Kapitel 5

Geschäftsprozessorientiertes Wissensmanagement

5.1 Motivation

5.2 Business processes management (BPM) as basis for knowledge management

5.3 Knowledge management integrated in Workflow-management systems

5.3.1 Example - Smart Task Support

5.4 KM as basis for Business Process Improvement/Reengineering

5.5 Conclusion

AIFB

5.1 Motivation

- Knowledge management is declared as very important management+IT activity in **almost all** organisations
- Knowledge management projects are started **in many** organisations
- ROI (Return Of Investment) of knowledge management projects are accounted only **some** of those organisations

=> Problem is that tasks of KM projects are not well (enough) integrated into achieving business goals of an organisation

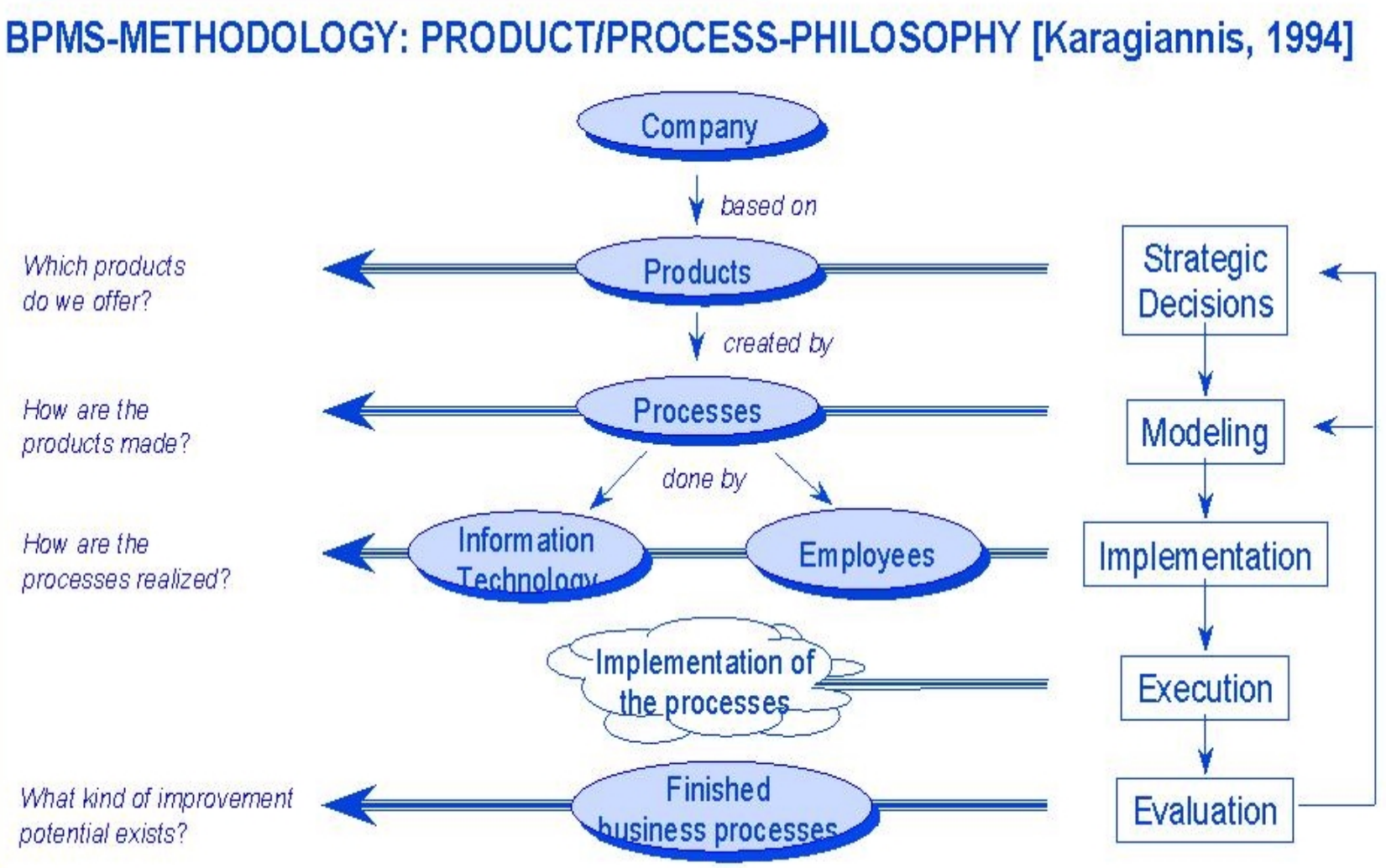
AIFB

Motivation

- Business goals are realised in business processes
- Business process is a structured, measured set of activities designed to produce a specified output for a particular customer or market (Davenport, 1993)
  - It implies a strong emphasis on how work is done within an organisation, in contrast to a product focus´ emphasis on what.
- Business processes are based on key competencies of an organisation and are therefore a source of knowledge in an organisation.
  - knowledge is especially important when it is suitable for business process improvement/reengineering

=> Knowledge management processes have to be integrated into business processes (knowledge is generated, acquired, used, evaluated in the context of a business process, i.e., business goals)

What is BPM - repetition



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BPM & KM

Three styles of integration:

- Business processes management as basis for knowledge management
  - Knowledge management processes (according to Probst), are organized around planing and implementation of business processes
- Knowledge management integrated in Workflow-management systems
  - Knowledge management processes has the support function in a WfM system (e.g. access to knowledge relevant for solving actual task)
- Knowledge management as basis for Business Process Improvement/Reengineering
  - Knowledge management provides knowledge for modelling, optimisation and automating of business processes

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5.2 Business processes management as basis for knowledge management

- Activities in business processes are connected to some knowledge and require more or less working experience

- Using knowledge in a process activity leads not only to better performances of that activity (time, money, quality), but also to better fulfilment of the goals of the process as whole
  - Knowledge is useful when it adds value to a business process

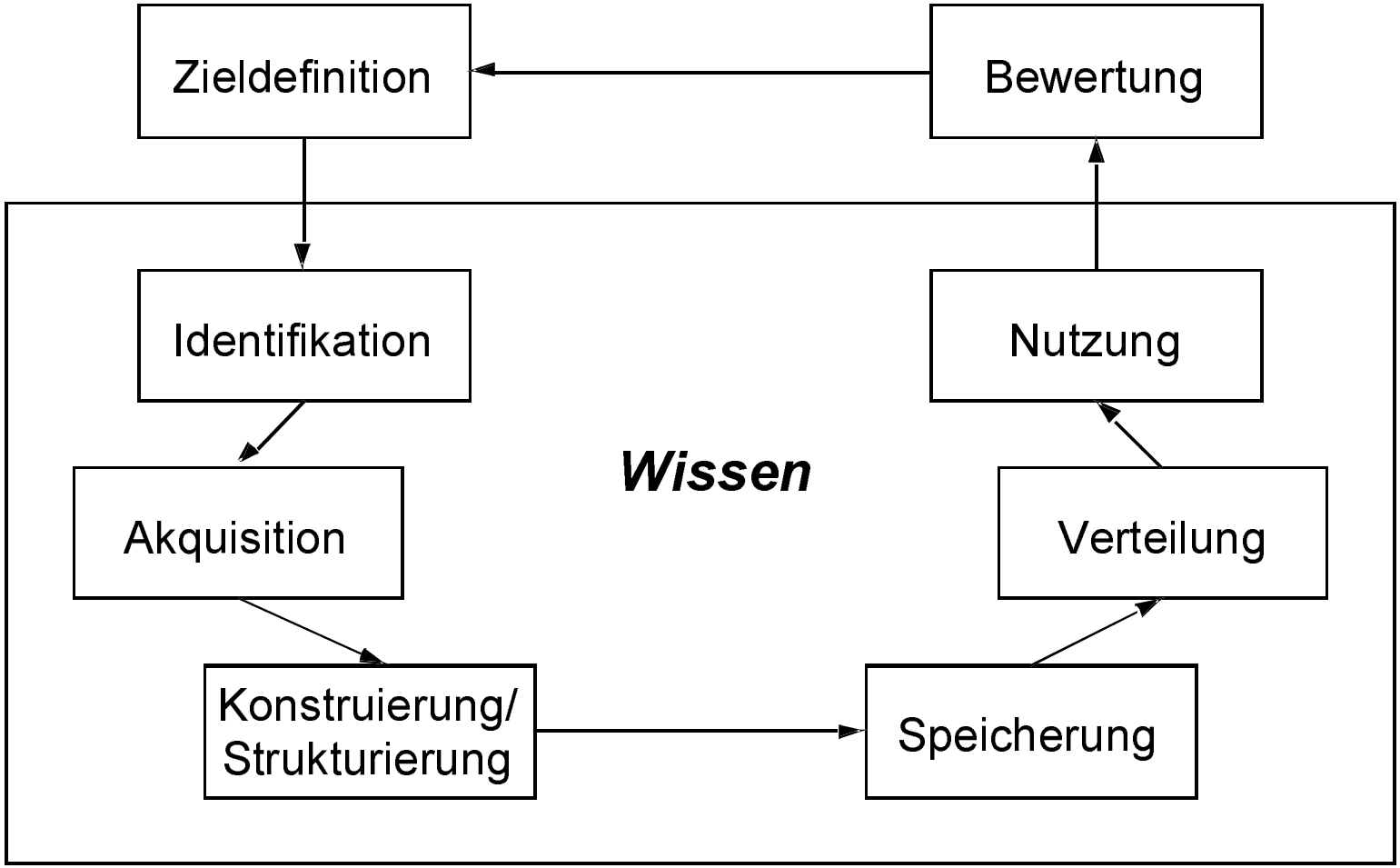
- This knowledge should be subject of an integrated KM system
  - KM system should be responsible for creating, acquiring, delivering and evaluating such high-valued knowledge

=> KM processes should be aligned to processes of planing and implementation of business processes (strategic management and process management)

Business processes management as basis for knowledge management

- **Primäre Aufgaben des Wissensmanagements**

vgl. [Probst et al. 1997]



BPM as basis for KM

- **Defining the goals of the KM system**
  - top-down analysis of the vision of the organisation
  - identification of the strategic and operational goals
    - strategic goals have to be aligned with organisational objectives

      e.g. “using knowledge to ensure competitive advantage of the organisation”
    - operational goals have to be integrated in business process management

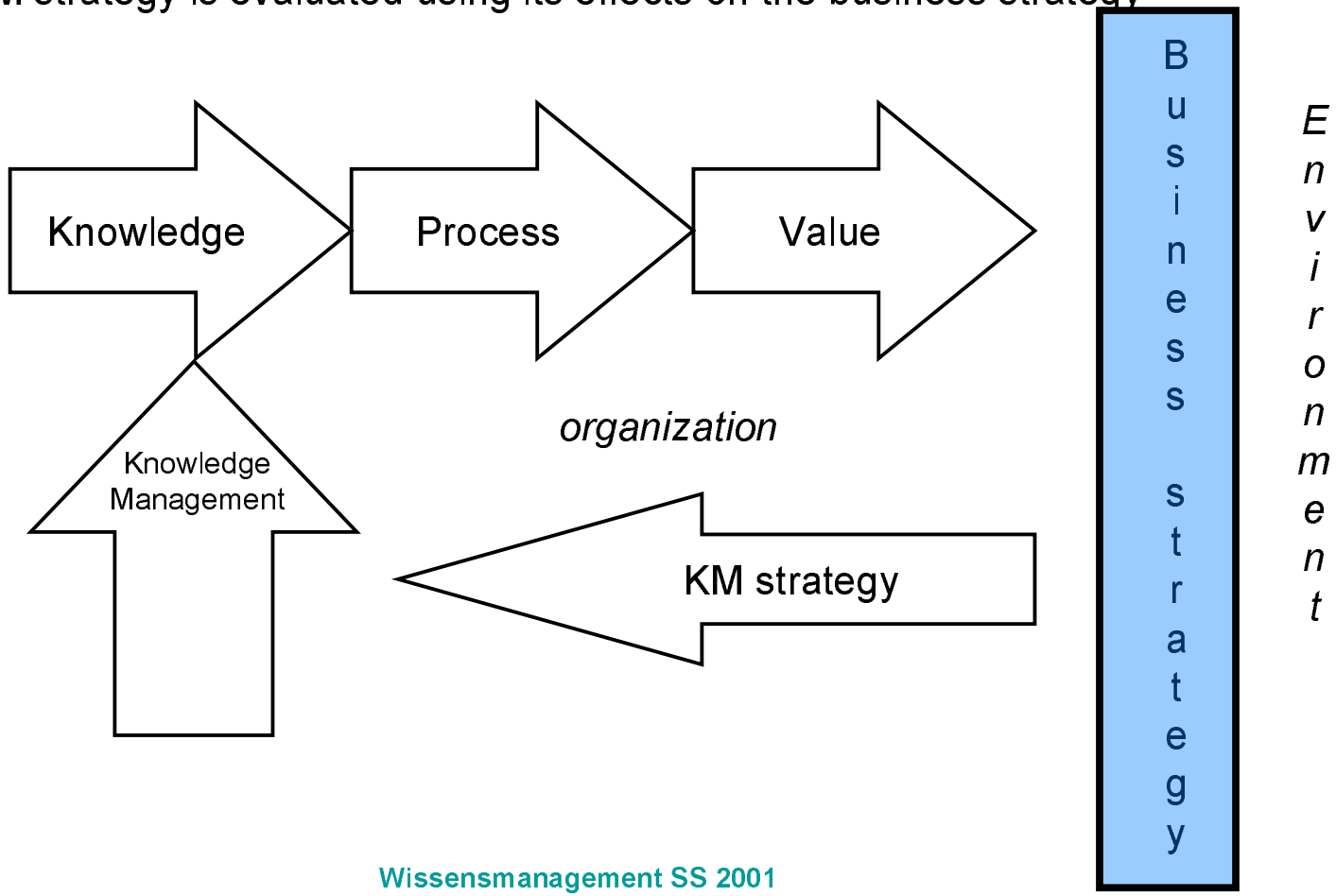
      e.g. “acquiring knowledge to enable better performance of the business process”

BPM as basis for KM

Defining the goals of the KM system - Example I

CommonKADS methodology

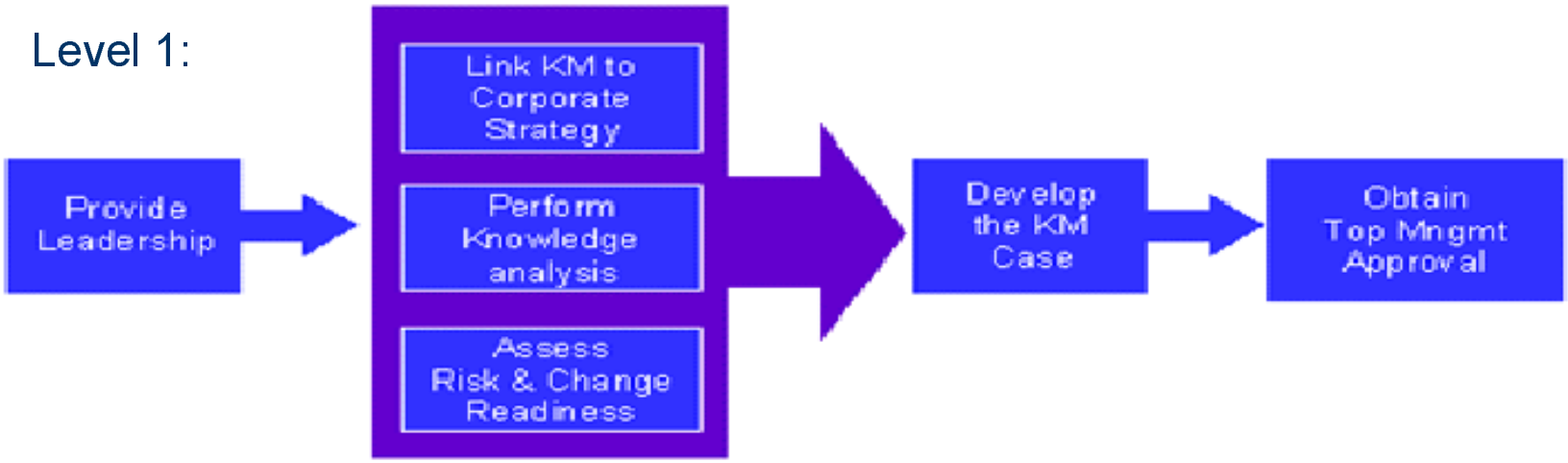
- KM strategy is derived from the business strategy
- KM strategy is evaluated using its effects on the business strategy



BPM as basis for KM

Defining the goals of the KM system - Example II

Know-Net KM-Method (Mueller, H.,J., Abecker, A., Maus, H., Hinkelmann, K., 2001).

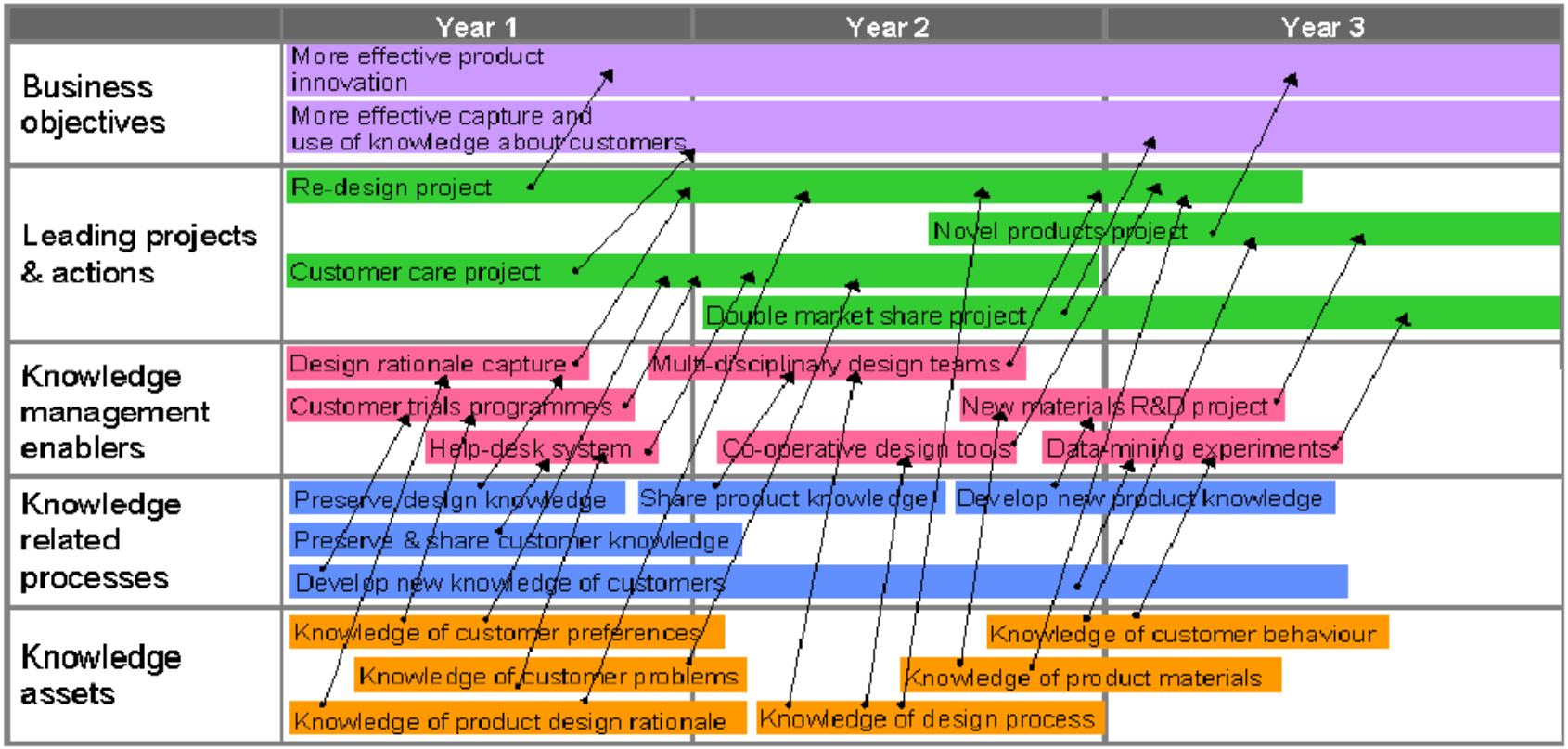


Step 2: Link KM strategy with corporate strategy	Organize workshop / conduct interviews Analysis o identify vision, strategy, and objectives o identify critical success factors o link strategy to critical success factors, improvement needs, key people and pocesses Select the key business area and process of focus

BPM as basis for KM

Defining the goals of the KM system - Example III

Knowledge Asset Roadmaps (Macintosh, A., Filby, I. & Tate, A., 1998).



BPM as basis for KM

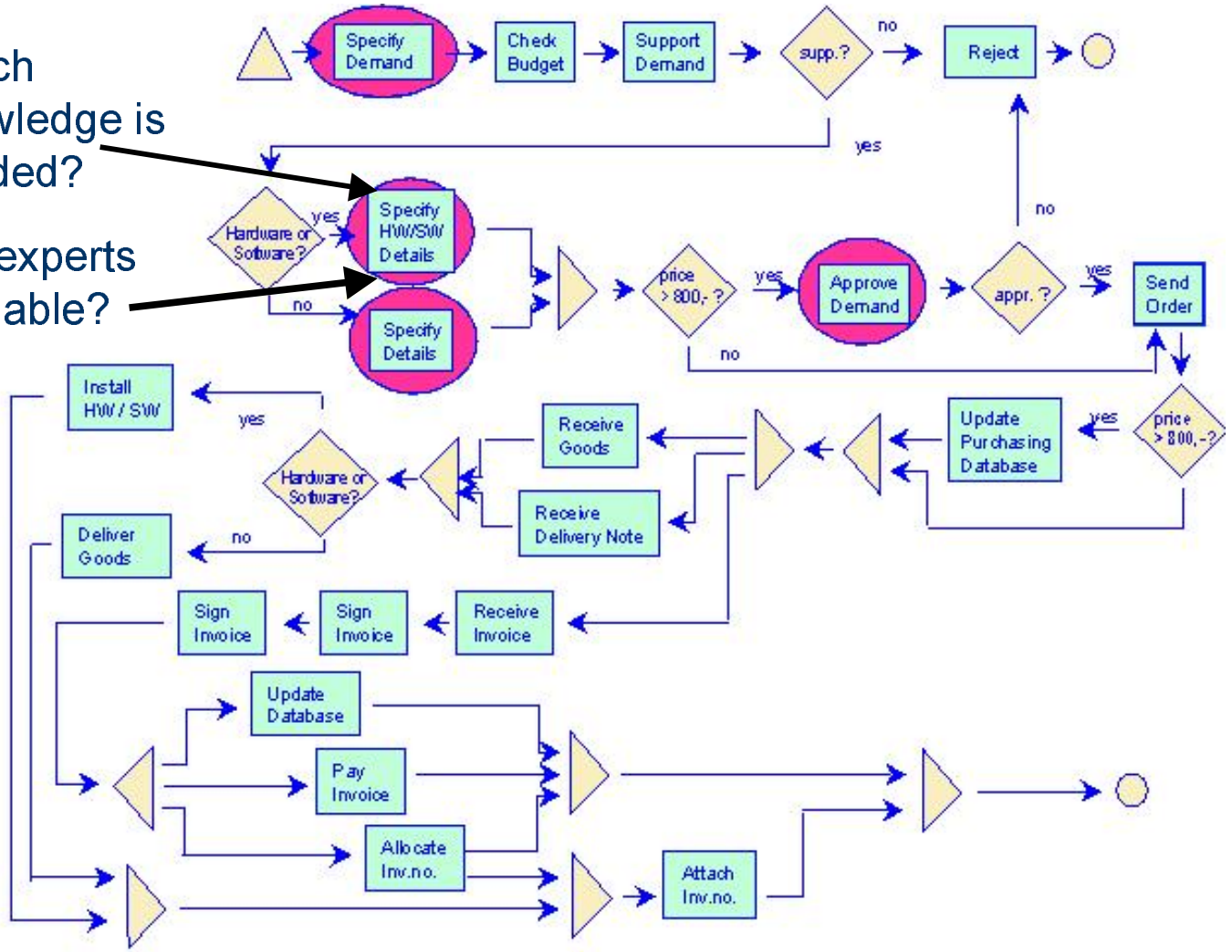
- **Identification of knowledge**
  - focus on a business process which should be improved (according to business goals)
  - analysis of process entities (people, documents, activities) in order to find suitable knowledge resources
    - knowledge intensive activities (tasks)
      - the main complexity of process is hidden in a few activities
    - critical expertise
      - wicked problems
      - small number of experts
      - time-/place- unavailability of experts
      - fluctuation of experts
    - CommonKADS example: Worksheet OM-4 - knowledge assets analysis

BPM as basis for KM

Identification of knowledge intensive activities

Which knowledge is needed?

Are experts available?



From (DFKI, 1999)

BPM as basis for KM

1. Context is defined (business process)
2. Content is defined (potential useful knowledge)

   => „operational“ KM is started

- **Acquisition of knowledge**
- **Structuring of knowledge**
- **Storing of knowledge**
- **Sharing of knowledge**

The most frequently used association to a KM system.

Only from this viewpoint a regular e-mail system can be KM system

BPM as basis for KM

Example of “operational” KM

Context: purchasing process

Content: knowledge about HW/SW requirements

Acquisition

Knowledge resources:

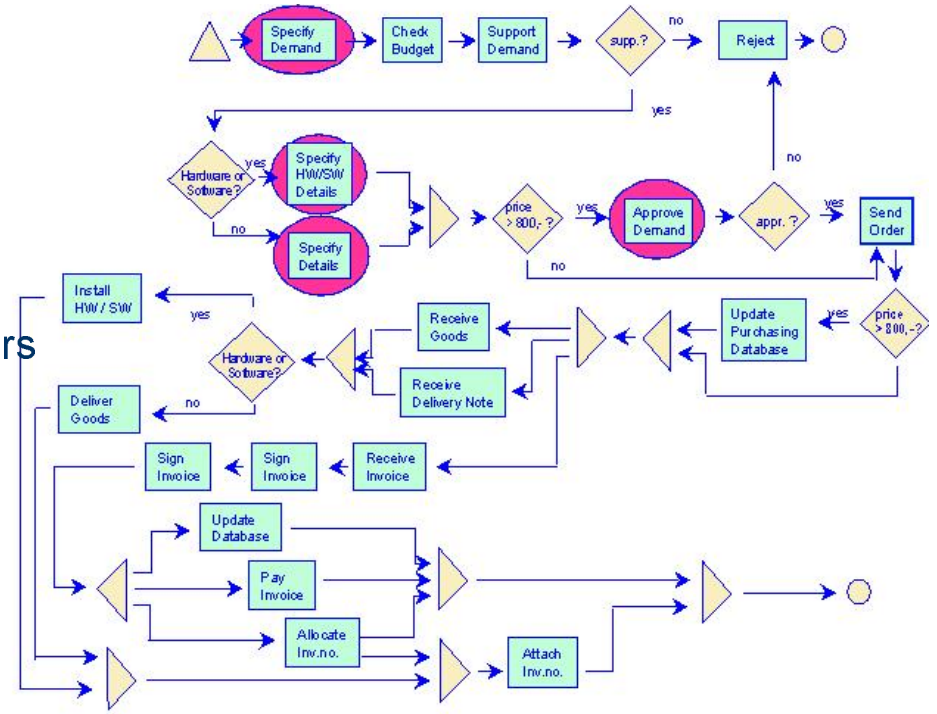
- IT knowledge
- experience
- past cases
- knowledge about suppliers

Structuring/Storing

- indexed documents

Sharing/Retrieval

- IR system



BPM as basis for KM

- **Using of knowledge**
  - Knowledge is used to add value to a business process in order to achieve business objectives
  - Only knowledge in action can be evaluated
- **Evaluation of knowledge**
  - Evaluation is performed on the level of (business/KM) objectives/goals and needs measurement
    - Is used knowledge aligned with defined strategic and operational KM goals
    - Is used knowledge valuable for fulfilment of defined business objectives
  - Evaluation is starting point for redefining old or defining new KM strategy

BPM as basis for KM
Conclusion

- Knowledge management is a business process

  - It is the process through which firms create and use their institutional or collective knowledge

- All types of business process analysis could be applied for knowledge management processes, e.g.

  - strategic management = defining goals of KM system

  - process management = identifying potential useful knowledge

  - continuous improvement = evaluating knowledge form the point of view of business objectives

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5.3 Knowledge management integrated in Workflow-management systems

- The goal of the WfM: To manage the flow of work such that the work is done at the right time by the proper resource

- KM support for Workflow Management system could be promising

  - knowledge is treated as another resource (machine, material) needed for process execution

- Knowledge management system enables access to task-specific knowledge in a workflow-management system

KM integrated in WfM system Approach:

- Model the overall business process with a conventional BPM or workflow tool
  - treat knowledge as a resource in the activity
- For knowledge-intensive tasks extend the respective workflow activity by generic queries to be posted to KM system
  - answers should help to perform those tasks
- During workflow enactment instantiate the generic queries, try to answer them through the KM and actively deliver the answer to user

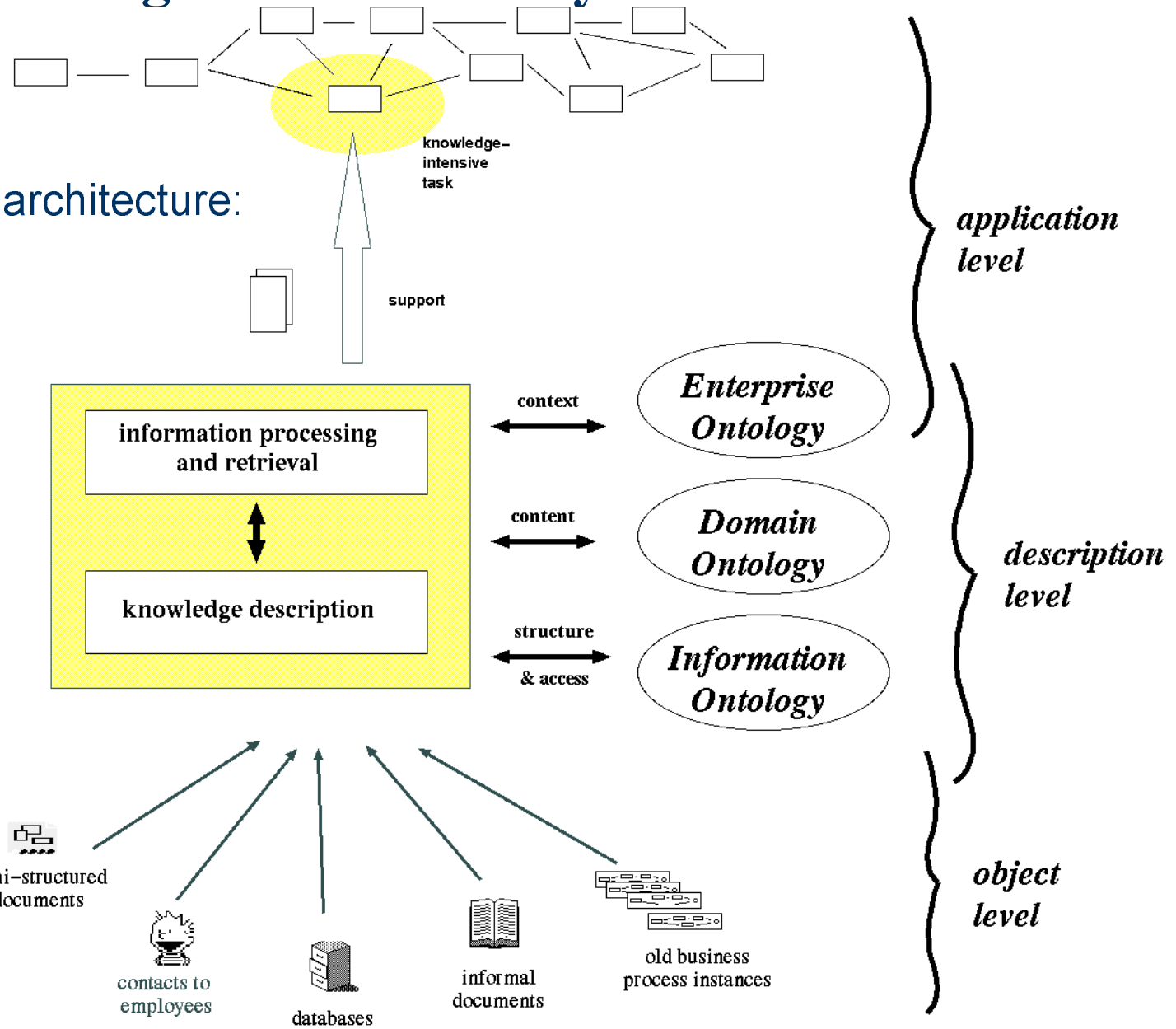
KM integrated in WfM system

Example: OMIS (Abecker, A., Bernardi, A., Hinkelmann, K., Kuehn, O., Sintek, M., 1998)

- central idea: knowledge can be viewed as information linked into the application context (workflow)
- requirements: access to multiple heterogeneous knowledge sources
- enabled through comprehensive knowledge description using several formal ontologies (information, domain, enterprise ontology)
- benefit: active knowledge delivery integrated into business processes (by WfM system)
  - explicit representation of context

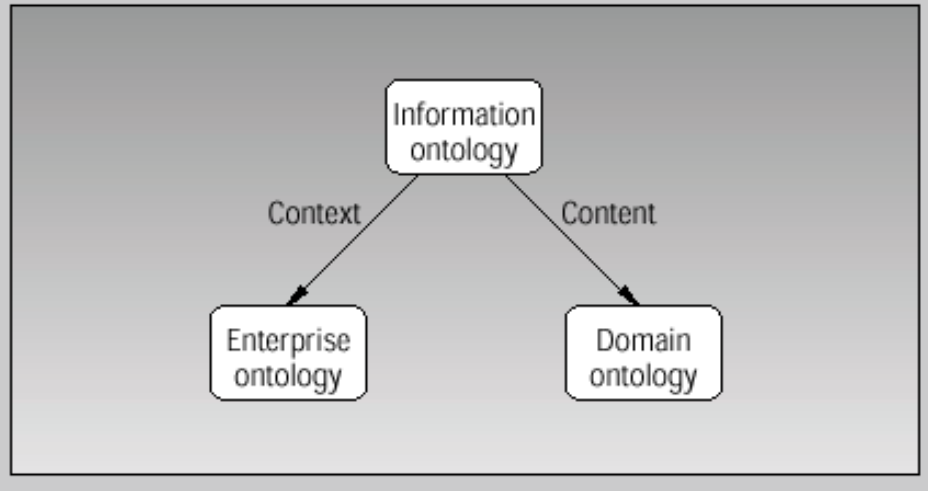
KM integrated in WfM system

OMIS architecture:



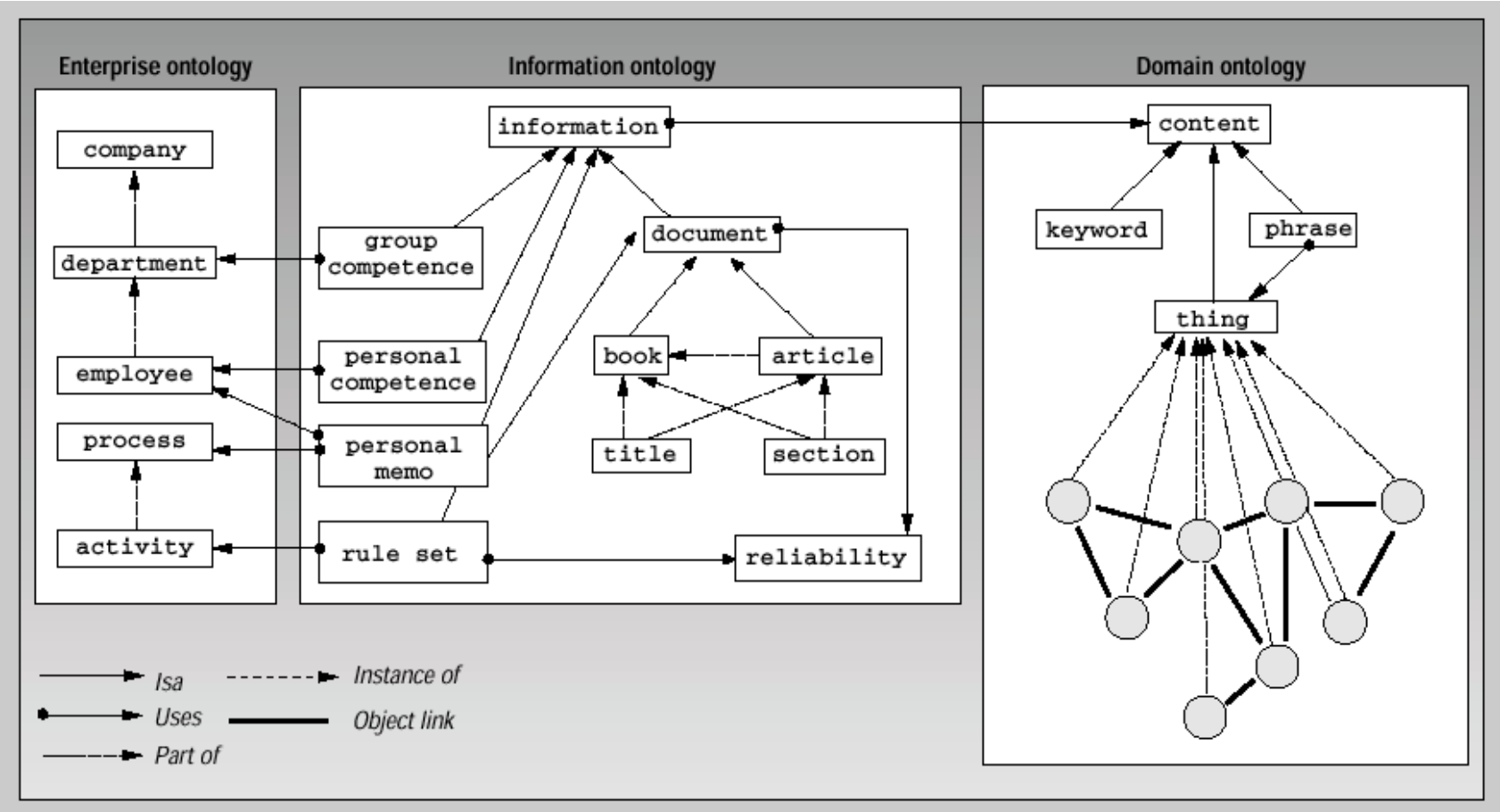
KM integrated in WfM system

OMIS ontologies:



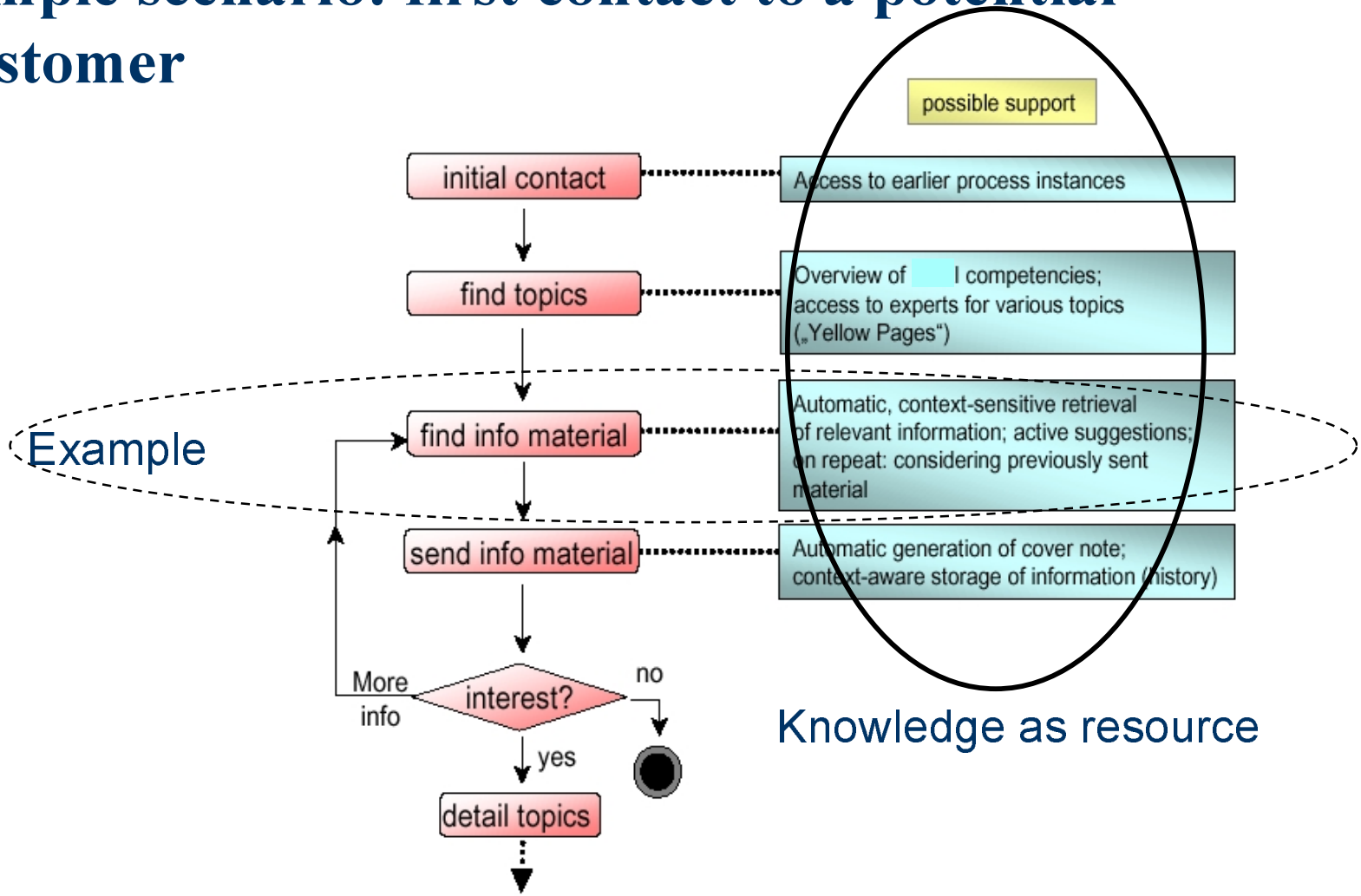
- **information ontology**: contains generic concepts and attributes that apply to all kinds of information (the timeliness, the author, the reliability of information)
- **domain ontology**: models the content of information sources (domain specific)
- **enterprise ontology**: expresses information context in terms of the organizational structure and the process models

KM integrated in WfM system



Example of Enterprise, Information and Domain ontology in OMIS

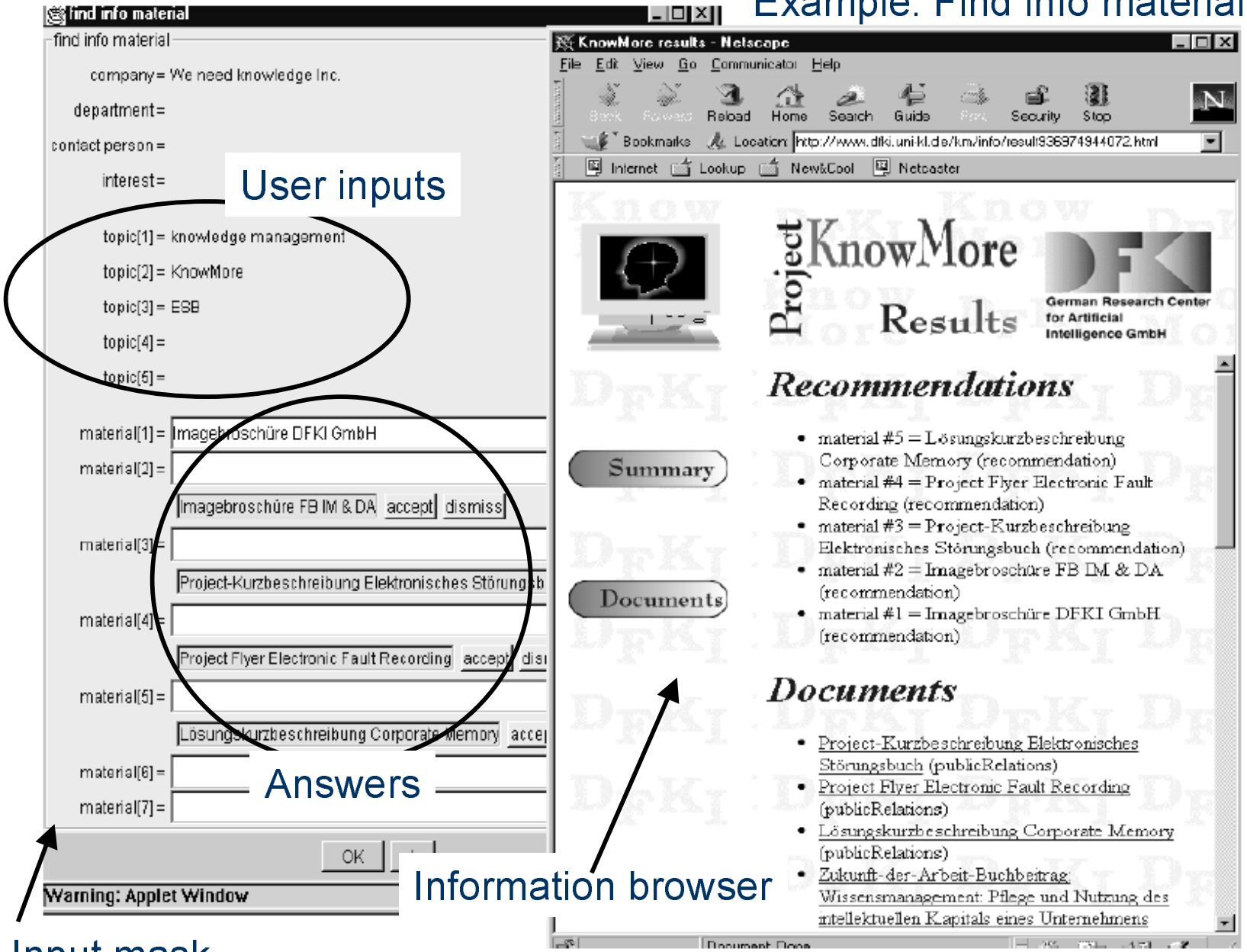
KM integrated in WfM system
Simple scenario: first contact to a potential customer



A simple workflow with possible support for knowledge-intensive tasks

KM integrated in WfM system

Example: Find info material



KM integrated in WfM system

Example: Find info material

- Workflow engine starts activity “Find info material”
- The system takes the inputs from user and finds out if some element of OM is relevant to the inputs
- Corresponding answers are inserted into user input mask
  - answers are ordered according to their relevance computed by retrieval function
- The user is free to accept or dismiss the suggestions or to select different material according to personal knowledge
- Hyperlinks to selected materials appear in Information browser
- The system keeps tracks of the solutions and the workflow
  - it records the results automatically together with the relevant contextual information
  - context-aware support: in repeated “finding info material” information from earlier activities are taken into account

5.3.1 Example - Smart Task Support

- Problem definition

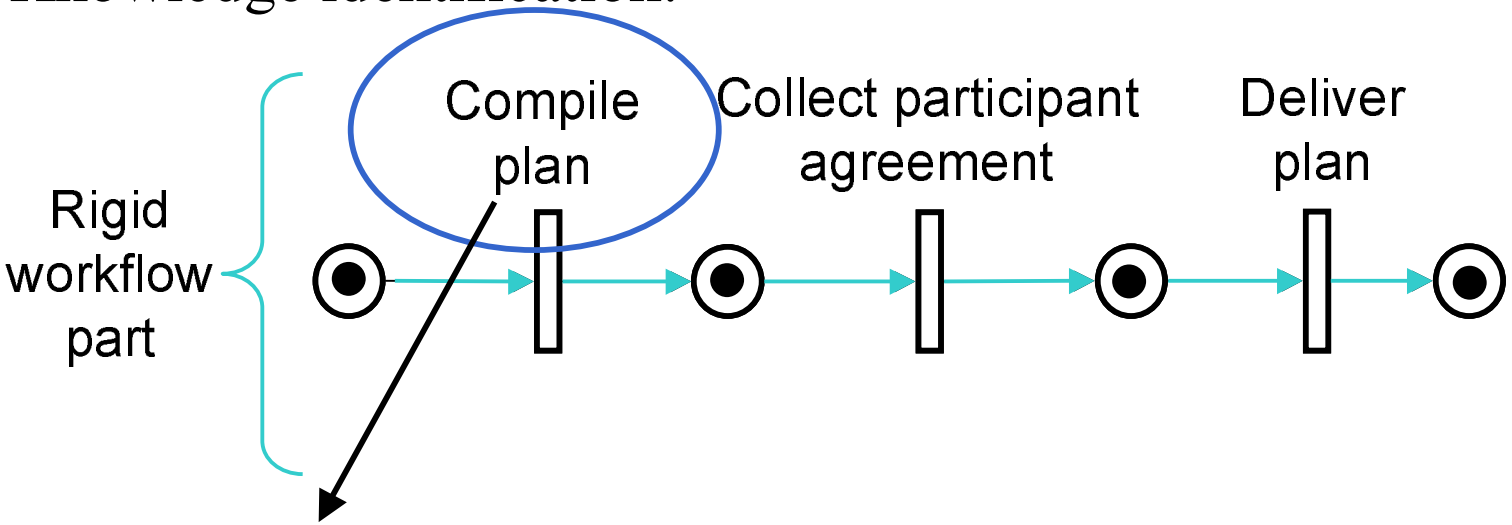
  For the given project-planing process introduce KM-support which enables better time/quality performance

  (i.e., reduce planning time and/or improve quality of the product)

- KM Analysis (KM processes)
  - KM goal: better time/quality performances
  - Knowledge identification: identify knowledge intensive activities in the given process
  - Knowledge acquisition: relevant knowledge
  - Knowledge storing: suitable for access
  - Knowledge sharing: access that knowledge
  - Knowledge usage: used in project-planning scenario
  - Knowledge evaluation: knowledge is evaluated by considering time/quality performance of the redesigned process

Project-planning business process

Knowledge identification:



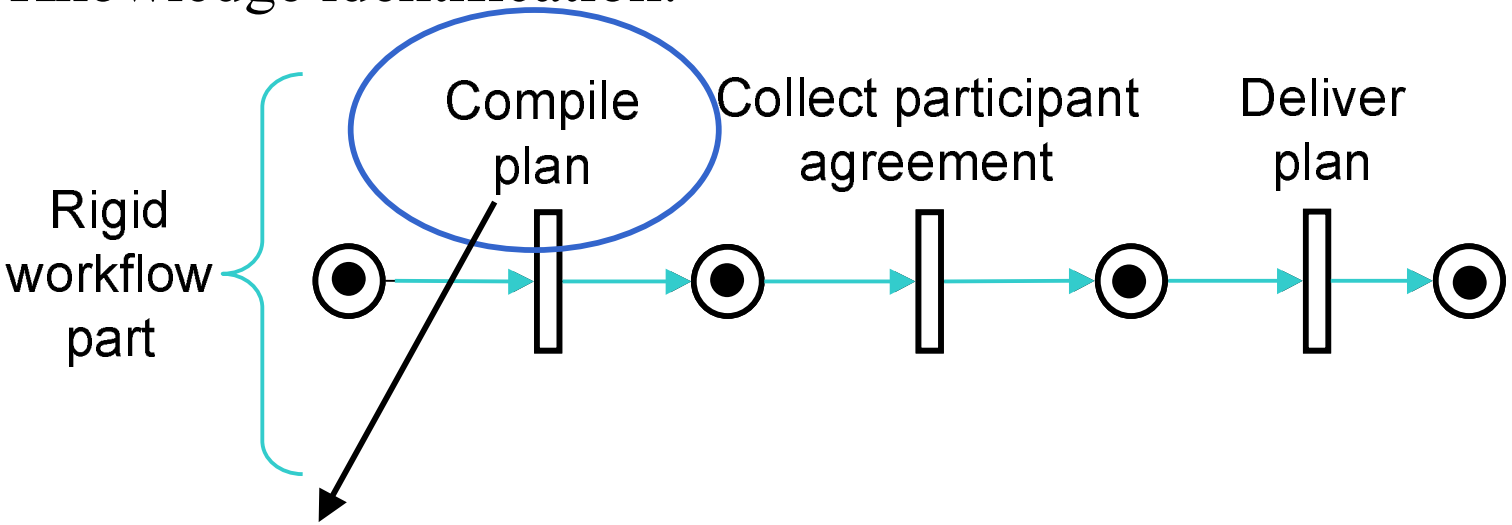
Knowledge intensive task:

- weakly structured
- no available expert
- knowledge is distributed among various sources
- many constraints (skill, experience, time)
- has strong effect on the quality of project-plan

Meta knowledge: How to identify knowledge intensive task

Project-planning business process

Knowledge identification:



Knowledge sources:

- employee pages
- skill-database
- past project web pages
- customer reports
- notices

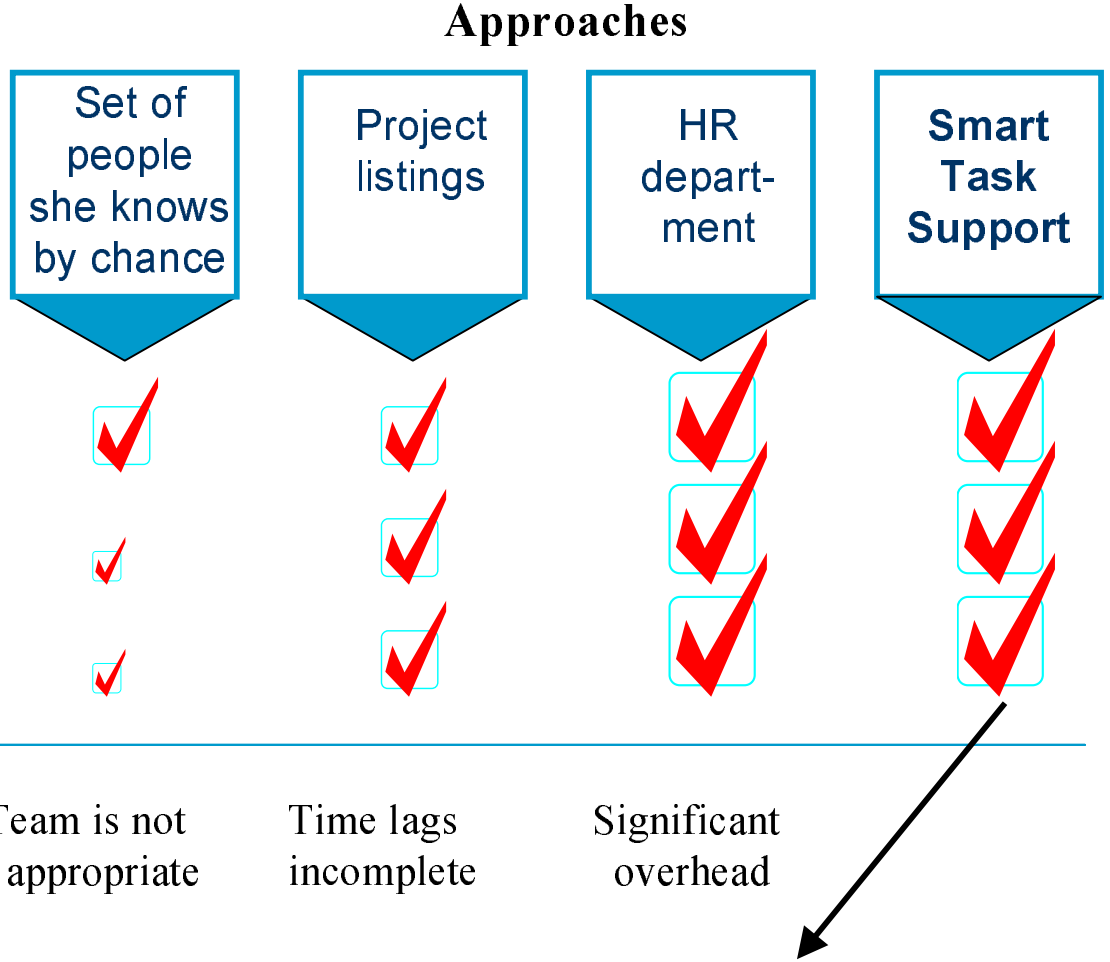
Meta knowledge: How to identify knowledge sources

Project-planning business process: Compile plan

Project Manager has to compile a team

Staff Requirements:

Availability
Particular technical knowledge needed
Client & industry knowhow



Problems:

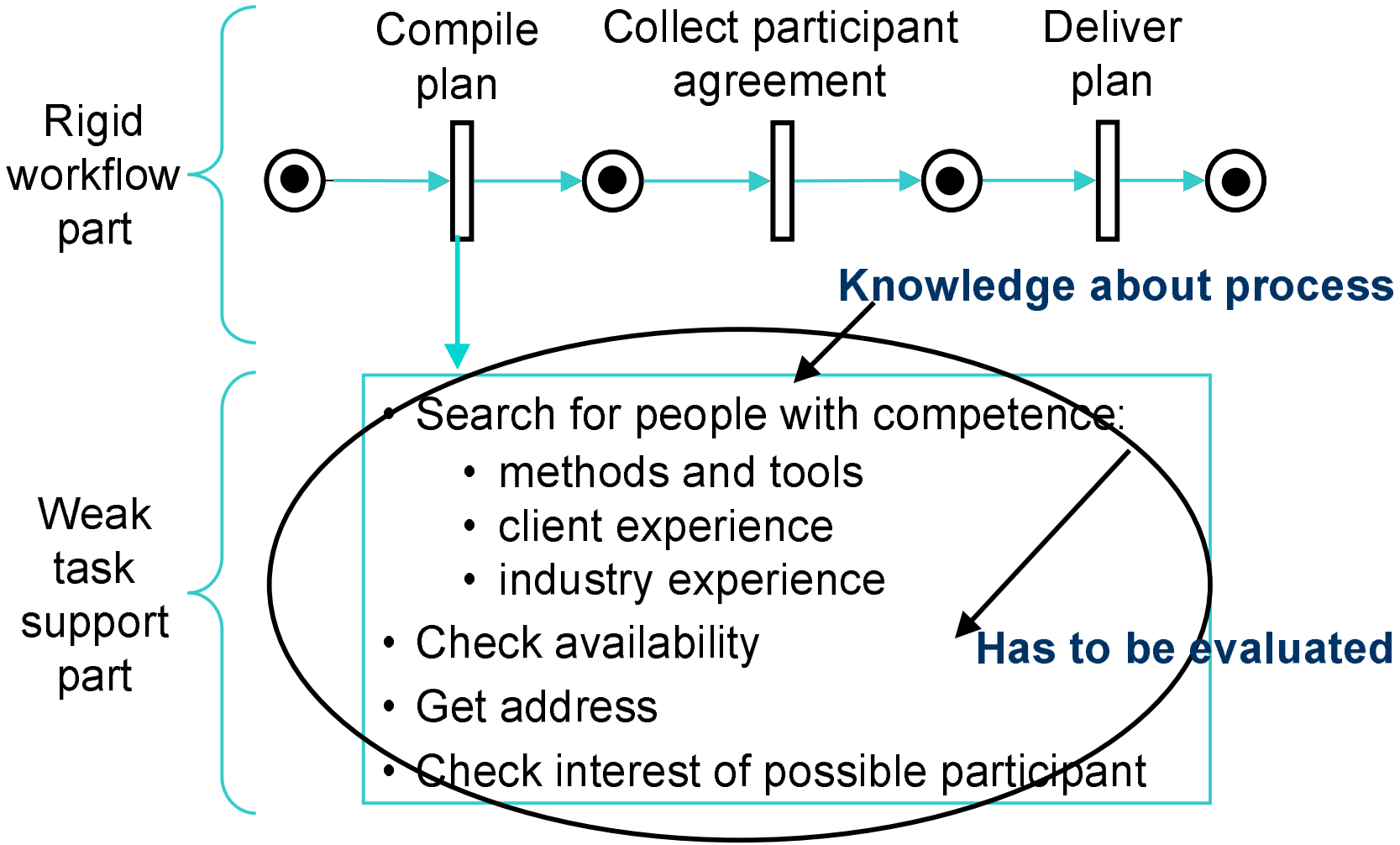
- Team is not appropriate
- Time lags incomplete
- Significant overhead

=> Project Manager decides to use SmartTaskSupport

Meta knowledge: How to decide which approach to use

Project-planning business process

Knowledge acquisition



Meta knowledge: How to acquire this knowledge

Project-planning business process

- Workflow modelling of a business process:
  - distinguishes two levels:
    - upper level:
      - captures rigid parts of a workflow
    - lower level:
      - captures **weakly structured** part of a workflow
  - upper level sets **context** for lower level task

„Operative“ KM

Design rationale for “operative KM”

- Support knowledge worker in performing **weakly structured** tasks
  - integrate support in business process
  - collect distributed knowledge and make implicit knowledge explicit
  - do not distract knowledge worker by a collection of new tools
  - do not overwhelm knowledge worker with huge amount of information, provided support has to be concise and directly relevant

Metaphor: Intelligent Assistant

Pull: answer questions at a particular point of work

Push: active proposition of reasonable questions and pre-fetch corresponding answers

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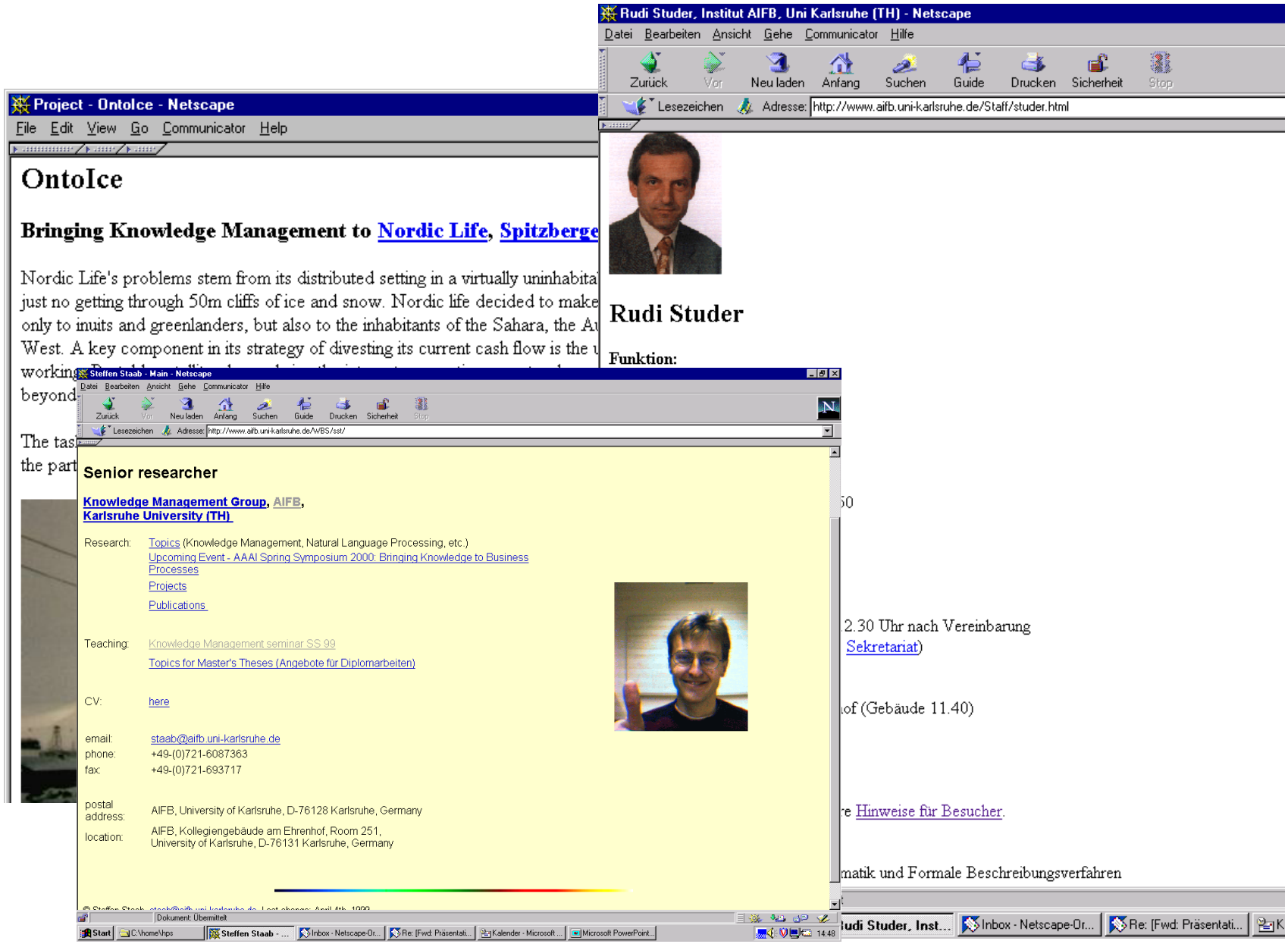
KM Scenario: Assumptions

- Project manager compiles a plan with common project planning, spreadsheet or text processing software
- Information is drawn from knowledge available in the intranet:
  - project pages
  - personal homepages
- Ontobroker:
  - provide ontology for given domain and business tasks
  - provide annotated documents linking semi-structured documents with the ontology
  - exploit inference engine to derive additional facts

KM Scenario: People and Project pages



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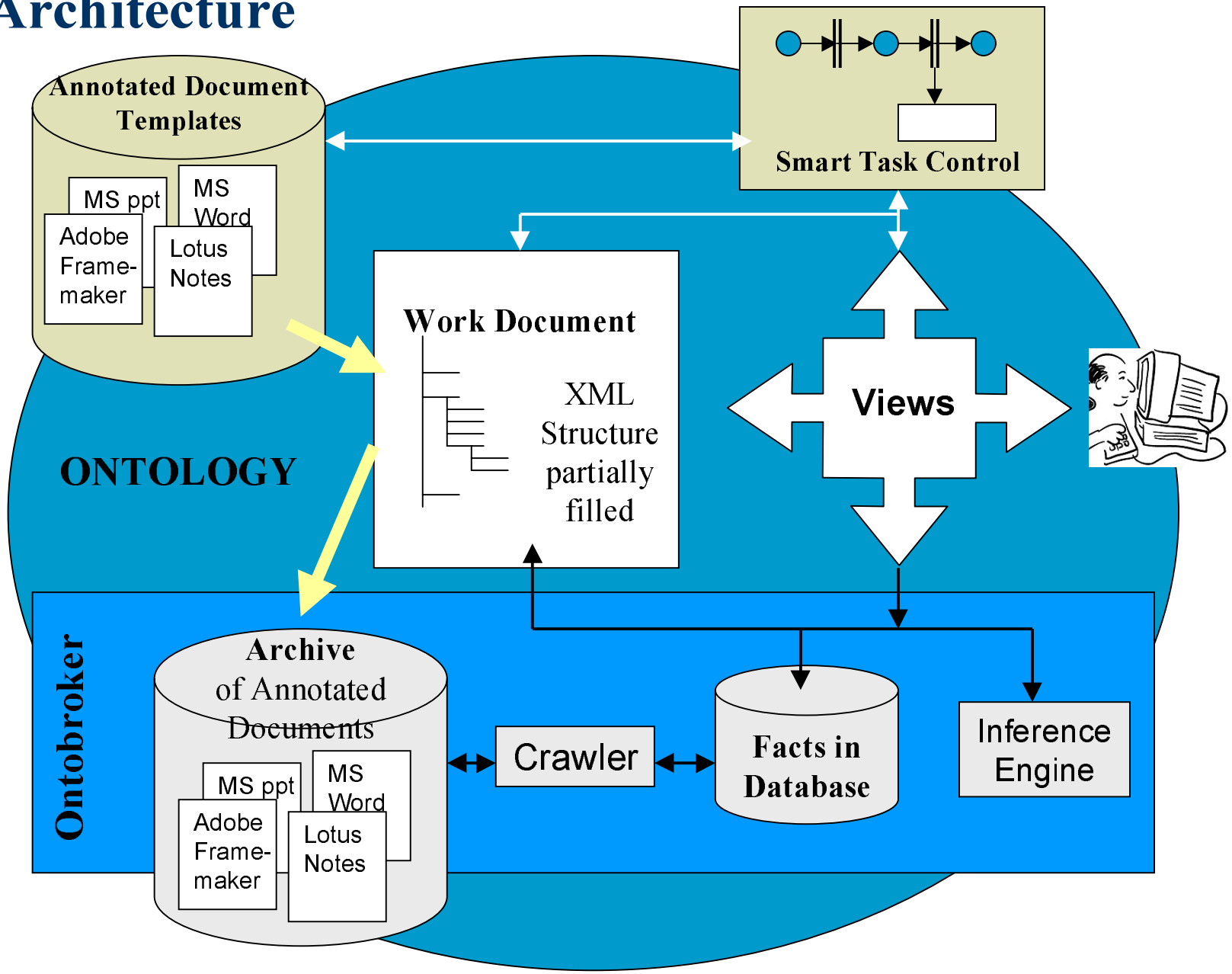
System Architecture

- **Ontology** is backbone for all system components
- **Ontobroker** provides
  - annotated documents
  - crawler
  - fact database
  - inference engine
- **annotated document templates** provide linkage between business documents and ontology
- current work document (partially filled template) represents task(s) to be performed
  - defines queries for the Ontobroker system depending on which fields are filled in
- **smart task control** defines context for providing views and delivering context specific information

Architecture

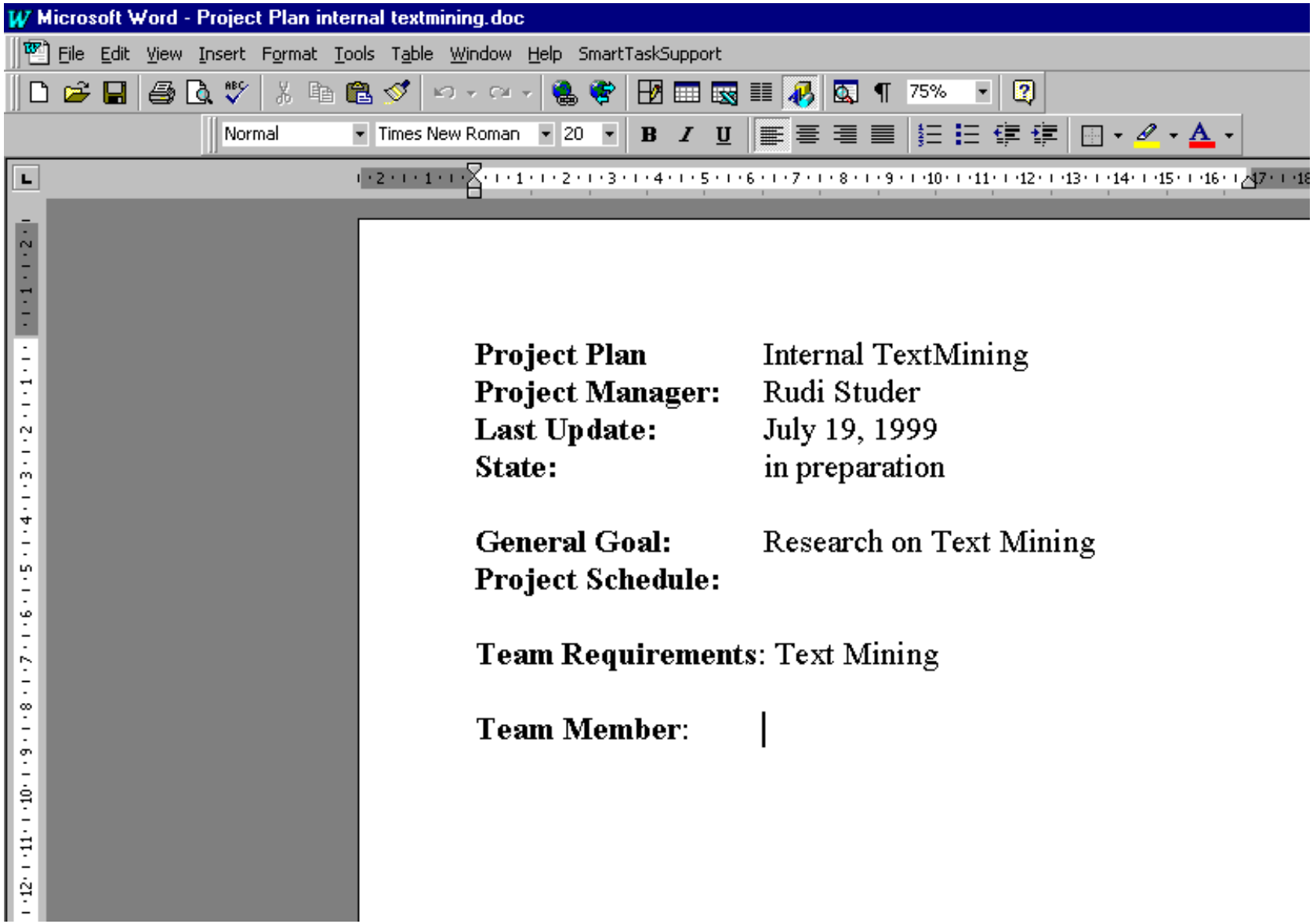


OntoIce-Ontologie (Wiederholung)

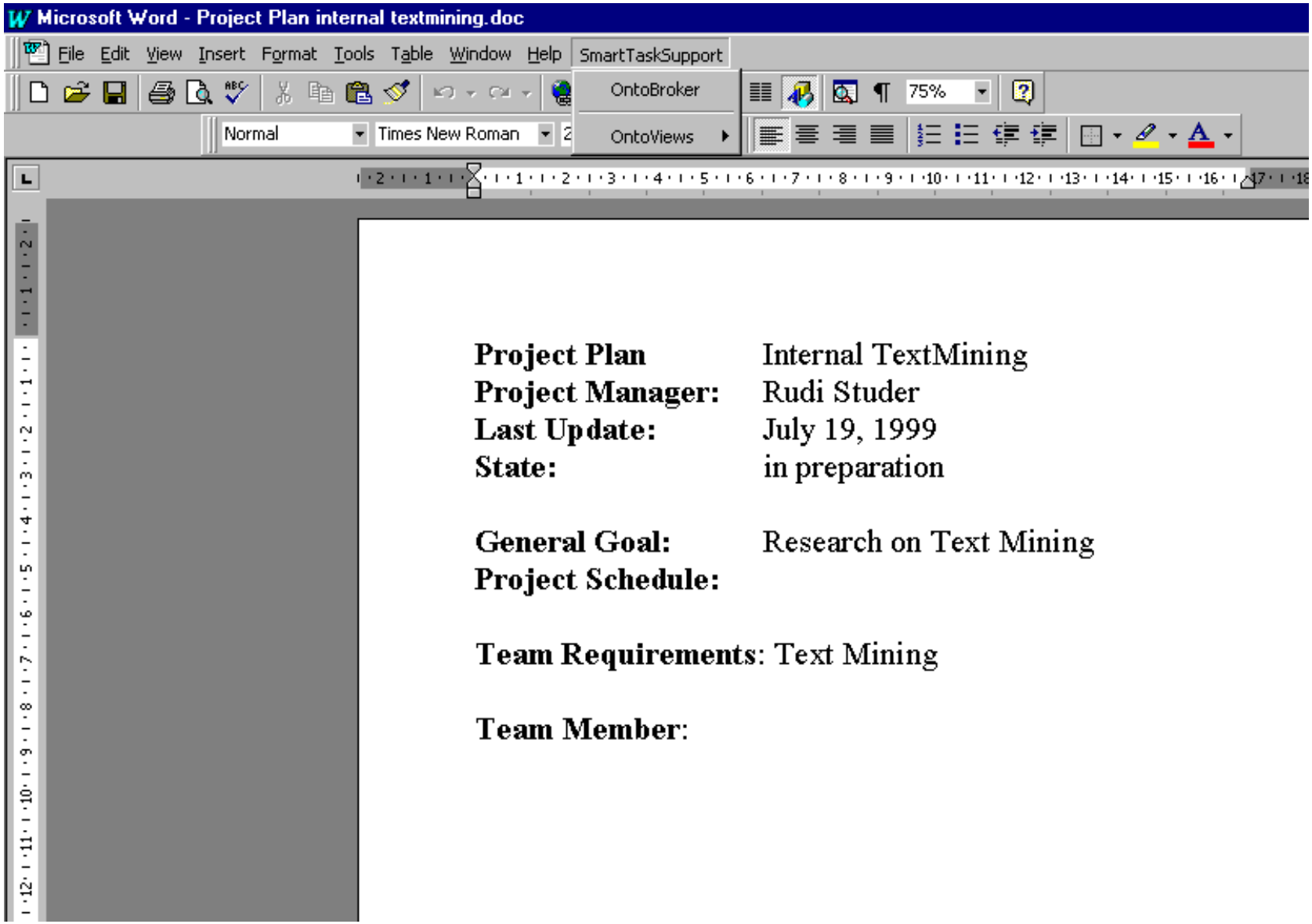
Konzepte	Beziehungen	Regeln

Object [ ].
  Person :: Object.
  Employee :: Person.
  Manager :: Employee.
  Consultant :: Employee.
 	
Project :: Object.
 	
Company :: Object.
  Manufacturer :: Company.
  FinanceComp :: Company.
  Insurer :: FinanceComp.
  LifeInsurer :: Insurer.
  Bank :: FinanceCompany.
 	
Location :: Object.
	Person [
	  firstName =>> String;
	  lastName =>> String;
	  email =>> String;
	  phone =>> String;
	  participantOf =>> Project;
	  hasCompExperience =>> Company;
	  address =>> Location]
	
	Project [
	  projectname =>> String;
	  projectgoal =>> String;
	  client =>> Company;
	  member =>> Person;
	  leader =>> Person].
		FORALL Proj1, Pers1
		  Proj1 : Project
		  [member ->> Pers1]
		↔
		  Pers1 : Person
		  [participantOf ->> Proj1].
		
		FORALL Pers1, Proj1, Comp1
		  Proj1 : Project
		  [member ->> Pers1,
		  client ->> Comp1]
		→
		  Pers1 : Person
		  [hasCompExperience ->> Comp1].

Business Documents



Business Documents

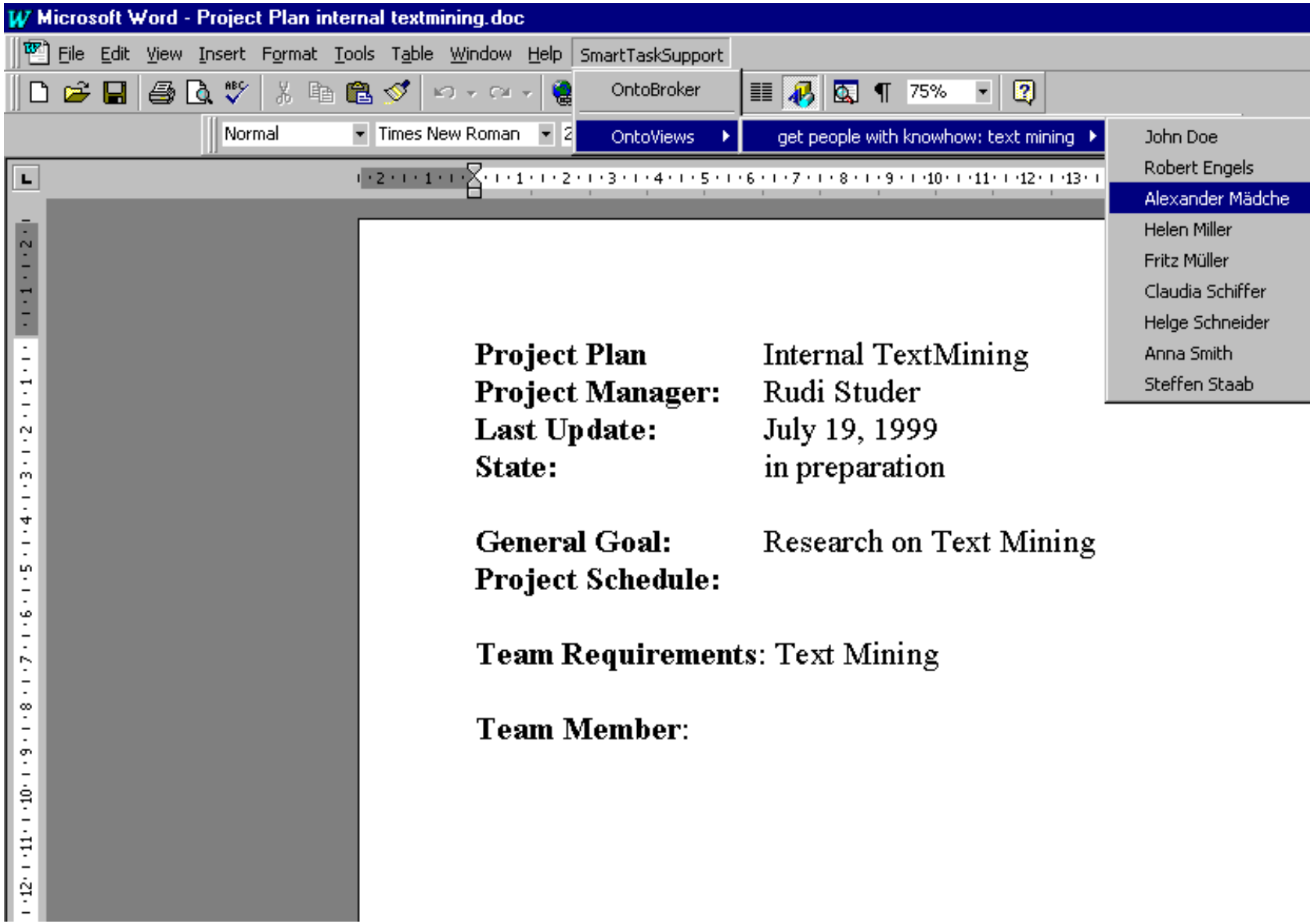


AIFB

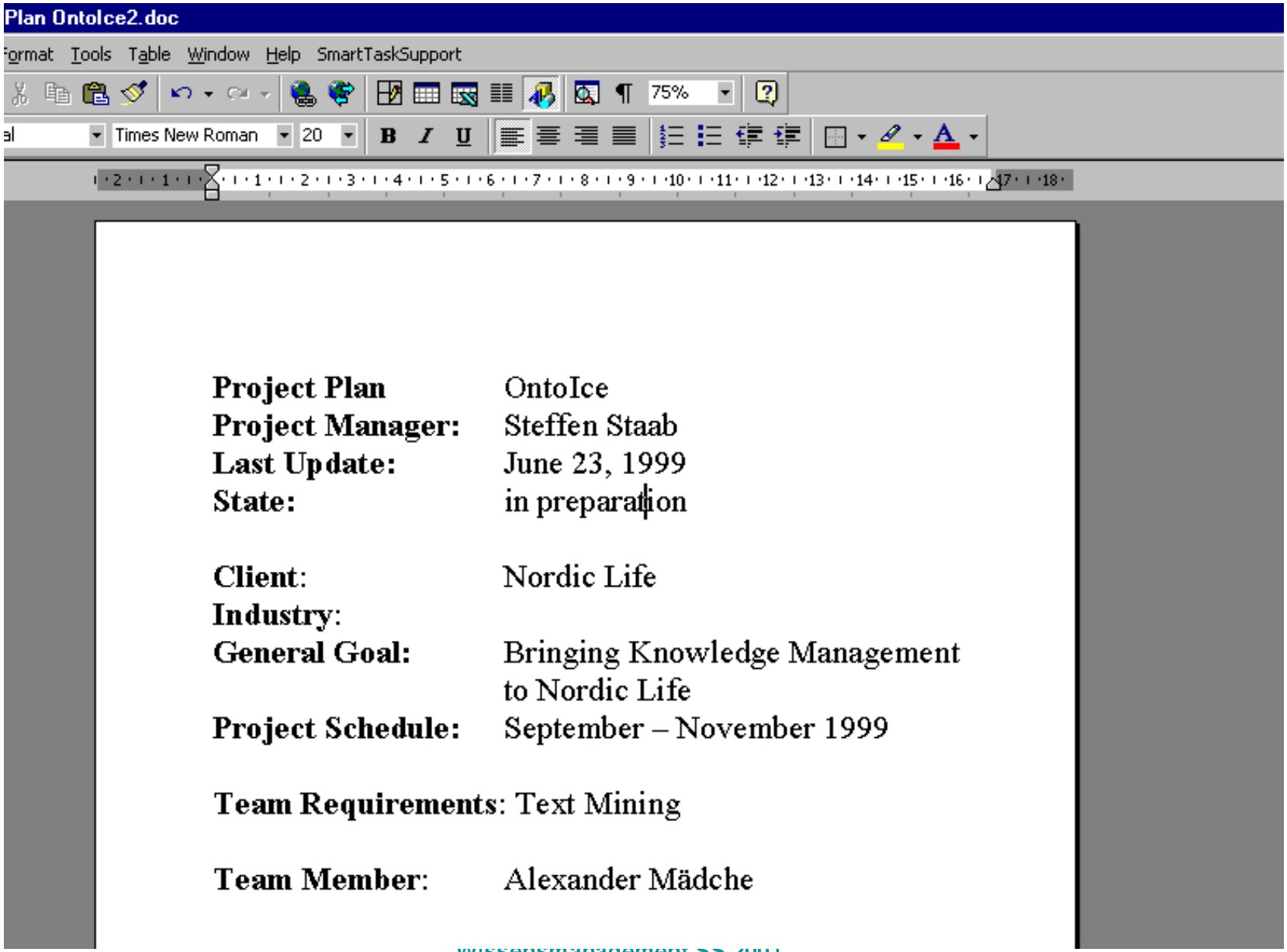
Example: Context-dependent queries

- Team is configured
- team members should have know-how in "Text Mining"
- "Intelligent Assistant" offers collection of **task relevant** queries (views), i.e. context as set up by document determines the offered queries
  - ask for persons with text mining know-how
- selected query is executed and Ontobroker delivers the corresponding answers
  - user may select a person from the offered list

Business Documents



Business Documents



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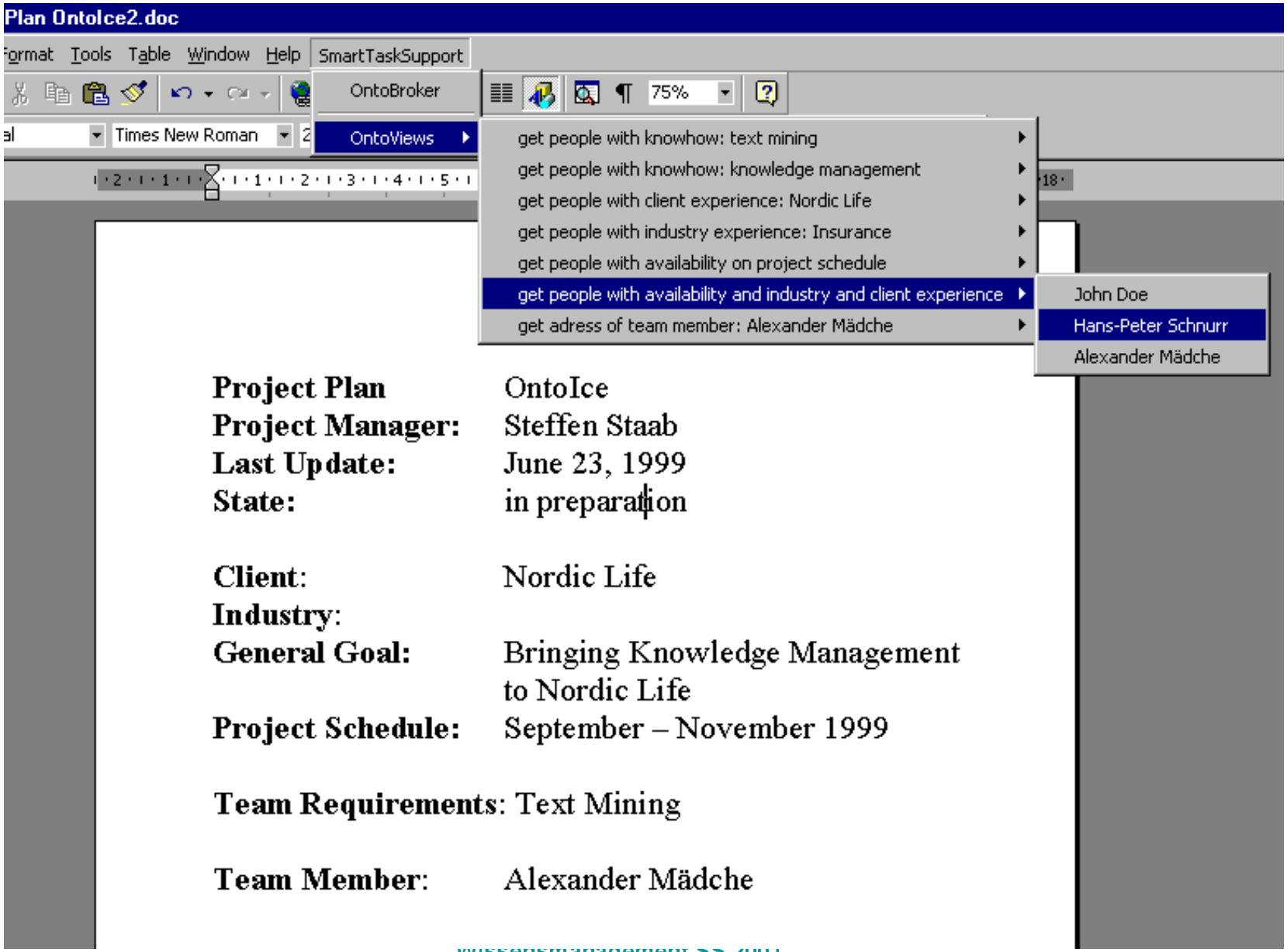
Example: Context-driven adjustment of views

- Offered views are adjusted to the status of the partially filled template
  - reflect also the project schedule as well as client experience
- selected query is executed and delivers up-to-date answers

Business Documents



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Project-planning business process

Knowledge evaluation:

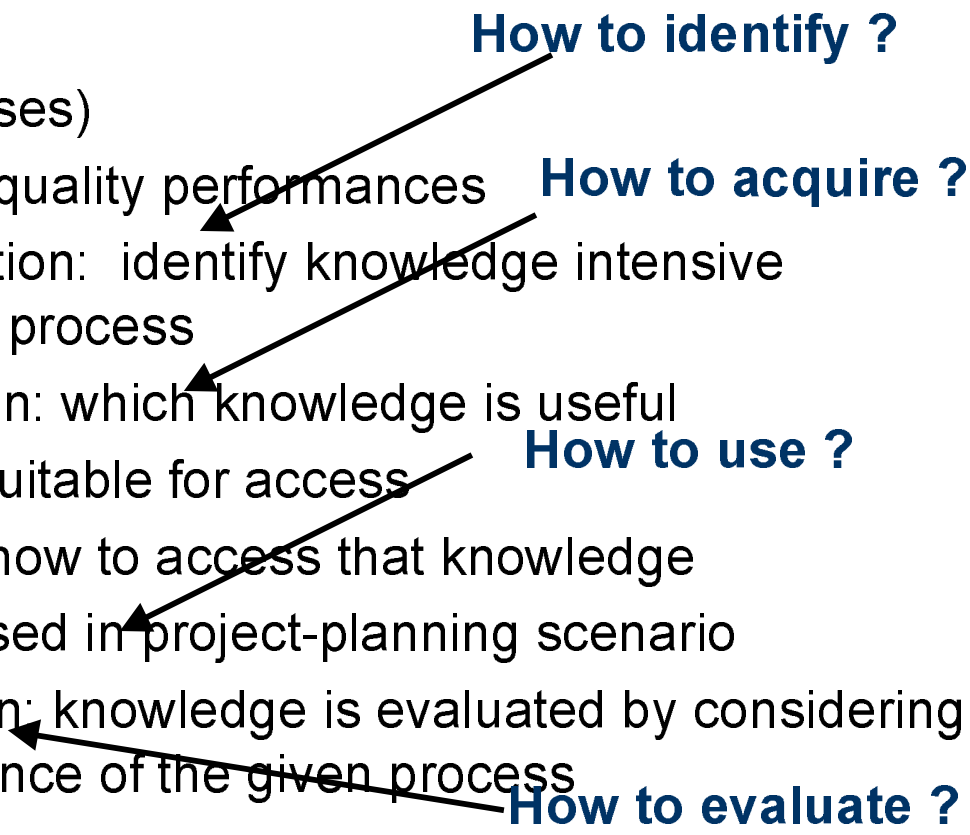
- Used knowledge has to be evaluated:
  - is the goal of KM system achieved:
    - shorter planning time
    - higher quality
  - requires measurement (quality, time)
    - quality of project-team could be obtained from project home page
- Possible evaluation:
  - knowledge about business activity “compile plan”
  - project-manager’s knowledge about deciding which approach for project-planning to use
  - meta-knowledge about
    - knowledge identification
    - knowledge acquisition

AIFB

Example - Smart Task Support
Discussion

- There are two kinds of knowledge:
  - knowledge about business process (how to organise a business process)
  - meta-knowledge about knowledge processes (how to perform a knowledge process)

- KM Analysis (KM processes)
  - KM goal: better time/quality performances
  - Knowledge identification: identify knowledge intensive activities in the given process
  - Knowledge acquisition: which knowledge is useful
  - Knowledge storing: suitable for access
  - Knowledge sharing: how to access that knowledge
  - Knowledge usage: used in project-planning scenario
  - Knowledge evaluation: knowledge is evaluated by considering time/quality performance of the given process



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5.4 KM as basis for Business Process Improvement/Reengineering

- Identification and effective implementation of business processes is the key task of an organisation.
- In dynamically changing environments business processes are a matter of continuous change (BPI/BPR)
- Knowledge management provides knowledge (documents, case base, experience base) for optimisation of business processes
- Goal: incorporate learning process into Change Management efforts

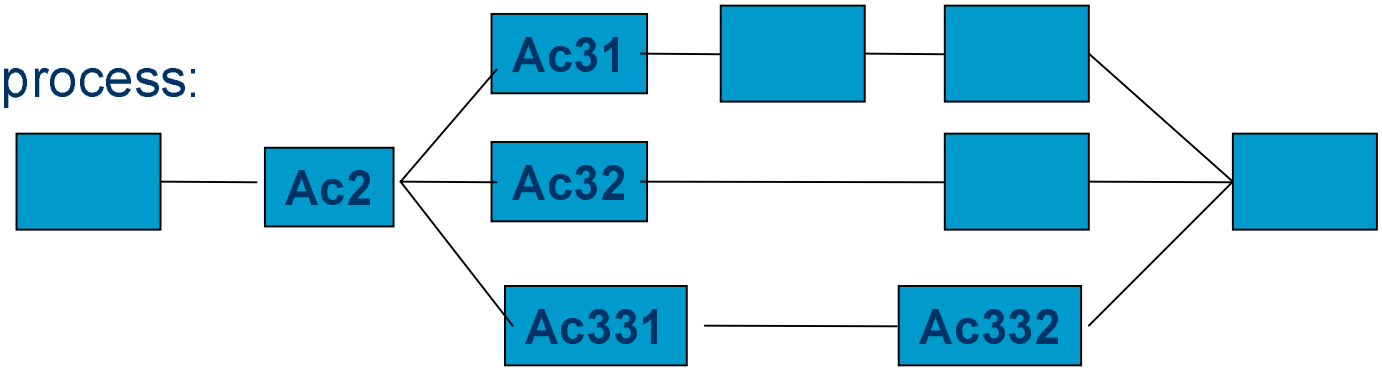
KM as basis for BPI/BPR

- Goal of a such KM system is to manage knowledge for improvement/reengineering of business process in order to achieve business objectives
- Useful knowledge is knowledge about process structure and process parameters
- This knowledge could be obtained from process handbooks and by analysis of measured process parameters
- Knowledge is used to analyse weak steps in process organisation
  - basis to redesign/reengineer process
- Knowledge is shared by similar business units
- Knowledge is evaluated by the improvement achieved in performing the business process

KM-BPR example: redesign a process to achieve better quality of the product

Knowledge identification: knowledge about process parameters

As-Is process:

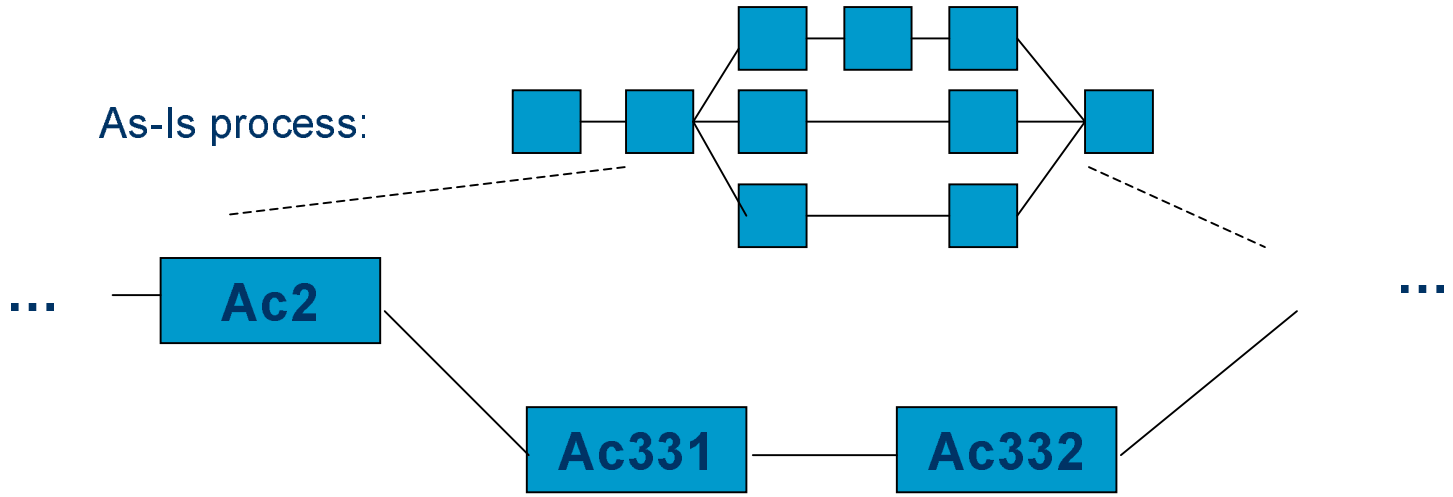


Measurements of the process parameters:

Activity / Process	…	Ac2	Ac31	Ac32	Ac331	Ac332	….	Product Quality
No11121		2 sec	3 sec					High
11122		2 sec			5 sec	10 sec		Low
11123		4 sec		6 sec				High
11125		3 sec			4 sec	6 sec		Low

KM-BPR example

Knowledge acquisition (knowledge about relations between process activities**)**



Using some knowledge discovery techniques new knowledge about given process can be generated:

IF succ(Ac2, Ac331) and succ(Ac331, Ac332) THEN

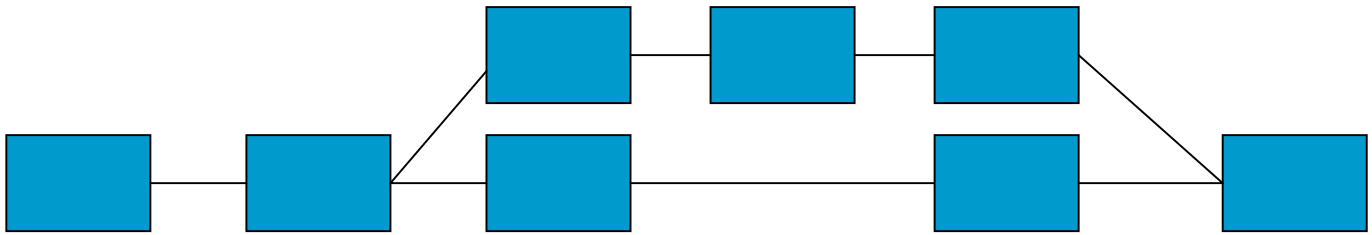
QualityOfProduct = low

KM-BPR example

Using of knowledge

This knowledge could be used to redesign the actual process chart (As-Is) in the case of the production of high-quality products

Redesigned process (for high-quality products)



=> acquisition of new knowledge (knowledge about process**)**

IF customer requires high-quality products THEN
use redesigned process

KM-BPR example

Knowledge sharing/reusing:

- New knowledge (about process structure and activities) can be shared by similar production units, which have the similar "quality" problem

- New knowledge (about process) - redesigned process chart - can be considered in similar business units in order to achieve similar business goals

Knowledge evaluation:

New knowledge has to be evaluated in some period of time in order to verify correctness/importance of knowledge

- on the process level (operative goals)
- on the business level (strategic goals)

In this phase selected KM strategy can also be evaluated

Knowledge management as basis for BPI/BPR Conclusion

- Knowledge management could be applied for managing knowledge about business processes in order to enable business process improvement

- Such knowledge has to be evaluated by analysing achieved improvements in business process, from the point of view of business objectives

- Benefits of this approach are twofold:
  - managing knowledge about processes and
  - managing meta-knowledge about KM processes, e.g.
    knowledge about knowledge generation/acquisition by mining process data,
    knowledge about using new knowledge,
    knowledge about sharing process-redesign knowledge

5.5 Conclusion

- In an increasingly complex and uncertain world, organisations are having:
  - to react to intensifying competition and
  - to sustain their advantage in a global marketplace through the faster improvement of their products/processes

- Such competitiveness is dependent on harnessing to best effect the knowledge resources available in the organisation, both tacit and explicit

AIFB

Conclusion

- Both initiatives (KM and BPM) are oriented toward similar optimisation tasks (Quality, Efficiency, ...)
- Both initiatives should be considered in the rectangle: people, culture, organisation and technology
- Both initiatives require extensive Change Management approaches
- Both initiatives requires wide organisational analysis (organisational objectives, critical success factors, process management, analysis of used technology, ...)

Conclusion - Future work

- KM & BPM integration leads to METAPRISE - Knowledge Innovative Organisation

(Firestone, J., 2000).

Conclusion - Future work

- A Metaprise is an organisation that has implemented an authoritative and formal Knowledge Management Process that
  - not only manages knowledge processes,
  - but also manages itself and
  - its own rate of innovation

- The Metaprise therefore contains at least two legitimated levels of process activity above the knowledge process level:
  - the first analyses and manages what occurs at the fundamental knowledge process level of interaction
  - and the second does the same at the knowledge management process level of interaction as well

- In short, the Metaprise is the knowledge-managing, knowledge-innovating organisation