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Lösung

Übungsblatt 2
CommonKADS methodology

Termin: 28. 05. 2001

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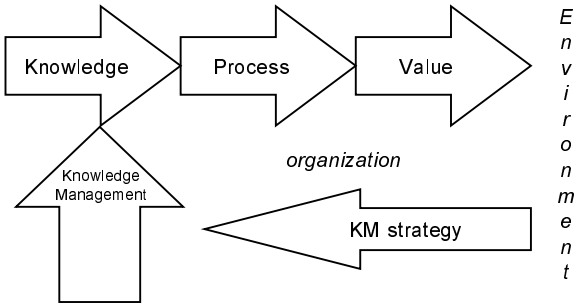
The Knowledge management Framework of CommonKADS



Knowledge management in relation to the business processes and value creation by the organization.

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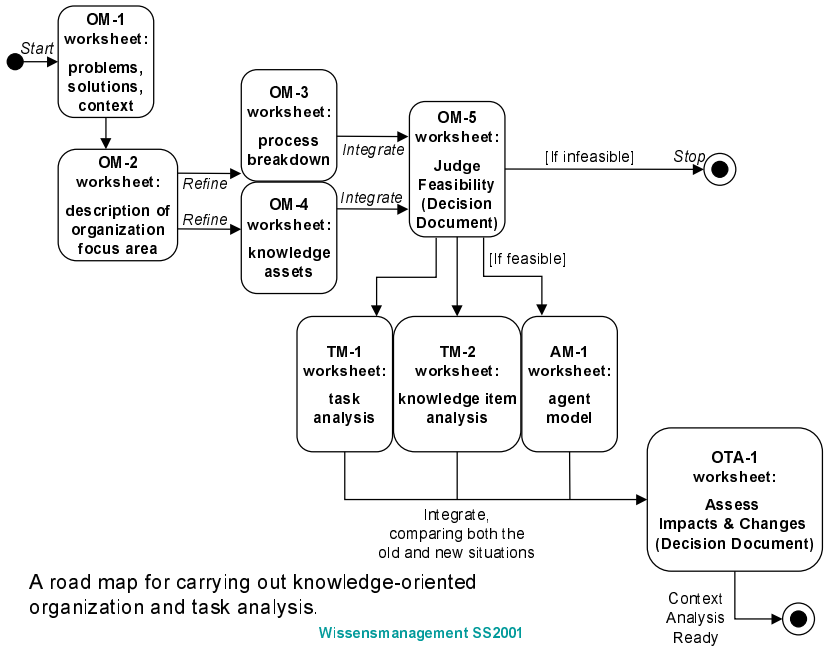
The Knowledge management Framework of CommonKADS



A road map for carrying out knowledge-oriented organization and task analysis.

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Aufgabe 1: Social Security Service

- Illustrate organization model study by real-life case study

Step 1: Problem Opportunity Context (OM-1):

- Handling of applications for general assistance benefits
- Amsterdam office is overwhelmed with applications
- Decision about applications is delayed
- Action has to be taken

Social Security Service

Organization Model	Problems and Opportunities Worksheet OM-1
Problems and opportunities	Because the applicable laws and regulations are so complex, it takes a long time for the staff involved to reach a decision. If we can assist these people with a knowledge system that stores the needed legal decision-making knowledge, the decision process can be speeded up, so that more clients can be served in the same time and the application backlog will be significantly reduced.
Organizational context	■ social security service is carried out by municipalities ■ approximately 60,000 people were supported by these general assistance ■ a considerable backlog in dealing with (the growing numbers of) clients had accumulated over the years ■ the clients themselves started to complain about the delays, and these complaints found their way into the local media
Solutions	■ the use of knowledge systems to help reduce the backlog

Worksheet OM-1: Identifying knowledge-oriented problems and opportunities in the organization

Social Security Service

Organizational Model	Variant Aspects Worksheet OM-2
STRUCTURE	Description of the organizational structure One central office and a collection of branch offices Each branch office has the same structure Connection to the computer center is shown that handles a lot of activities for the central office
PROCESS	The given process is decomposed into tasks, which are detailed in worksheet OM-3.
PEOPLE	In general, a lot of different people are involved Here, only a small fragment of persons is relevant, i.e. the staff members that are involved in the decision-making process

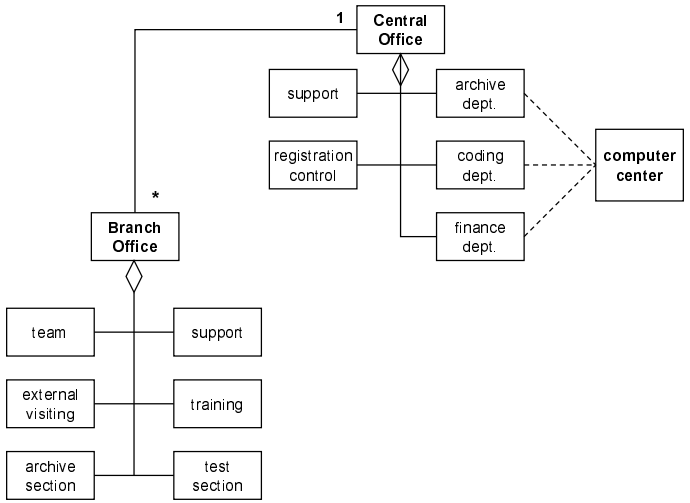
Worksheet OM-2: Description of organizational aspects that have an impact on and/or are affected by chosen knowledge solutions. (Part I)

Social Security Service

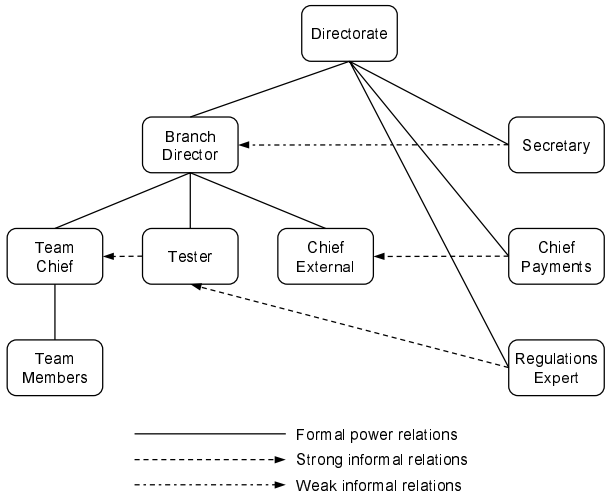
Organizational Model	Variant Aspects Worksheet OM-2 (continued)
RESOURCES	Computing is done by central computer center Some branch offices are inadequately housed
KNOWLEDGE	Required knowledge for the decision-making process The description of this component of the organization model is given separately, in worksheet OM-4 on knowledge assets.
CULTURE & POWER	Identify and describe the power relations among the involved persons Distinguish between Official relations Strong informal relations Weak informal relations

Worksheet OM-2: Description of organizational aspects that have an impact on and/or are affected by chosen knowledge solutions. (Part II)

Social Security Service



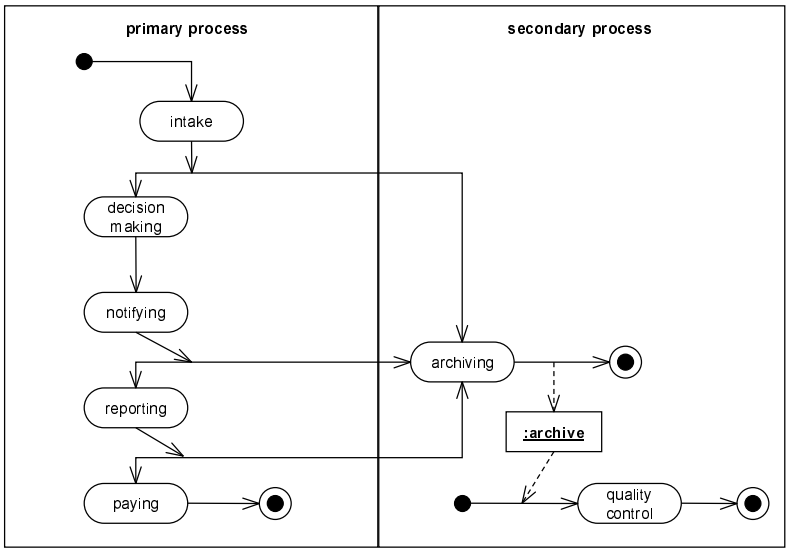
The structure component in the social security service case



Various power relationships in the social security service case.

Step 3: Breakdown of Business Processes (OM-3) and Knowledge Assets (OM-4)

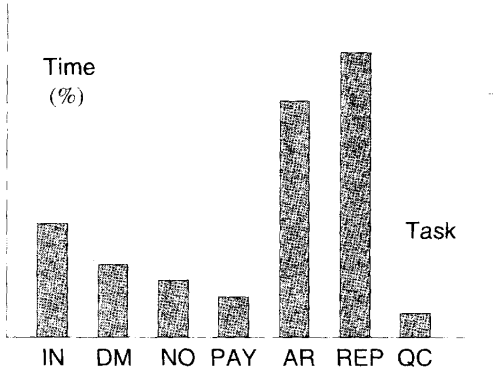
- Business process is decomposed into several tasks
  - Intake: collect all relevant information about the applicant
  - Archiving: handle files/documents for each client
  - Decision-Making: make the decision about the application; decide about amount of money
  - Notifying: send out written notification
  - Reporting: write internal report about the client
  - Paying: make actual payment to the client
  - Quality Control: check selected cases for correct handling



Activity diagram of the task in the business process of the social security service.

- Only some of the tasks are knowledge intensive, especially 'decision-making' and 'quality control'
- Decision-making:
  - Sometimes applicants are cheating
    - How to handle it?
  - Sometimes the office staff makes a positive decision based on some 'informal feeling'
- Analysis of the workload of each task showed that
  - Over 60% of the time is consumed by 'archiving' and 'reporting'
  - Decision-making is not the main bottleneck

Social Security Service



Task significance: Workload in the social security service case, expressed in percentage of total time spent.

Social Security Service

Organization Model	Checklist for Feasibility Decision Document: Worksheet OM-5
BUSINESS FEASIBILITY	Focus on improvement in archiving and reporting Has impact on organization structure since these tasks involve several departments Central computer center is affected as well
TECHNICAL FEASIBILITY	No problem for archiving/reporting; very difficult for decision making
PROJECT FEASIBILITY	Ensure participation of the actors
PROPOSED ACTIONS	Address 'archiving' in the first step

Worksheet OM-5: First decision document, comprising various feasible knowledge-improvement scenarios for product development.

Social Security Service

- Remark:
  - Organizational analysis is very important step
  - Be careful whether initial expectation is correct
  - Result of analysis may provide
    - New insights
    - that result in different actions when compared to the initial expectation

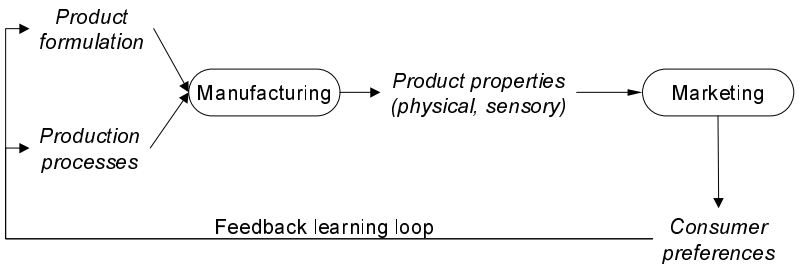
Aufgabe 2. Ice-Cream Product Development

- Ice cream is a rather knowledge-intensive product
  - Delicate product structures and properties
  - Sophisticated production processes
  - Consumer preferences that change over time and that are often local
  - New ice cream products are required regularly
- Case study is taken from Unilever

- Phase I: Organization Model
  - Initially, variety of solutions were discussed:
    - Knowledge systems for supporting assessment or manufacturing
    - Ways to prevent loss of skills due to retirement
    - Improving the flow of knowledge between factories
    - …
  - Establish business support for KM project
    - Interview business executives
    - Discuss general outline for such a KM project

OM-1: Organizational Context, Problems, Solutions Portfolio

- Ice-cream factories are located in many different countries
- Two main problem areas are identified
  - Reduce time to market
  - Leverage knowledge across sites / functions
- Business interviews result in the vision of an organizational learning cycle
  - KM has to be cross-functional and cross-site oriented
- Product formulation and development seems to have the strongest needs with respect to knowledge management



A vision for ice-cream knowledge management, seen as an organizational learning feedback loop.

Organization Model	Problems and Opportunities Worksheet OM-1
PROBLEMS AND OPPORTUNITIES	* Speed-up time to market of new ice-cream products * Leverage associated knowledge across functions and sites
ORGANIZATIONAL CONTEXT	Vision and strategy: * Achieve a situation as depicted later External factors: * Local and changing consumer preferences * Variety in relevant national legislation * Branding issues * Strong international competition Major value drivers: * Fast-moving alignment with local consumer markets by new product introductions
SOLUTIONS	Solution 1: Upgrade current IT systems for product development Solution 2: Develop new functionalities through knowledge systems (e.g., assessment, processing support) Solution 3: Let specific solution direction be the result of a stakeholder-driven process

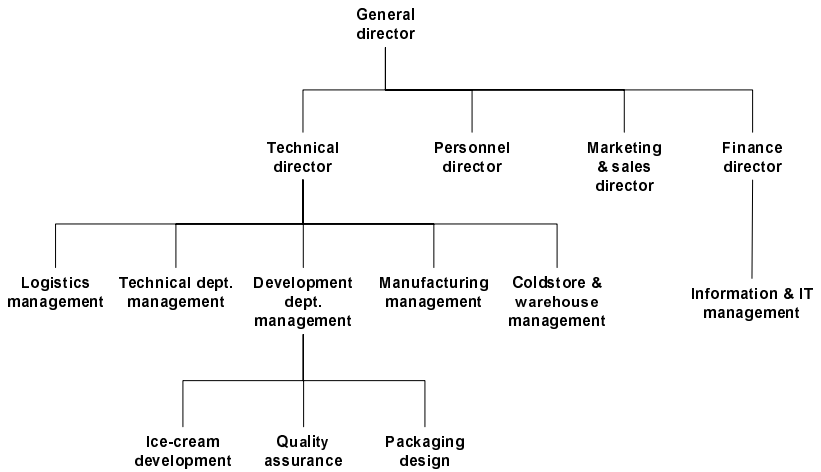
Worksheet OM-1: Problems, organizational context and possible solutions for the PARIS ice-cream project.

OM-2: Description of Focus Area in the Organization

- Several ice-cream factories are surveyed
- New product development appears as the key business process
- Product development is composed of 5 major sequential stages (cf. OM-3)
- Many different functional areas are involved
  - Strong cross-functional aspect

Organization Model	Variant Aspects Worksheet OM-2
STRUCTURE	See next slide
PROCESS	Product development process: involves five major phases. See high-level breakdown in worksheet OM-3
PEOPLE	Wide range of functional areas is involved in product development: e.g., marketing, sales, logistics, quality management, operations planning, manufacturing, and the legal department
RESOURCES	* *Information systems*: existing system for storage of ice-cream formulations, capable of making certain predictive calculations of product properties, used as a tool for product development managers * ...
KNOWLEDGE	Linked to the different functional areas listed above, evidently wider than product development
CULTURE & POWER	* Focus on features of own market * Local cross-functional interplay between marketing, process technology and operations people

Worksheet OM-2: Description of variant organizations aspects of an ice-cream factory.



A typical organization structure of an ice-cream company.

OM-3: Breakdown of the Product Development Business Process

- All tasks have to be completed successfully for introducing a new product on the market
- Feasibility phase and planning phase are rather knowledge-intensive
  - The more knowledge is used the less iterations are needed in the early phases
- Only top-level tasks are shown in OM-3
  - Each of these tasks is composed of a collection of subtasks (not shown)

Ice-Cream Product Development

Organization Model		Process Breakdown Worksheet OM-3				
NO.	TASK	PER-FORMED BY	WHERE?	KNOWL-EDGE ASSET	KNOWL-EDGE INTENSIVE	SIGNIFICANCE
1	Product idea generation	Marketing, development (mainly)	-	New product-market combination	Yes	Any new product must subsequently pass all listed tasks successfully
2	Feasibility phase	Development core team formed from several depts.	-	Concept development, experimentation, and testing	Very high	See above
3	Production and sales planning	Packaging, manufacturing (and others)	-	Capabilities evaluation, experimentation, and planning	High	See above
4	Imple-mentation	Manufacturing, packaging, quality, training, marketing	-	Operations expertise for the various functional areas	Yes	See above
5	Post-launch review	Various	-	Evaluation, standards conformance	Medium	See above

Worksheet OM-3: Top-level task breakdown for the ice-cream product development process.

Ice-Cream Product Development

OM-4: Example Knowledge Assets

- Tasks are typically performed by staff from different departments; knowledge is required from different areas
  - Communication and sharing of knowledge is highly important
- Ice-cream processing knowledge is typically heuristic, experiential and incomplete
  - Quality of results is an issue

Ice-Cream Product Development

Organization Model		Knowledge Assets Worksheet OM-4				
KNOWL-EDGE ASSET	POSSESSED BY	USED IN	RIGHT FORM?	RIGHT PLACE?	RIGHT TIME?	RIGHT QUALITY?
Concept development and testing: ice-cream processing	Manufacturing	2. Feasibility phase	Yes	No (needed at Development)	Yes	No (in-complete, heuristic)
...	...	...	...	...	...	...
Concept development and testing: finished product specification	Development core team	2. Feasibility phase	No: paper form too limited	Yes	Yes	Yes

Worksheet OM-4: An excerpt from the knowledge assets analysis.

Ice-Cream Product Development

OM-5: First Decision Document: Knowledge-Improvement Scenarios

- Major knowledge bottlenecks have been identified
- Different opportunities for knowledge improvement have been identified
- Feasibility plase is the most crucial knowledge intensive task
  - Properties of raw materials / products
  - Properties of production process
- Reduce time to market
  - Quick dissemination of knowledge across different functional departments

Ice-Cream Product Development

- Different knowledge-improvement scenarios
  - Processing scenario
    - Make explicit effects of processing on product properties
  - Optimization scenario
    - Optimize one or more parameters in the whole product formulation
  - Supply chain scenario
    - Follow one ice-cream brand through the whole process chain
  - Knowledge transfer scenario
    - Quicker dissemination of research knowledge to the business units

Ice-Cream Product Development

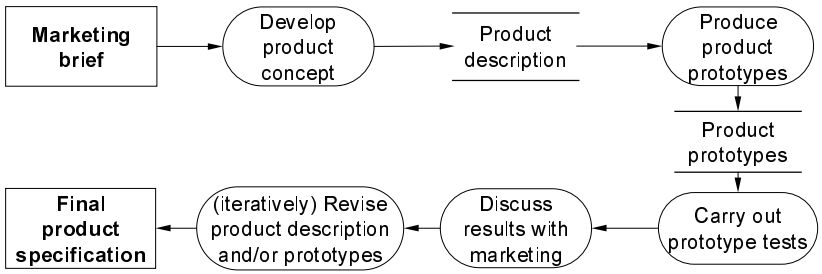
Organization Model	Checklist for Feasibility Decision Document: Worksheet OM-5
BUSINESS FEASIBILITY	Based on the organization-model analysis, the most important knowledge bottlenecks in product development have been clarified. In addition, a number of different scenarios for knowledge improvement opportunities have been identified for product development, e.g., a processing scenario, optimization scenario, supply chain scenario, internal knowledge transfer scenario. Each scenario represents a promising, feasible (to varying degrees), but different solution direction.
TECHNICAL FEASIBILITY	An important requirement is that any new system, including knowledge-based modules, has to fit into the overall IT strategy and must be interoperable with currently used tools. This is a reason to consider an upgrade of the existing product formulation and development tool. As any new IT system will make key business knowledge more explicit and available in a rather centralized way, very sound security measures are crucial.
PROJECT FEASIBILITY	Due to the stakeholder-driven approach, there is good basis for further work. To maintain support, it is advisable to develop and demonstrate a first knowledge module that demonstrates limited but visible results at an early stage.
PROPOSED ACTIONS	* Further rank and prioritize the knowledge improvement scenarios, by detailed task / agent / knowledge item analysis, leading to both short-term and mid-term recommendations and actions. * Consider how the current IT architecture can be gradually extended to a broader and more knowledge-intensive support environment. * Select a first system module with a high potential impact that can be developed relatively quickly.

Worksheet OM-5: First decision document, comprising various feasible knowledge-improvement scenarios for product development.

Ice-Cream Product Development

TM-1: Business Task Decomposition and Analysis

- Task analysis is made for feasibility task
- Worksheet TM-1 represents a refinement of worksheet OM-3
- Task analysis shows the cross-functional nature of ice-cream product development



Flow diagram for the subtasks of the feasibility phase task within ice-cream product development.

Ice-Cream Product Development

Task Model	Task Analysis Worksheet TM-1
ORGANIZATION	Part of the ice-cream product development process; different departments involved (see OM-2, OM-3, and Slide 66)
GOAL AND VALUE	This task aims to establish the feasibility (in terms of both product properties, processing requirements, packaging, and marketing needs) of a new product idea, by turning this into an finished and agreed-upon product specification. This task is a necessary (but not sufficient) precondition for new product introduction to the market.
DEPENDENCY AND FLOW	Input tasks: Product idea generation Output tasks: Production and sales planning For task decomposition and flow: see Slide 74
OBJECTS HANDLED	Input objects: Marketing brief Output objects: Finished product specifications Internal objects: See Slide 74
TIMING AND CONTROL	Frequency: In the order of dozens of times per year, but variable Duration: Several months, but variable Control: See Slide 74; for each new product this task must be carried out. Constraints: National legal requirements must be satisfied, including environmental and safety regulations

Worksheet TM-1: Analysis of the "feasibility phase" task within the ice-cream product development business process. (Part I)

Task Model	Task Analysis Worksheet TM-1 (continued)
AGENTS	From various functional areas; cf. OM-2 and OM-3 for examples
KNOWLEDGE AND COMPETENCE	Variety of domains; cf. OM-4 and TM-2 for examples
RESOURCES	Time is a resource of prime importance here, particularly because trials for product and production testing are by their nature highly iterative and time-consuming
QUALITY AND PERFORMANCE	ISO 9000 standards (e.g., development, production); environmental life-cycle analysis (LCA) indicators (e.g., packaging)

Worksheet TM-1: Analysis of the "feasibility phase" task within the ice-cream product development business process. (Part II)

TM-2: Detailed Knowledge Bottleneck Analysis

- Each knowledge item (knowledge assets of smaller grain size) is described in a separate worksheet

Task Model	Knowledge Item Worksheet TM-2	
NAME POSSESSED BY USED IN DOMAIN	Consumer desires Marketing, research 2. Feasibility phase Ice-cream consumer marketing	
Nature of the knowledge		**Bottleneck / to be improved?**
Formal, rigorous		
Empirical, quantitative	X	
Heuristic, rules of thumb	X	
Highly specialized, domain-specific	X	
Experience-based	X	
Action-based		
Incomplete	X	X
Uncertain, may be incorrect	X	
Quickly changing	X	
Hard to verify	X	X
Tacit, hard to transfer	X	X

Worksheet TM-2: Characterization of the “consumer desires” knowledge item. (Part I)

Task Model	Knowledge Item Worksheet TM-2 (continued)	
NAME POSSESSED BY USED IN DOMAIN	Consumer desires Marketing, research 2. Feasibility phase Ice-cream consumer marketing	
Form of the knowledge		**Bottleneck / to be improved?**
Mind	X	X
Paper		
Electronic		
Action skill		
Other		
Availability of knowledge		
Limitations in time		
Limitations in space	X	X
Limitations in access		
Limitations in quality	X	X
Limitations in form		
Remarks: Consumer desires constitute a difficult area for several reasons: (i) how to find out what the consumer actually wants; (ii) how to identify and interpret consumer desires; (iii) how they relate to properties of the ice-cream product.		

Worksheet TM-2: Characterization of the “consumer desires” knowledge item. (Part II)

- OTA-1: Decision Summary of Recommendation and Actions
  - Processing and optimization scenarios are the most promising ones

First module opportunity	Available knowledge	Technical feasibility	Potential benefits	Costs	Risks
Processing scenario	Good	Good	Good	Medium	Low
…	…	…	…		
Optimization scenario	Medium	Medium / poor	Good	High	Medium
…	…	…	…	…	…
Supply chain scenario	Medium / poor	Medium	Poor	Medium	High
Knowledge transfer scenario	Good	Good	Unknown	High	Medium

Comparison of knowledge-improvement scenarios in the ice-cream case, based on task and knowledge asset analysis.

Organization-Task-Agent Models	Checklist for Impact and Improvement Decision Document: Worksheet OTA-1
IMPACTS AND CHANGES IN ORGANIZATION	For proposals A and B below, meant as short-term recommendations, these are relatively limited. Proposals C and D, intended for the midterm, require the setup of a proper archive maintenance process (C), and the design of new cross-site team meetings and reporting (D).
TASK/AGENT-SPECIFIC IMPACTS AND CHANGES	Product developers may have to take on new knowledge-archiving and maintenance tasks. Members of cross-site teams will have new knowledge-sharing and reporting tasks, which takes time off their earlier, normal duties.
ATTITUDES AND COMMITMENTS	The short-term proposals have been positively received. The Midterm recommendations need further investigation in this regard, because they bring with them new duties for various parties.
PROPOSED ACTIONS	A. Develop a first knowledge module for ice-cream processing, so that product developers can consider manufacturing knowledge upfront in concept development. B. Start preparations for the addition of an optimization function to the existing (conventional) product development tool. C. Archive past formulations and the experiences with them in electronic form. D. Develop structured knowledge management approaches to facilitate knowledge sharing in multidisciplinary, cross-site teams.

Worksheet OTA-1: Summary of organizational recommendations and actions in the ice-cream case.