

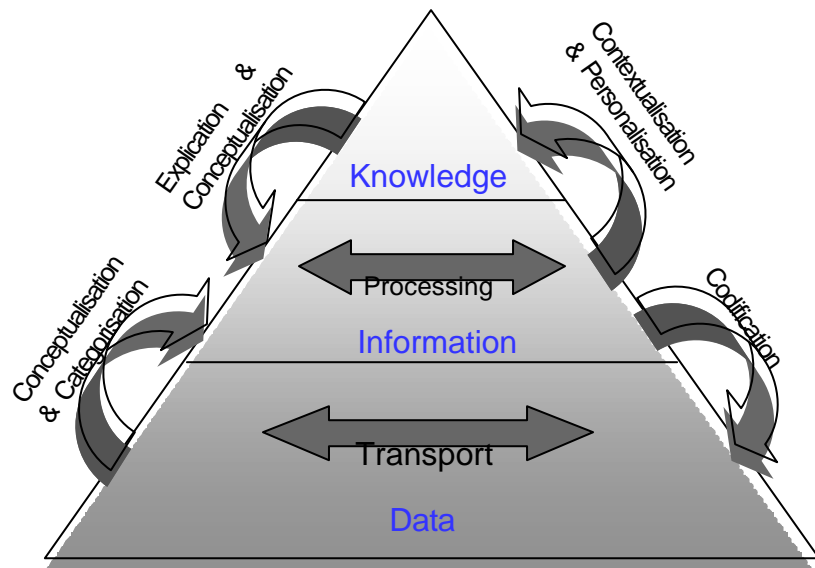
## Metadata and Cooperative Knowledge Management

*Matthias Jarke, Ralf Klamma*  
Information Systems Group, RWTH Aachen  
Fraunhofer FIT, Birlinghoven



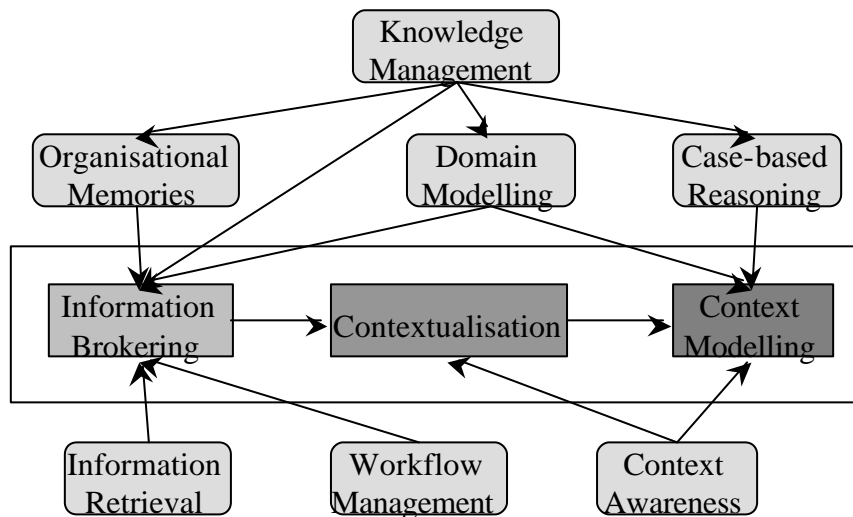
Thanks to many collaborators ...

### Knowledge Management Pyramid (Alavi and Leidner 1999)



## The Central Role of Context

Matthias  
Jarke



15-MJ-00083

[Klemke, Diss. 2002]

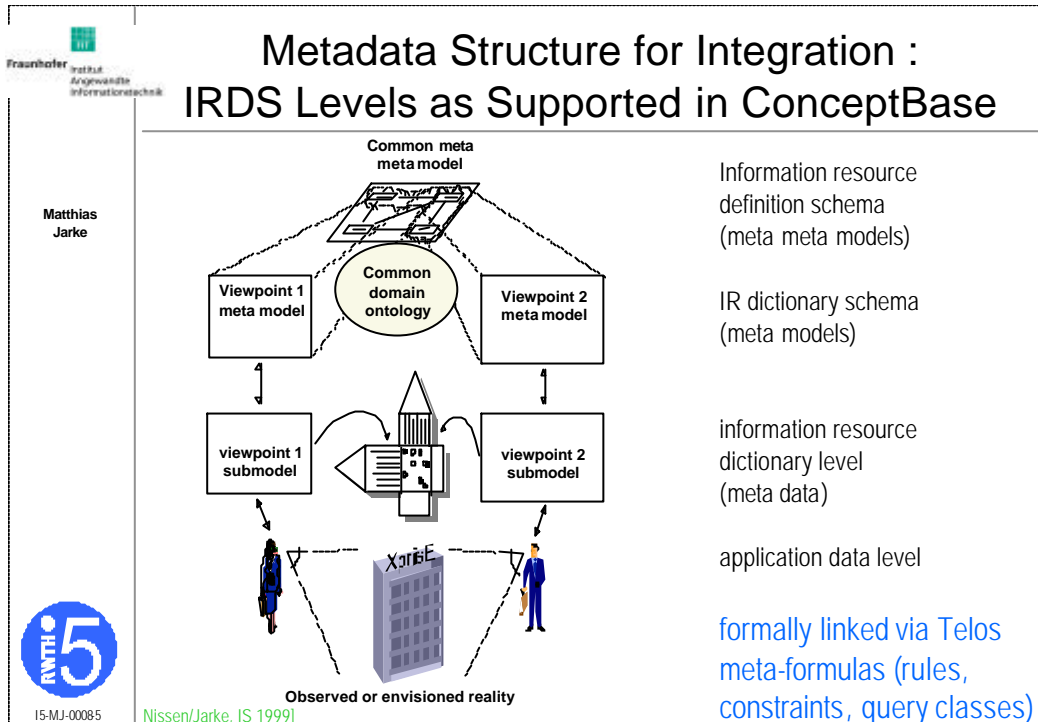
## Metadata = Data About Data

Matthias  
Jarke

- o in IS Engineering often : **instantiation abstraction** for **indexing / integration / transformation / evolution**
  - o Information Resource Dictionary Standard (IRDS)
  - o Telos/ConceptBase, MetaEdit+, Microsoft Repository
  - o XML-based MPEG-7 standard for multimedia description
  - o online reflection between data and metadata possible when combined with rules or methods
- o context structured by meta models and ontologies
  - o **vendor context**: domain, notation, process, goal
  - o **client context**: user location, interests, capabilities



15-MJ-00084



Fraunhofer Institut Angewandte Informationstechnik

## FIT: Expanding the Reach of Human Abilities

Matthias Jarke

- o mission: **human-centered computing in process context**
- o research programs
  - o formal handling of **Information Contexts** (R. Oppermann)
  - o networking via the **Social Web** (W. Prinz)
  - o **Human Enabling** via Enhanced Reality (T. Berlage)
- o application domains
  - o cooperative (chemical/software) engineering, biomedicine
  - o (political & business) decision support
  - o handicapped/elderly people, tele-learning, tourism

15-MJ-00086

## Outline

Matthias Jarke

- o Metadata and Cooperative Knowledge Management
  - o is knowledge management *dead*?
- o The Culture Gap in Knowledge Management
  - o identify the research needs (WHY / WHAT / HOW should a community or organisation know ?)
- o There are no (Media-Free) Ontologies!
  - o transcribe -- address -- localize
  - o example: data warehousing / information brokering
- o Lessons and Outlook



15-MJ-00087

## Is Knowledge Management Dead ?

Matthias Jarke

- o Does your KM project
  - o "run the bank" or
  - o "change the bank"?



15-MJ-00088

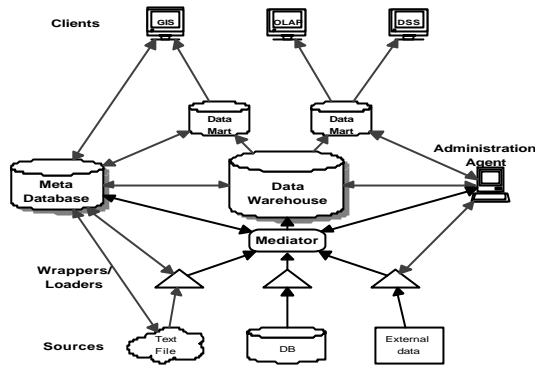
## Quality Reasons for Traditional Data Warehouse Architecture

Matthias Jarke

Online Analytic Processing

DW as a Buffer and Tracer

Online Transaction Processing



### Why separate OLTP from OLAP ?

performance and safety : small update vs. large query

logical interpretability: multi-dimensional analysis

temporal and granularity mismatch : operational detail vs. aggregation

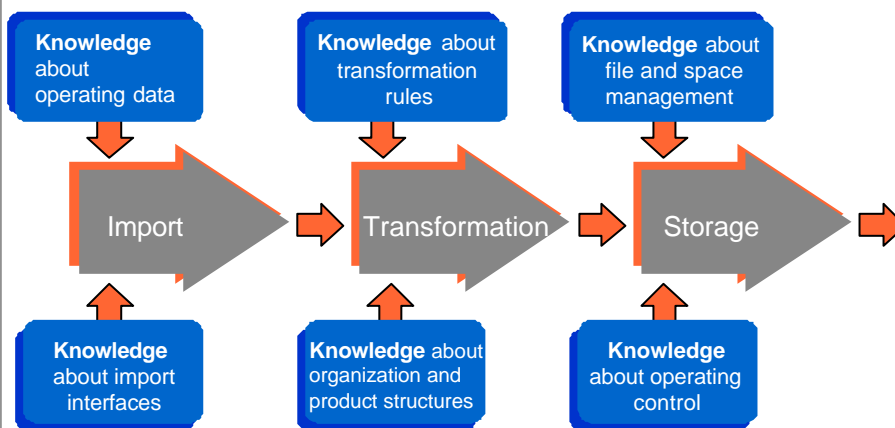
[Jarke et al., Fundamentals of Data Warehouses, Springer 2000]



15-MJ-00089

## Metadata Structure for Controlling DW Deutsche Bank (1)

Matthias Jarke

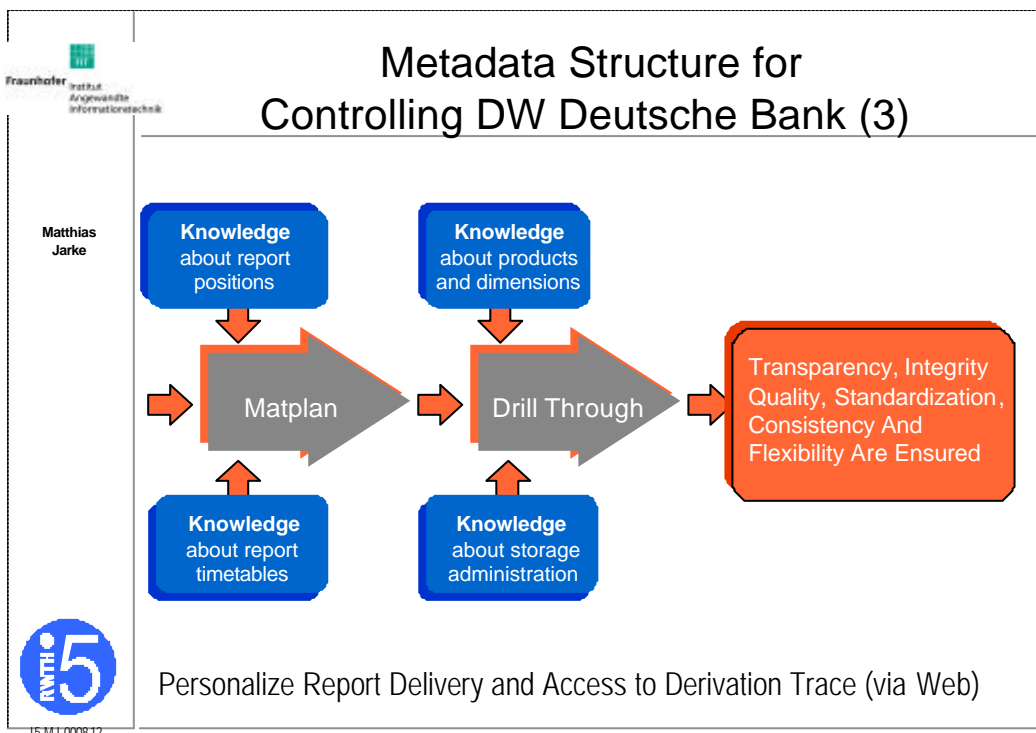
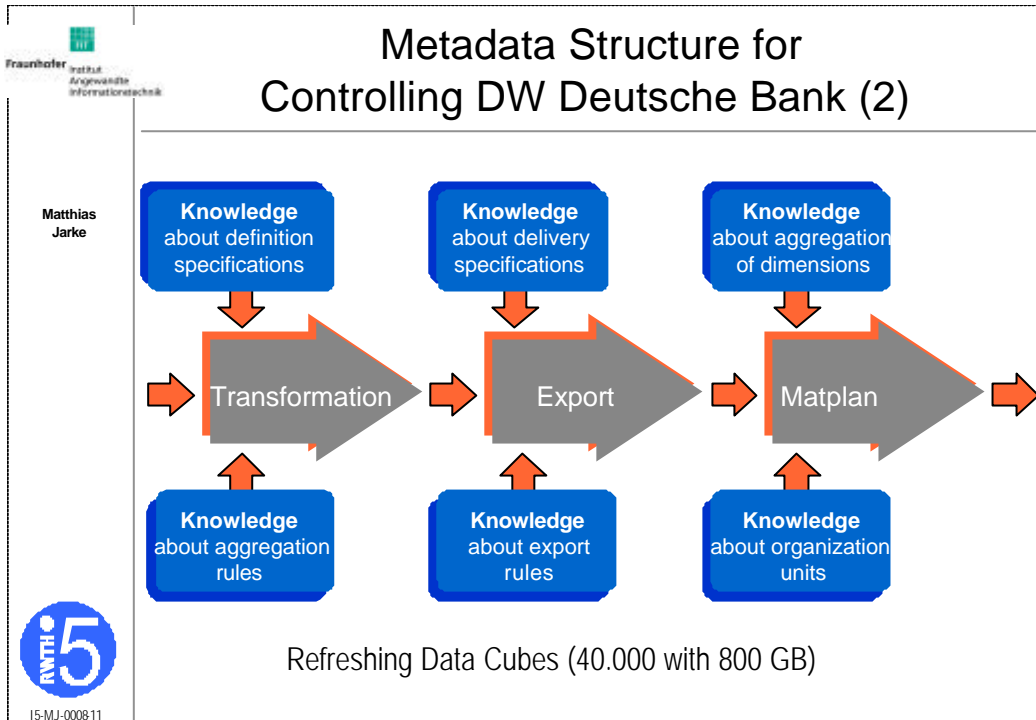


Loading the Operational Data Store (from 200 databases with 1.4 TB daily)

[Schafer et al., VLDB 2000]

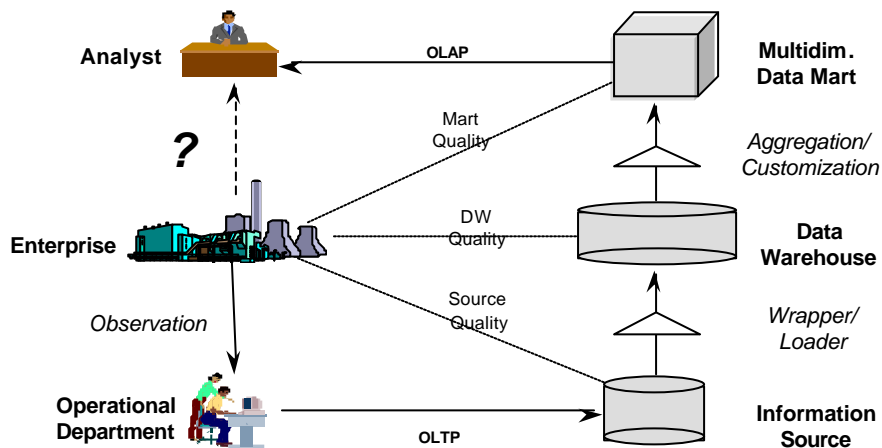


15-MJ-000810



## The Enterprise Perspective has the Key ROI Impact

Matthias Jarke



*Need to capture domain/task semantics with more complete analysis of information flows --- DWQ Methodology*

[Jarke et al., CAISE 1998]

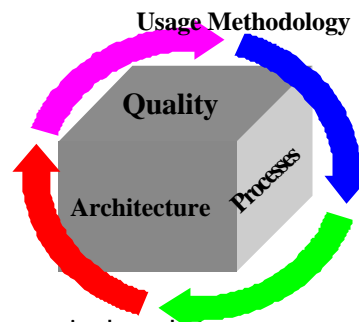


15-MJ-000813

## Is Knowledge Management Dead ? No but ...

Matthias Jarke

- o Does your KM project
  - o "run the bank" or
  - o "change the bank"?



- o Elementary survival challenges in hard times
  - o make KM directly relevant to the organization goals and processes
  - o protect KM invest through incremental ISE technologies
  - o make KM directly helpful for *each* user community



15-MJ-000814

## Outline

Matthias  
 Jarke

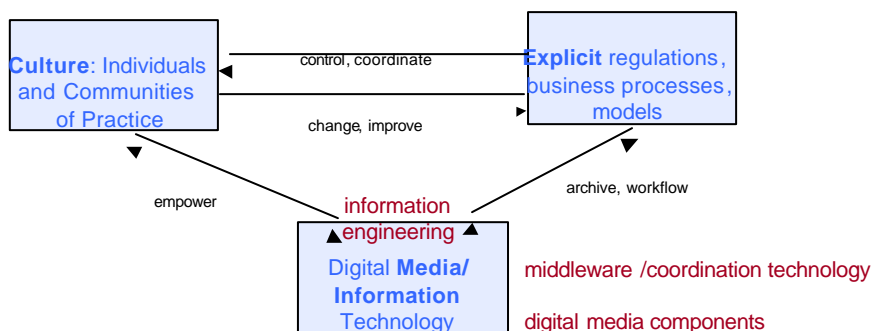
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  - o identify the research needs (WHY / WHAT / HOW should a community or organization know ?)
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- o Lessons and Outlook



15-MJ-000815

## Cooperative Information Systems Framework

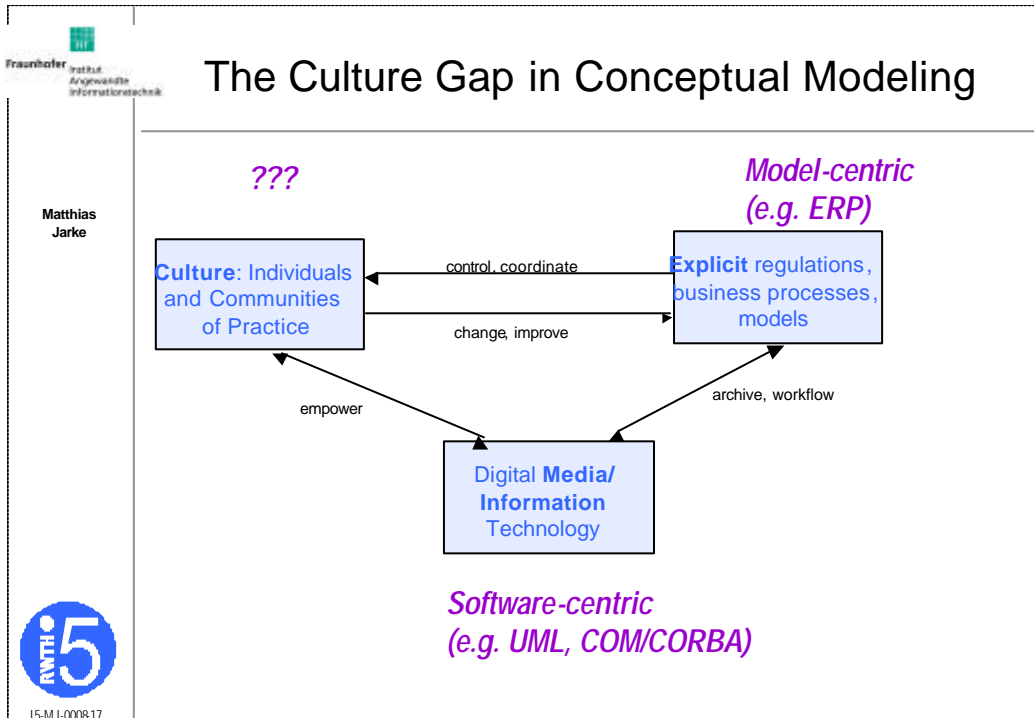
Matthias  
 Jarke



15-MJ-000816

[deMichellis et al., CACM 1998]

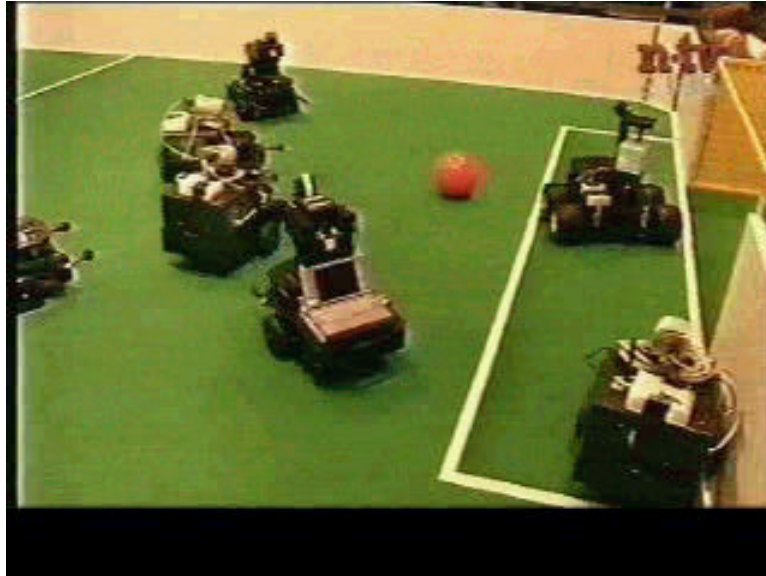




- Fraunhofer Institut Angewandte Informationstechnik
- ## Need to reconcile three aspects of a KM solution for work practice
- Matthias Jarke
- o **Business view**: knowledge is information in a context of action (WHY to know?)
    - o support full knowledge creation cycle (Nonaka+)
  - o **Engineering/TQM view**: knowledge is defined by what is wrong or different (WHAT to know?)
    - o ‚we judge our engineers by how well they deviate from the textbook‘
  - o **Cultural Science view**: knowledge evolves in a media-enabled discourse (HOW to know?)
    - o inter-media transcriptivity, focussed addressing, community evolution
- 15-MJ-0008-18

## Business View: Knowledge as Information in a Context of Action

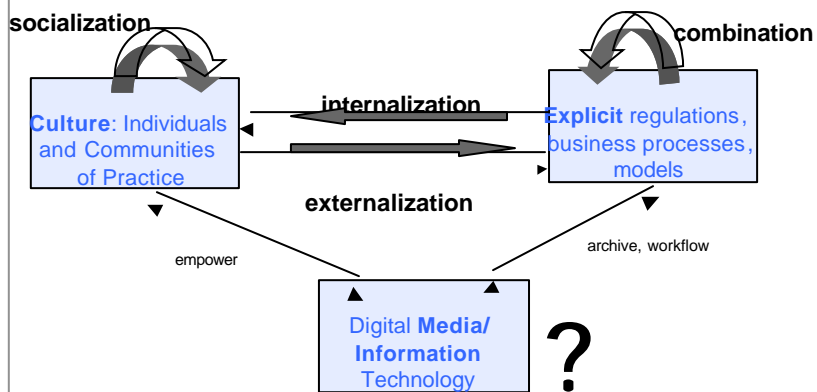
Matthias Jarke



15-MJ-000819

## Knowledge in a Context of Action: Nonaka & Takeuchi Process Model

Matthias Jarke



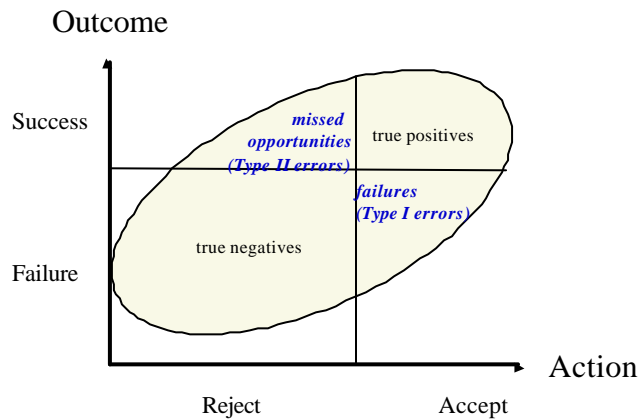
key IS Engineering issue:  
 de-contextualization and re-contextualization of knowledge



15-MJ-000820

## Engineering View: Knowledge is Defined by What is Wrong or Different

Matthias Jarke



### Organizations recognize failures more easily (type I bias):

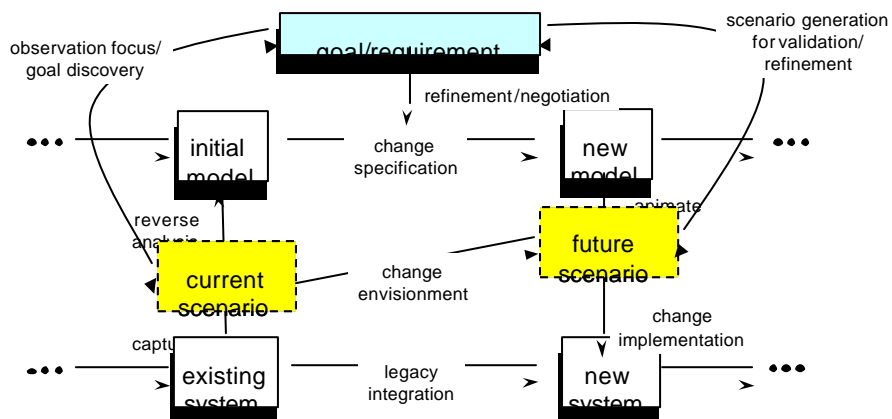
- > autonomy, creative chaos desirable
- > share experiences across boundaries
- > simulate alternate experiences in virtual worlds [Dhar, IS 1998]



15-MJ-000821

## Scenarios Show What is Different or Wrong wrt. Models and Goals

Matthias Jarke



### Scenarios as middle-ground abstractions for organizational memory::

- > focus on *use* and *differences*
- > delay *commitment* but increase *participation*
- > improve *memorization/ reuse*



15-MJ-000822

[Jarke/Bull/Carroll, REJ 3/98]

Fraunhofer IITB  
Institut für Angewandte Informationstechnik

## Scenarios Circumscribe Models in Constructivist Learning (MPEG-7 based Virtual Entrepreneurship Lab)

Matthias Jarke

15-MJ-000823 [Klamma et al. 2001]

Fraunhofer IITB  
Institut für Angewandte Informationstechnik

## Outline

Matthias Jarke

- o Metadata and Cooperative Knowledge Management
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- o The Culture Gap in Knowledge Management
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- o There are no (Media-Free) Ontologies!
  - o **transcribe -- address -- localize**
  - o example: data warehousing / information brokering
- o Lessons and Outlook

15-MJ-000824

## Research College 427 „Media and Cultural Communications“

Matthias  
Jarke

- o the postulate of **transcriptivity**:
  - o concepts depend on media, **no media-independent knowledge**
  - o knowledge externalization by media commenting on media
- o the postulate of **addressing**:
  - o freely designed digital media foster **globalization** of address spaces
- o the postulate of **localization**:
  - o **culture-specific adoption** of media and knowledge

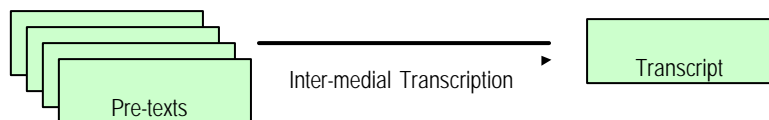


15-MJ-000825

[Jäger 2001]

## Transcription: Media-Enabled Discourse

Matthias  
Jarke



Pre-texts (unstructured information) are media objects.

The **transcript** is also a media object.

It **represents a concept** by defining a way of selecting and reading the pre-texts which are then seen as prototypical examples or counter-examples (cf. scenario-based design, constructivist teaching).

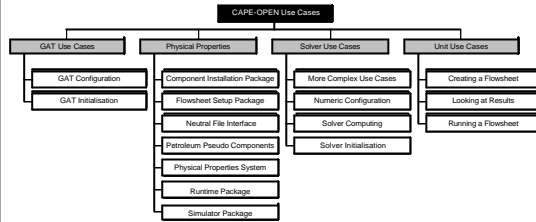
If **targeted to media-competent communities**, it also enables a critique of itself and thus 'conceptual progress'.



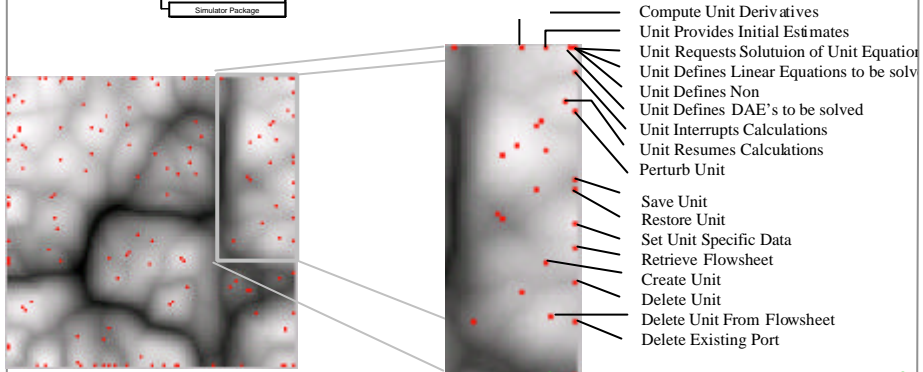
15-MJ-000826

## Transcription example: document maps

Matthias Jarke



*Use Cases in  
Brite-Euram project  
CAPE-OPEN*



[Braunschweig et al., INCOSE 99, Diss Becke '2001]

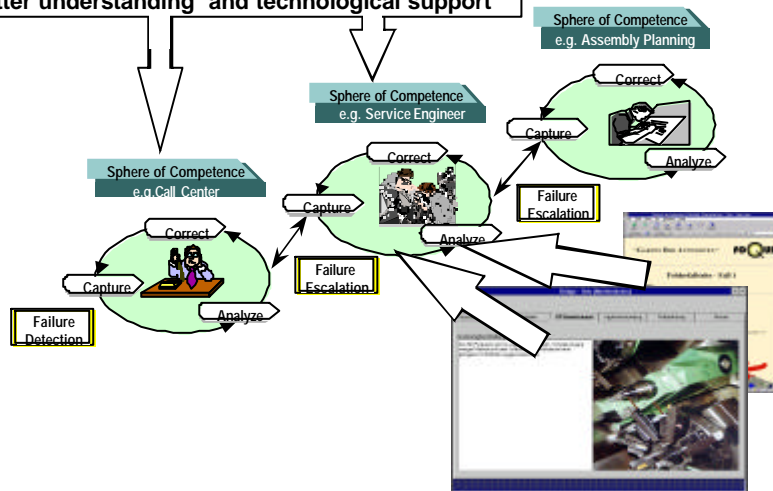


15-MJ-000827

## Addressing : Multiway Helpdesk Knowledge Management

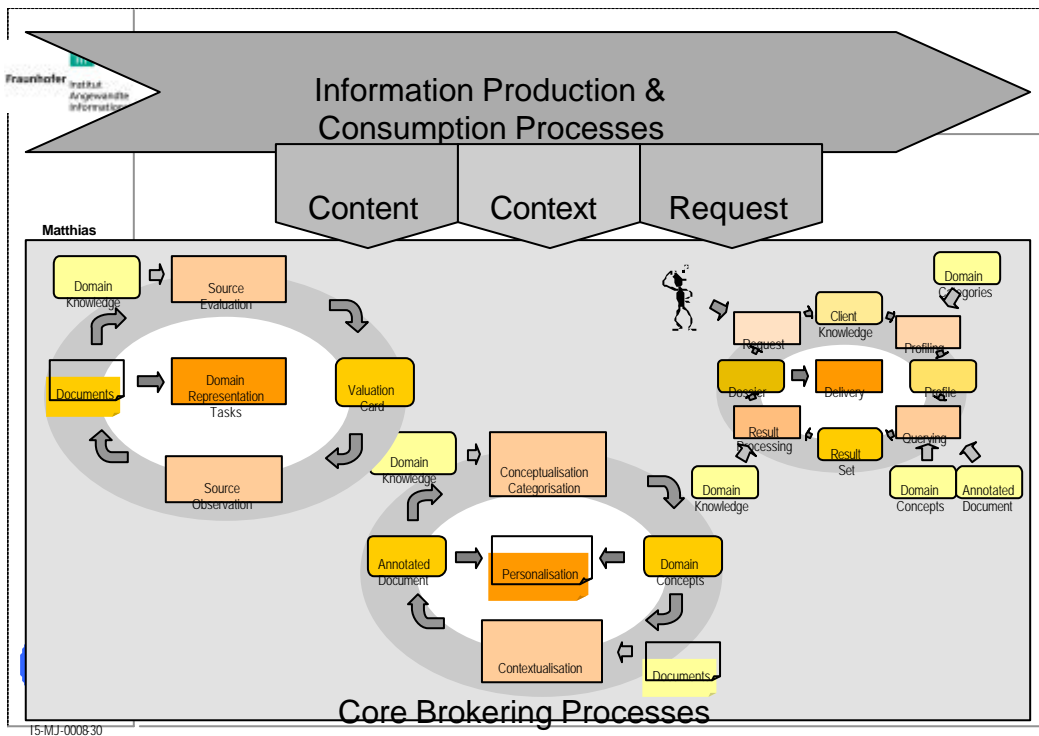
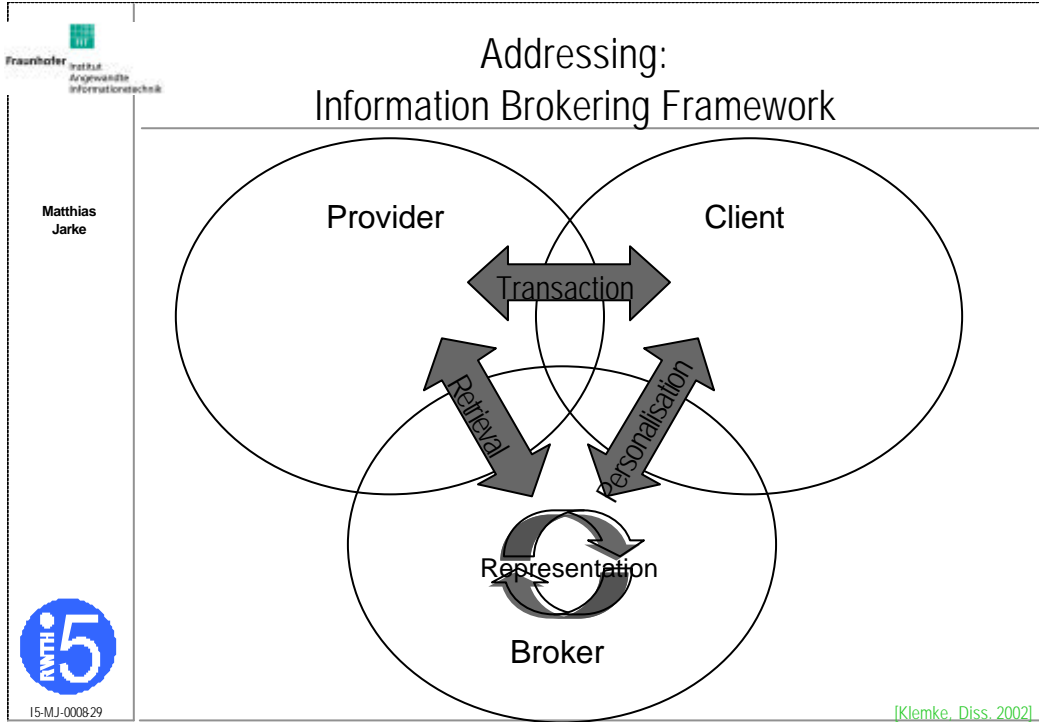
Matthias Jarke

**CAFMs: Utilization of OM to shorten processes by better understanding and technological support**

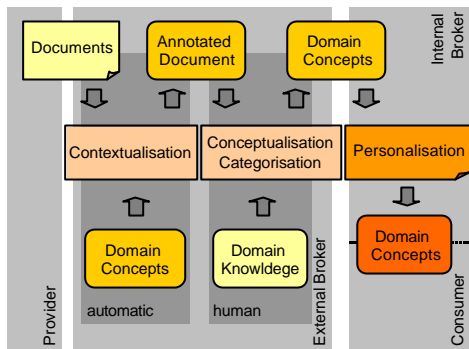


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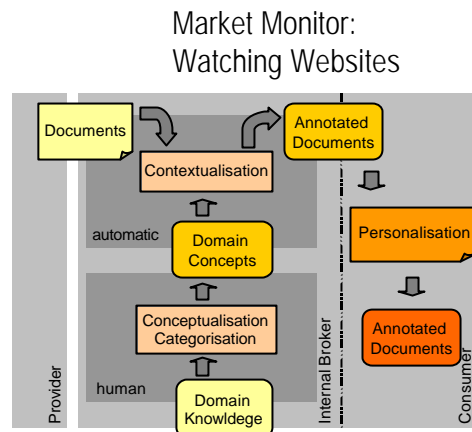
[KlammerJarke, ECIS 98]



# Information Brokering: Two Process Examples



EIFi: Brokering of Funding Information



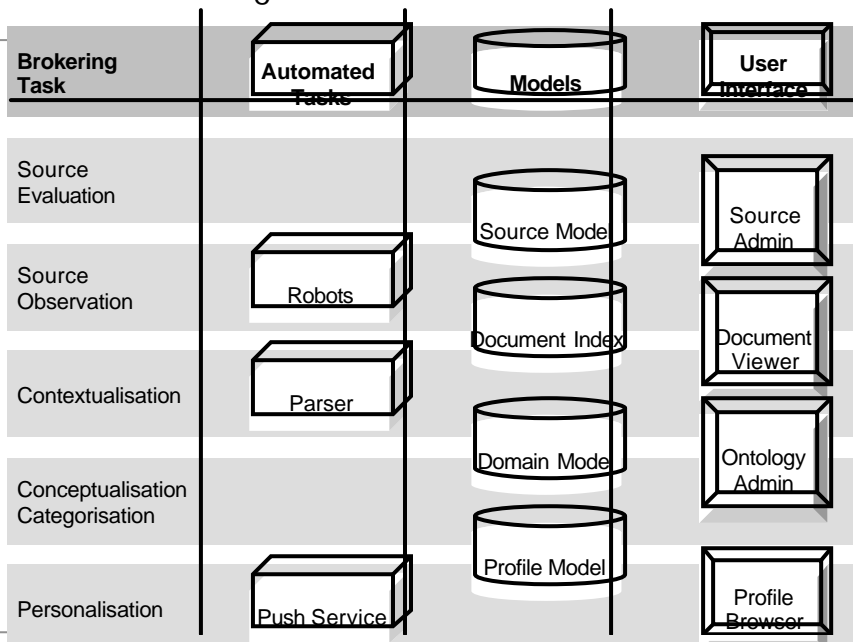
[Jarke/Klemke/Nick, HICSS 2001]



15-MJ-0008:31

# Brokers Lounge: Tools, Models, Interfaces

Matthias Jarke



15-MJ-0008:32



## Localization of Media Impact: Community-Ware

Matthias  
Jarke

- o Basic Support for Cooperative Work (BSCW)
  - o shared workspace with group formation & awareness
  - o grass-root adoption pattern (ca. 500.000 users worldwide)



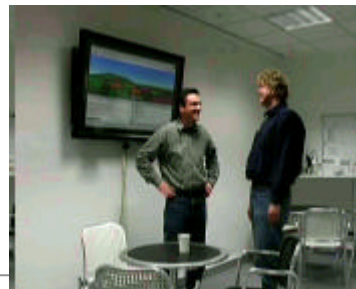
15-MJ-0008:33

[Appelt 1999]

## Localization: Hybrid and Mobile Communities (European TOWER Project)



Matthias  
Jarke

- o Shared Environment
  - Shared context and material
  - Social presence
  - Chance encounters
  - Information landscape
- o Awareness of
  - Group
  - Activities
 for Mutual Orientations
- o Inclusion of Nomadic Context involves  
**even more metadata**



15-MJ-0008:34

[Gross/Specht 2001, Prinz et al. 2002]

 <p>Matthias Jarke</p>  <p>15-MJ-0008:35</p>	<h2 style="text-align: center;">Outline</h2> <ul style="list-style-type: none"> <li>o Metadata and Cooperative Knowledge Management             <ul style="list-style-type: none"> <li>o is knowledge management <i>dead</i>? No but ...</li> </ul> </li> <li>o Closing The Culture Gap in Knowledge Management             <ul style="list-style-type: none"> <li>o <b>WHY : information in a context of action</b></li> <li>o <b>WHAT : no trivialities but differences and exceptions</b></li> <li>o <b>HOW : media-enabled discourse</b></li> </ul> </li> <li>o There are no (Media-Free) Ontologies!             <ul style="list-style-type: none"> <li>o <b>transcribe -- address -- localize</b></li> </ul> </li> <li>o Lessons and Outlook</li> </ul>
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 <p>Matthias Jarke</p>  <p>15-MJ-0008:36</p>	<h2 style="text-align: center;">Lessons from the Media Culture Perspective</h2> <ul style="list-style-type: none"> <li>o the postulate of <b>transcriptivity</b>:             <ul style="list-style-type: none"> <li>o concepts depend on media, <i>no media-independent knowledge</i></li> <li>o knowledge externalization by media commenting on media</li> <li>o <i>ontology design is inherently media- and community-dependent, regardless if for data or document brokering</i></li> </ul> </li> <li>o the postulate of <b>addressing</b>:             <ul style="list-style-type: none"> <li>o freely designed digital media foster <i>globalization</i> of address spaces</li> <li>o <i>personalization and context adaptation become success-critical</i></li> <li>o <i>brokers like complex ontology nets, clients at best multi-hierarchies</i></li> </ul> </li> <li>o the postulate of <b>localization</b>:             <ul style="list-style-type: none"> <li>o <i>culture-specific adoption</i> of media and knowledge</li> <li>o <i>communityware for self-organized attention management</i></li> </ul> </li> </ul>
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## SEWASIE

Matthias  
Jarke

- o new European project "Semantic Web and Agents in Integrated Economies" (Germany, Italy, UK)
- o brings together data warehouse and document-based information brokering technologies under a media-integrated ontology-based search-and-transact approach
- o application partners: a network of 40.000 small companies around the Milano fashion industry
- o stay tuned ...



15-MJ-000837