of knowledge processing in operative business processes
- Modelling of specific knowledge processes
- Model-based navigation through knowledge assets

Initial point for model based knowledge management are business process models in form of EPC

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Allweyer 1998
Business related knowledge is divided in categories by content
Knowledge maps

- Overview of existing knowledge and how it spreads in the company
- Connection of knowledge objects and employees
- Representation of place and content (if necessary document source)
Expansion of business processes with elements of knowledge processing
Specific knowledge process

- Information about knowledge provided and used by process execution for analysis of knowledge handling

- Documented project knowledge
- Knowledge about knowledge demand
- Knowledge about knowledge structure
- Documented branch knowledge
- Documented knowledge about application area

New project reports and evaluations
- See project reports and evaluations
- Identify generally relevant information
- Merge information and bring structure in it
- Bring information into intranet
- Information was brought into intranet
Tool: ARIS

Model based Knowledge Management
KMDL - Knowledge Modeling and Description Language
Collected experience from KM projects

- Action oriented by classical business process consideration
  - Only mapping process steps does not show real process cycle
- Absent connection between concepts and approaches of knowledge management and day-to-day operation
  - Often isolated consideration of business processes and knowledge basis of company
  - Absent attention for knowledge flow between employees beyond organizational entities
- No transparency in all existent knowledge resources (in particular implicit employee knowledge) in the company
- Overemphasis on recorded information (on computer or databases)
Objectives

| Use of modeling metaphor for configuration of knowledge intensive business projects |
| Overcoming of disabilities of conventional Business Process tools and methods |
| In particular modeling of knowledge flows and knowledge conversion |
| Demonstration of weaknesses (e.g. Knowledge monopolies, unsatisfied knowledge request) |
Explicit and implicit knowledge

Method basis
- Separation explicit knowledge from implicit knowledge
- Description of knowledge conversions

Properties of explicit knowledge
- Person independent, for example patents, organigrams, guides
- Easily externalized, e.g. through recording on media or through writing down in documents

Properties of implicit knowledge
- Assignment to particular persons in the company
- Person dependent, viz. it is personal, context specific and because of it hard to communicate
- Hard to externalize, only with content loss possible

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Polanyi (1958), Nonaka und Takeuchi (1990)
## Kinds of knowledge conversion

<table>
<thead>
<tr>
<th>Socialization</th>
<th>Externalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propagation of implicit knowledge from person to person through direct personal communication</td>
<td>Conversion of implicit knowledge into information is comprehended</td>
</tr>
<tr>
<td>Implicit knowledge objects interact through bearer, particular persons</td>
<td>Creation of information with help of one or several knowledge objects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internalization</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information conversion into implicit knowledge</td>
<td>Use of one or several information sources for generation of new information</td>
</tr>
<tr>
<td>Creation of knowledge object with help of one or several informations</td>
<td>Involvement of one or several knowledge objects</td>
</tr>
</tbody>
</table>
Introduction of KMDL methods
What is Knowledge Modeling and Description Language?

### KM DL
- Semiformal description language, consist of two model layers and one procedural model
- Modeling of knowledge and information flows
- Visualization of knowledge conversions
- [http://www.kmdl.de](http://www.kmdl.de)

### K-Modeler
- Based on Graphical Modeling Frameworks (GMF)
- Plug-In for Eclipse
- Graphic user interface
- Functions: e.g. modelling, visualization, analysis
- Download-link: [http://www.k-modeler.de](http://www.k-modeler.de)
## KMDL development

### Goals

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modelling metaphor for composition of knowledge intensive business</td>
<td>Modelling, analysis and evaluation of knowledge flows and knowledge conversions</td>
</tr>
<tr>
<td>processes</td>
<td>Demonstration of knowledge potentials</td>
</tr>
</tbody>
</table>

### Development

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMDL v1.1</td>
<td>Process and cycle oriented</td>
<td>2001</td>
</tr>
<tr>
<td>KMDL v2.0</td>
<td>Activity and conversion oriented</td>
<td>2005</td>
</tr>
<tr>
<td>KMDL v2.1</td>
<td>Process and activity oriented</td>
<td>2007</td>
</tr>
</tbody>
</table>
KMDL integration

KMDL closes the gap between business processes and knowledge flows.

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Only through procedural model the method becomes transferable and therefore applicable.
Knowledge intensive tasks are represented in an activity model. Thus the flow and creation of knowledge are recognizable.

(N. Gronau, J. Fröning, 2006)
The process model contribute to representation of control flow.
Task and role

<table>
<thead>
<tr>
<th>Task</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation</td>
<td>Banker</td>
</tr>
<tr>
<td>Financing</td>
<td>Proj. manager</td>
</tr>
</tbody>
</table>

- Amount of tasks, which would not be detailed further in the process level
- Contribute to simple structuring of processes
- Tasks can be more specified through activity view

- Roles as processor are assigned to tasks in the process view
- Every person in the activity view participate in one task in one specific role
Information system and process interface

<table>
<thead>
<tr>
<th>Information system</th>
<th>Process interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lotus Notes</td>
<td>Process A</td>
</tr>
<tr>
<td>SAP R3</td>
<td>Process B</td>
</tr>
</tbody>
</table>

- Represents information and communication technology
- Contribute to computer based recording, storage, processing, care, analysis, use, disposition, transfer and visualization of information

- Contribute to consolidation of sub-processes to process chains
- Refer to other processes
- Allow integrative evaluation of processes
Activity model

Objects

Example

Strongly person oriented, because they are knowledge bearer!

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[N. Gronau, J. Fröming, 2006]
## Knowledge and information objects

### Knowledge object
- Persons or team knowledge in particular knowledge area
- Illustration of competence, knowledge, capabilities, experience, attitudes and behaviour of one person
- Characteristics: professional, methodical, social skills and capacity to act

### Information object
- Representation of explicit (documented) knowledge
- Conventional form: e.g. texts, drawings or diagrams on the paper,
  Digital form: e.g. in documents, audio data, bitmaps or video
- Exist independent of persons

<table>
<thead>
<tr>
<th>Knowledge object</th>
<th>Information object</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Product idea" /></td>
<td><img src="image2" alt="Work report" /></td>
</tr>
<tr>
<td><img src="image3" alt="Customer demand" /></td>
<td><img src="image4" alt="Business plan" /></td>
</tr>
</tbody>
</table>
## Requirement, Person and Team

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Person and Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>For conversion realization or accomplishment settled requirements</td>
<td>Knowledge bearer: represents real existing persons in the company</td>
</tr>
<tr>
<td>Covered through personal or team knowledge</td>
<td>Team consists from several persons or teams</td>
</tr>
<tr>
<td>Differentiation: professional, methodical, social, interactive and technical</td>
<td>Accomplish tasks in knowledge intensive business process</td>
</tr>
<tr>
<td>requirements</td>
<td></td>
</tr>
</tbody>
</table>

**Capacity to teamwork**

**Java 2.0**

**Maier**

**Person A**

**M-WISE Team**

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## Conversion method and function

### Conversion method

- Document  
- Categorize

- Indicate how the knowledge conversion is processed
- Conversion methods are processed by persons/teams
- Display requirement on conversion
- Must be covered by person/team as knowledge object

### Function

- Mail
- Calendar

- Represent function of information system
- Cover technical requirements
Socialization

- Propagation of implicit knowledge from person to person, e.g. through direct personal communication (e.g. personal conversation, on the phone)
- Method
  - Monitoring of others' behaviour
  - Practice (Application of seen, learning-by-doing)
  - Communication (direct human interaction)

Combination

- Use of one or several information objects for generation of new information
- Method
  - Sort, categorize/classify
  - Aggregation
  - Adding/deleting (block-by-block), exchange (record-by-record), integration (word-by-word/symbol-by-symbol)

Introduction of KMDL methods

Illustration of knowledge conversion with KMDL (1/2)
Conversion of information in implicit knowledge
Knowledge object is created by one or several information objects
Method
- Read (Text)
- Watch (Text+Picture)
- Hear (Text+Picture+Sound)
- Learning by watching/reading/hearing

Conversion of implicit knowledge into information
Information object is created through one or several knowledge objects
Person connected aspects of implicit knowledge are lost
Method
- Documentation(Headwords, text, graphic, model)
Characteristics of knowledge conversion

- Knowledge conversion are represented as directed relationship with different frequency.

- Un-idirectional
  - One time exchange

- Bi-directional
  - One time exchange

- N-time exchange

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[J. Fröming, D. Fürstenau, 2007]
Atomic conversions have exactly one input and output object.
Complex conversions

- Components
  - Atomic conversions
  - Several input objects and one output object or
  - One input object and several output objects
- Representation of complex circumstances
  - E.g. complex internalization: different information objects are internalized in one knowledge objects
  - E.g. reading of several books about knowledge management creates an overview of knowledge management

Complex conversions allow to identify ways of creating and knowledge objects exactly.
Complex conversions

Components
- Atomic conversions
- Several input objects and one output object or
- One input object and several output objects

Example
- Complex internalization: different information objects are internalized to one knowledge object, for example reading of several books about knowledge management creates an overview of knowledge management

Complex conversions allow to identify ways of creation of information and knowledge objects exactly.

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Abstract conversions

- Different input and output objects
- Sum of several conversions taking place
- Sum of several existing conversions

Ways of creating and assignment cannot be retraced clearly in abstract conversions.
# Analysis and evaluation processes

## Reports
- e.g. object frequency reports (Person, information objects, knowledge objects, conversions)

## Pattern
- e.g. Multi-step Pattern (input or output objects)

## Views
- e.g. communication structure

## Free analysis
- e.g. Potential and weaknesses analysis
Which employees are frequently and unexpectedly asked questions during the process?

- The evaluation of model through reports gives advice about knowledge barriers.
Modelling and analysis of processes

- Modelling of knowledge intensive SD-Processes (Distributed software development)
- Analysis of software development processes
- Definition of qualification processes
- Deduction of communication view
- Identification of knowledge barriers
- Creation of check lists and guide lines
KMDL- Application areas
# Application area

## Knowledge transfer
- Representations of person related knowledge (Relation: person <-> knowledge object)
- Search for experts is possible

## Project management
- Representation of requirements and person related knowledge
- Requirements and knowledge balancing (e.g. staffing)

## Qualification management
- Requirements profile and qualification profile deduction (human resources development)

- KMDL helps to make knowledge related management decisions!
Simulation: Diffusion of knowledge in the company

- Emulation of knowledge intensive business processes / tasks
- Input and output factors
  - Expertise level
  - Creativity level
  - Effectiveness
  - etc.
- Rules for information and knowledge spread
  - Increase vs. decrease
  - Process dependencies definition
  - Transfer medium, buffer time
  - Conditions
  - etc.

► Process simulations can substantiate management decisions in knowledge management.

With what speed does the knowledge spread?
► which measures have an influence on the spreading (support or hinder)?
Analysis of Computer Mediated Communication

- Assignment of car racing network, for example in Wiki-applications

**Analysis possibilities (Examples)**

- Group identification
- Impact evaluation of particular persons inside of Wikis (knowledge library)
- Comparison of formal organizational structure with virtual community structure

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Network analysis:
Which are the turntables for knowledge in the company?

- Analysis of
  - Information networks, e.g. theme networks
  - Knowledge networks, e.g. competence networks
  - Social networks, e.g. collaboration networks

- Identification of
  - Central, frequently asked topics
  - Unused relations
  - Knowledge communities
  - Isolated persons or groups
  - Hidden competences
  - Chronological development of corporate information and knowledge flows

Network analysis is a tool for publication and analysis of theme and person networks in companies.
Which information and functions needs a knowledge worker?

- Process based choice and adjustment of
  - IT-tools and knowledge services
  - Contents and meta structure
  - Access / presentation through individual views

The knowledge infrastructure must be adjusted to the business process.

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Introduction of K-Modeler
K-Modelers user interface

Navigator

Palette

Property window

Modell-overview

Model-editor

Introduction of K-Modeler
Example process in K-Modeler

Introduction of K-Modeler
Control questions

- Which approach has the business process oriented knowledge management?
- Which approach of business process oriented knowledge management have you learned and how can these be assigned?
- What is a KIT by Promote?
- Which knowledge activities does GPO-KM have?
- What are knowledge maps by model based knowledge management?
- Which element is central in the KODA?
- What is explicit and what is implicit knowledge?
- Which forms of knowledge conversion can be differentiated?
- What does KMDL stand for?
Literture