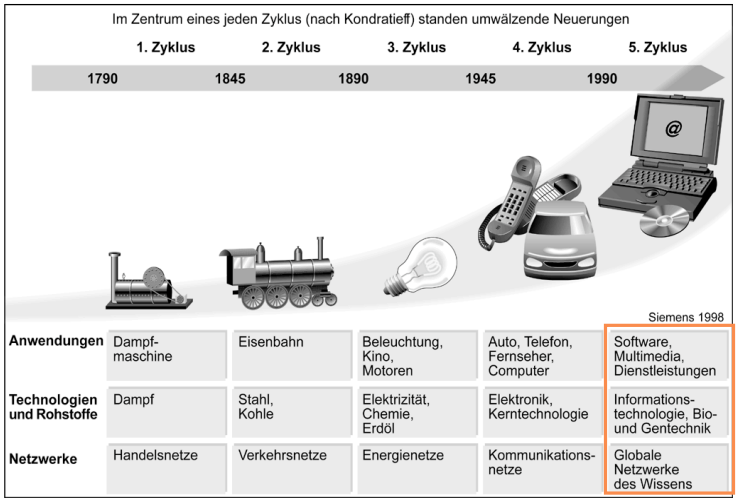
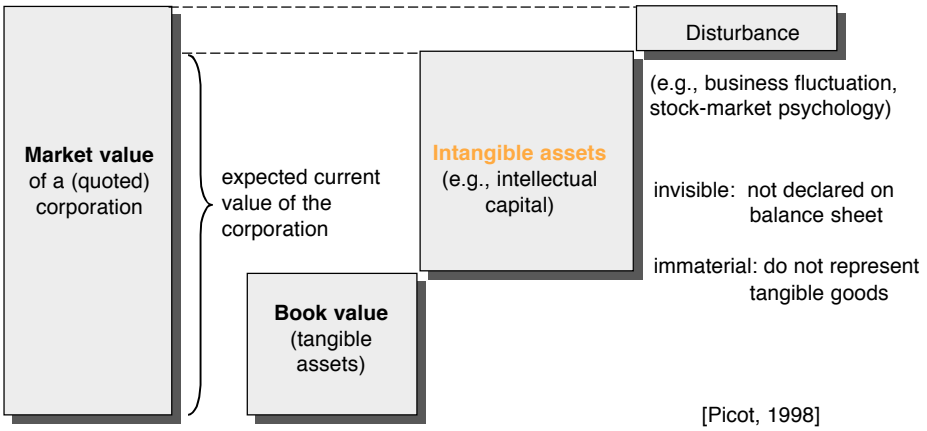
4. B2C,B2E Systems: Concepts and Architectures

Heading Towards the Information Society

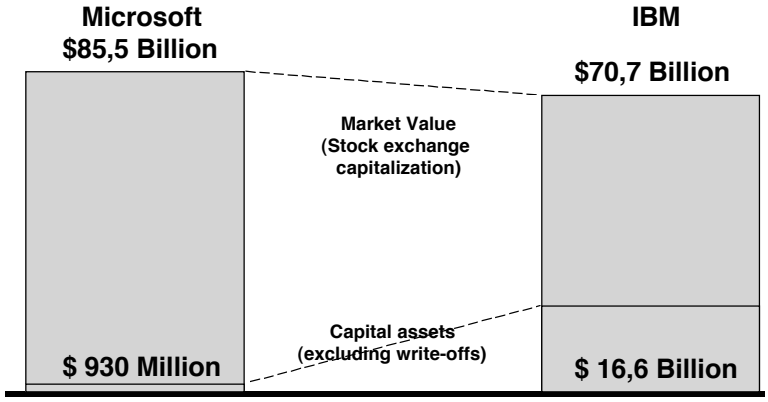


Anwendungen	Dampf-maschine	Eisenbahn	Beleuchtung, Kino, Motoren	Auto, Telefon, Fernseher, Computer	Software, Multimedia, Dienstleistungen
Technologien und Rohstoffe	Dampf	Stahl, Kohle	Elektrizität, Chemie, Erdöl	Elektronik, Kerntechnologie	Informations-technologie, Bio- und Gentechnik
Netzwerke	Handelsnetze	Verkehrsnetze	Energienetze	Kommunikations-netze	Globale Netzwerke des Wissens

Example: A Corporation's Value

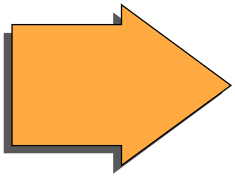


Similar Market Value, Different Capital Expenditure

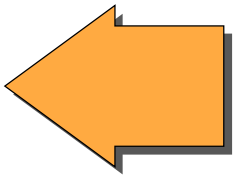


[Stewart97]

Knowledge is a Strategic Resource



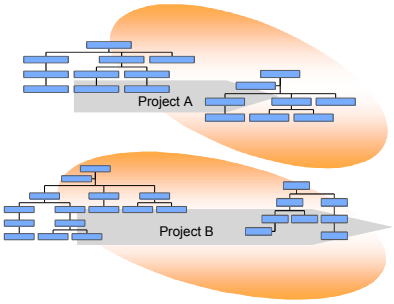
Knowledge is a central resource for corporate success!



"Intellectual Capital is something you can not touch but still makes you rich."

Business Trends

Structural & project organization



Communities of Practice

- **Speed, growth, networking** of business transactions
- Global **distribution** of staff, customers, partners
- Fast growth of knowledge
- **Co-operations**, alliances, partnerships
- Fast-moving, changing organization structure
- **Replacement of functional structuring of departments** by process- and customer-oriented corporate structuring
- **Experts** of similar field of knowledge are often distributed over the corporation without interconnection

Quotes from the Management Literature

"Knowledge is the one asset that grows with use."
Paul Romer

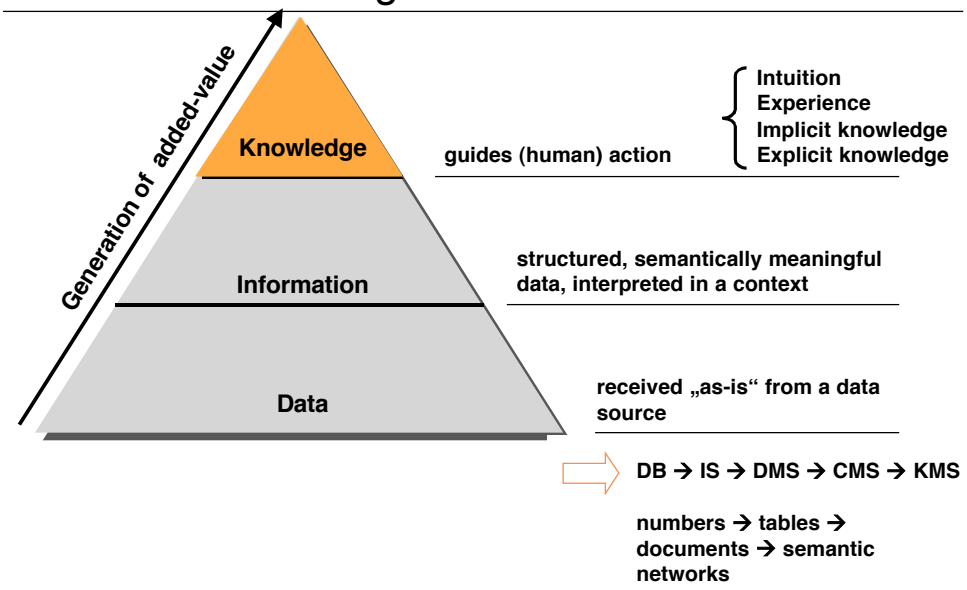
In the future management will have as main purpose the fertilization of knowledge resources.

Peter F. Drucker (Harvard Business manager 4/1998)

"The great end of knowledge is not knowledge but action."
Thomas Henry Findley

4. B2C,B2E Systems: Concepts and Architectures

Process: Generating Added-Value



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Knowledge vs. Information

Knowledge enables humans to execute certain tasks by combining **data** from different external sources, thus enabling them to act using their own **information**, experience and attitude.

Knowledge is defined by understanding the task‘s domain either theoretically or practically and by understanding the processes relevant to the task‘s execution. Applying this knowledge leads to announcements, predictions, causal associations or **decisions** about what to do and how to do it.

Consequently, knowledge is a concept that can only be attributed to persons (actors).

compare [*Wegg99*]

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Explicit Knowledge vs. Implicit Knowledge

Explicit Knowledge (coded knowledge)

- Information that is publicized in theories, formulae, documentation, models, diagrams, etc. (cognition)
- shared / transferred via instruction
- acquired by studying
- explicit knowledge does implies few power

⇨ **Documents & Storage**

Implicit Knowledge

- „tacit knowledge“, everyday knowledge
- experience, skills and attitude (can & will)
- shared / transferred by demonstration
- acquired by copying and imitation
- implicit knowledge can be regarded as power

⇨ **Persons & Communication**

Definition: Knowledge Management

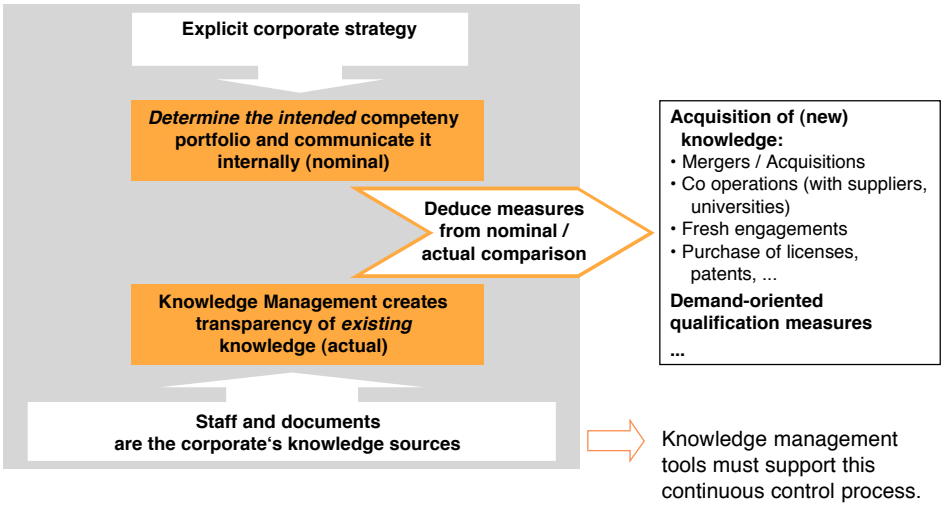
Knowledge Management (KM) comprises all human- and machine-oriented interventions and measures that help optimize

- **Knowledge creation,**
- **Knowledge reproduction,**
- **Knowledge distribution,**
- **Knowledge utilization and**
- **Knowledge logistics**

in a corporation.

[Schüppel, 1997]

Knowledge Management and Value-oriented Corporate Management



Knowledge management tools must support this continuous control process.

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Knowledge Management: Approaches

Technocratic Knowledge Management

Buy or „suck off" knowledge

Knowledge = Information

Knowledge hoover, -filter, Databases

Expert-related Knowledge Management

Identification and access to isolated expert knowledge

Knowledge = individual expert knowledge

Expert maps, isolate expertise in „Centers of Excellence"

Ensure availability of experts

Knowledge ecology & Knowledge community

Cultivate shared knowledge

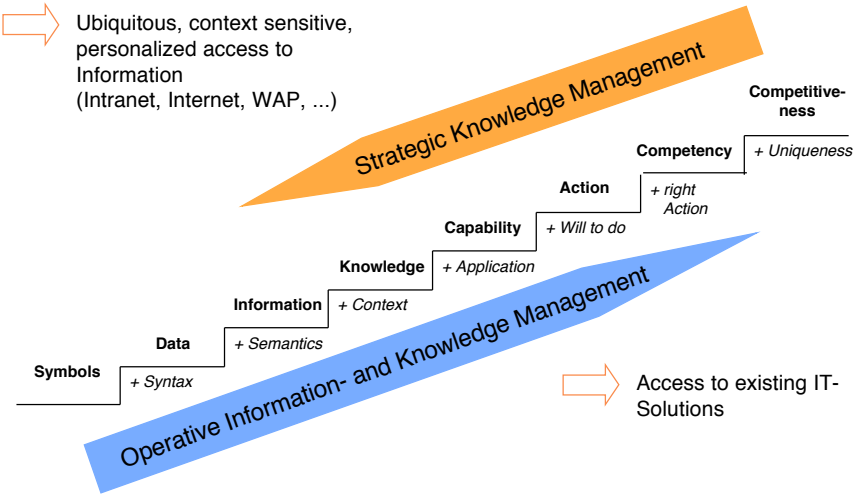
Knowledge = vivid process of interaction between persons

Create general conditions for cultivating knowledge

Electronic Commerce (WS-02/03) 4-60

Knowledge Staircase

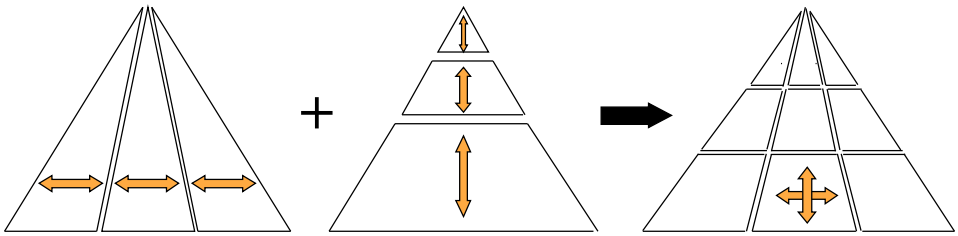
Ubiquitous, context sensitive, personalized access to Information
(Intranet, Internet, WAP, ...)



Access to existing IT-Solutions

[North98]

Formation of Knowledge Islands



Functional Barriers **Hierarchical Barriers** **Knowledge Islands**

Differentiate and support

- Corporate view
- Group view
- Personal view of employee

[Wilensky68]

4. B2C,B2E Systems: Concepts and Architectures

IT Support for Knowledge Management

Communication/ Coordination	**Information Management**	**Competency Management**	**Information Portals**
E-mail	(Distributed) Databases & Data Mining	Yellow Pages	Organizational Memory Information Systems (OMIS)
Newsgroups	**Document-Management**	Skill Management Systems	**Enterprise / Knowledge Portals**
Chat	**Content-Management**	Computer Based Training (CBT) / E-Learning	Best Practices
Workflow	Retrieval-Tools	Assessment-Systems	Lessons Learned

Interconnecting: Persons & Documents, Communication & Storage Processes

Document Management Systems

Document Management Systems:

Predecessors of Content Management Systems. Originated as information repositories for the “paper-less office”. Manage *explicit information* as documents.

Purposes:

- Recognize paper documents (by OCR); store, archive, retrieve, allow edit, print, forward electronic documents,
- Increase productivity of users by immediate provision of relevant documents.

Properties:

- Store documents (text, spreadsheets, multimedia content) centrally at a server,
- Realized in client / server architecture,
- Stored documents can be organized in directories or in multi-dimensional classification systems (kind, authors, category, related concepts, etc.),
- Manage role-based access to documents, support editing process (check-out/check-out), manages document versions,
- Documents are indexed by keywords, metadata (creation date, authors, etc.).

Content Management Systems (1)

Web Content Management Systems are the base for Web-Sites / Web-Portals as they manage the content (information pieces) and documents to be created, edited, controlled and published on the Web-Site.

Content and documents:

- **Content / information pieces** (text, audio streams, etc.) are not interconnected,
- Content is assembled and linked to form complex **documents**.

  Document properties:

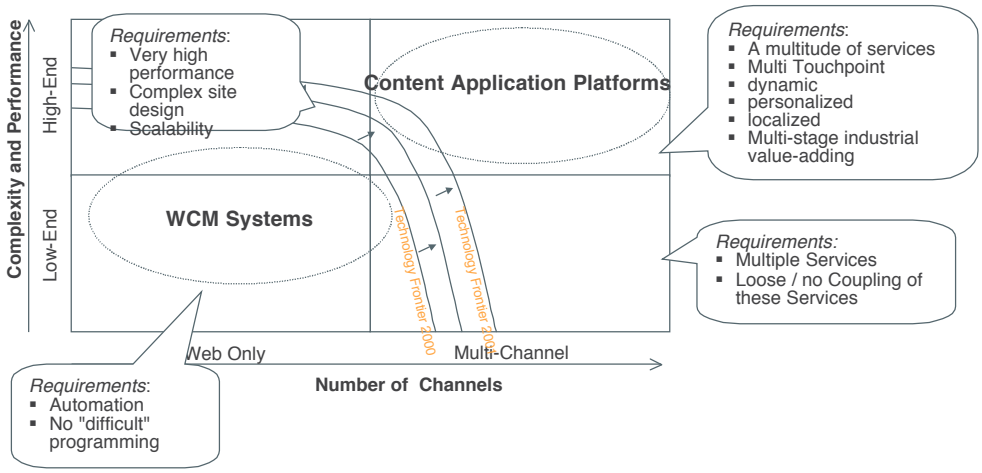
  - **Structure**: Logical assembly of information that forms a document.
  - **Content**: The information that is contained in the document (text, images).
  - **Visualization**: Is separated from structure and content, can be adapted to the rendering system (browser, WAP cordless phone, ..., eMail). Document contains layout information (text alignment, definition of headings).
  - **Use**: Document can be a static, ready-to-publish document, a template or a dynamic page (content is embedded at request-time).

Content Management Systems (2)

Content Management System properties:

- At the **information level**, they manage the storage, retrieval and linking of basic information pieces (content) of a single information pool.
- At the **process level**, content management systems manage the content life-cycle, i.e. processes of creation, aggregation, value-adding, publication, analysis, and re-use of documents by users of different groups (editors, information providers, and consumers).
- Integrate the content management of diverse areas:
  - Email-Newsletters
  - Internet Shop content (products, banners, ...)
  - Reporting
  - ...

WCMS vs. Content Application Platforms



The **Content Economy** is evolving. Future requirements on **production systems for digital services** go well beyond the requirements of WCMS (web content management systems).

Web Portals

A **Web-Portal** is a website that provides their users (personalized) access to linked information from different, selected sources via a Web-Browser. Access is realized by search functionality and navigation of organization (directories, classifications), and possibly extended by editorial content; functionality for communication and information processing [KLT00].

A **horizontal web portal** span a number of topics / domains, while vertical portals (vortals) focus in more detail on a specific domain [KLT00].

Web portal properties:

- **Context of Information:** Search, navigation and directories,
- **Content:** Articles, News, Web-Pages, Products, etc.,
- **Commerce:** Online Shopping (B2C), Bank: Online Portfolio management,
- **Communication:** e-Mail, Chat etc.,
- **Connectivity:** Integration of Internet Access (DSL, ISDN) and Portal.,
- **Communities: Support for virtual communities:** Discussion forums, Chat, Homepages, etc.

Enterprise Portals (1)

Enterprise Portals are Web-Portals that define a single access point to a company for members, business customers, private customers, investors. These can be classified:

Enterprise Web-Sites:

- Information for the public, (Media, Investors, ...) about a company, its products / services, for marketing purpose and public relations.
- No personalized information
- Accessed via Internet

(Business) Customer portals:

- Aiming at (business) customers.
- Purpose: Electronic sales and distribution; tighter customer-relationships. (using Customer Relationship Management systems, CRM).
- Often, customer portals are integrated with (back office) electronic procurement and material management.
- Accessed via Internet, sometimes via Extranets.

Enterprise Portals (2)

Business-to-Business (Business Partner) Portals support

- ❏ supply chain management (Supply Chain Management, SCM),
- ❏ electronic market places and
- ❏ application service providing.

Used by the company‘s procurement and sales divisons, business partners and suppliers.

Accessed via extranets.

Enterprise knowledge portals / Enterprise expert portals:

Purposes:

- ❏ Manage (internal) corporate knowledge
- ❏ Help Identify experts

Used by the corporate employees,

Accessed either via the corporate intranet (internal knowledge portals) or publicly available via Internet,

Provide personalized access, collaboration services (discussion forums).

Classification of Enterprise Portals

	Enterprise WebSite	Customer Portal	Business Partner Portal	Knowledge Portal
Paradigm	B2P (Business to Public)	B2C	B2B	E2E (Employee to Employee)
Access Medium	Internet	Internet, (Extranet)	Extranet, (Internet)	Intranet, (Internet)
Purpose	Marketing, PR	CRM	SCM, ASP, e-procurement, electronic marketplaces	Knowledge Management
User Groups	Public	Business customers, private customers	procurement, sales, suppliers	employees
Orientation (internal/external)	external	external	external/internal	internal (public)

Knowledge Portals: Enterprise Application Portals

Enterprise Application Portals:

Purpose:

- Provide uniform, personalized, role-based, (web-based) single point of access for employees to all existing systems, information, and functions (single sign-on).

Integration with existing corporate services (ex: personal data management) that can then be handled by the employees themselves (self service).

Integration with Enterprise Resource Planning Systems.

Aimed at the (corporate) employees and (external) customers and partners.

Knowledge Portals: Enterprise Information Portals

Enterprise Information Portals:

Purpose:

- Make explicit corporate knowledge available at a central access point to employees via personalized, role-based.
- Integrate knowledge sources (structured and unstructured content), provide uniform visualization.
- (Automatic) classification of knowledge for retrieval

Knowledge can come from:

- Web content,
- documents in corporate file servers / integration with document management systems,
- database content,
- news and articles,
- reports,
- faxes.

Knowledge Portals: Enterprise Expert Portals

Enterprise Expert Portals:

Purpose:

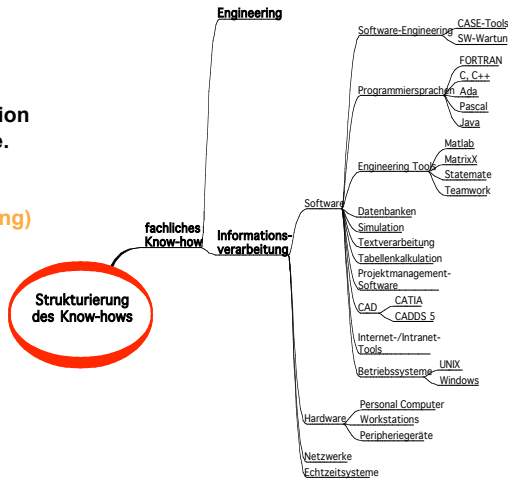
- Provide access to the corporate's internal knowledge (intellectual capital)

Identify employees' qualifications, knowledge and skills and make this knowledge visible and usable:

- knowledge maps / topics maps,
- yellow pages.

Knowledge Maps / Topic Maps

- **reflect a corporate's terminology.**
- **relate concepts semantically.**
- **provide a structure for acquistion and presentation of knowledge.**
- **help visualize know-how.**
- **support networking (interrelating) relevant Information objects.**
- **support fuzzy description of knowledge.**



Topic Maps

Topic Maps (**Topic Navigation Maps, ISO /IEC Standard 13250**) is a standard that was passed in autumn 1999 by *ISO* that defines a model and an architecture for describing *semantic networks*.

Topic Maps shall improve efficiency of *text retrieval* on large, unstructured document collections by explicitly defining *semantic relationships between words* and the meaning of a word (also synonyms and homonyms) in texts shall be perceptible by use of Markup.

A Topic Map is an *extended semantic network* and comprises

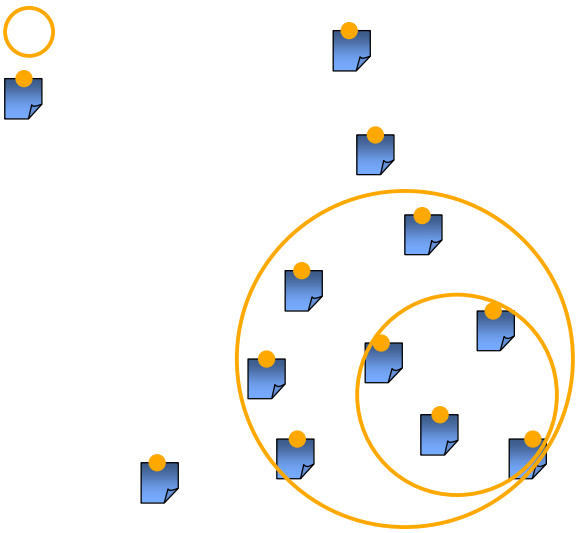
- Topics (Concepts)
- Topic occurrences (indication in which documents a topic occurs) and
- Associations (between topics, edges of the semantic network).

A topic map can be exchanged between systems in a standardized text format like *SGML* or *XML*-Document.

Concepts as the Structure of a Topic Map

Topic = Field of knowledge

Concept (with a description)

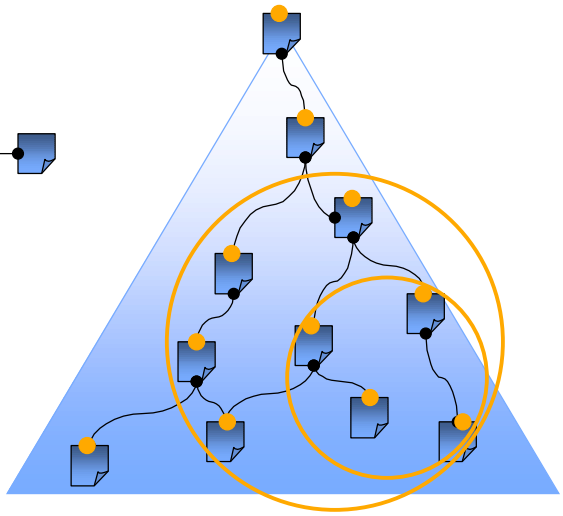


Utilization of a Topic Map

Topic = Field of knowledge

Concept (with a description)

Semantic Relationship
(Classification / Cross reference)



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Utilization of a Topic Map

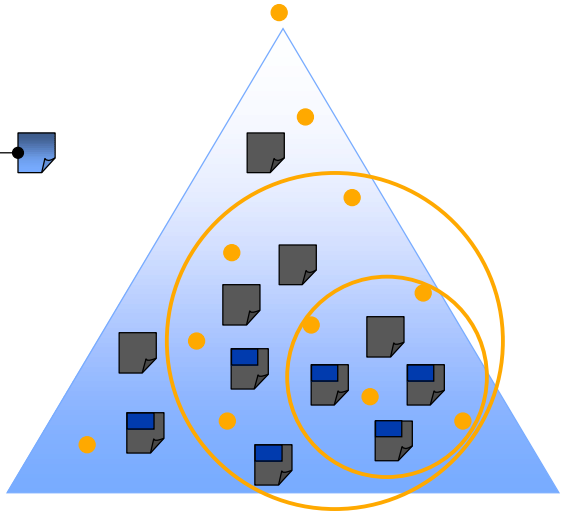
Topic = Field of knowledge

Concept (with a description)

Semantic Relationship
(Classification / Cross reference)

Document

Instructions and
sample exercise
(Knowledge for action)



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Utilization of a Topic Map

Topic = Field of knowledge

Concept (with a description)

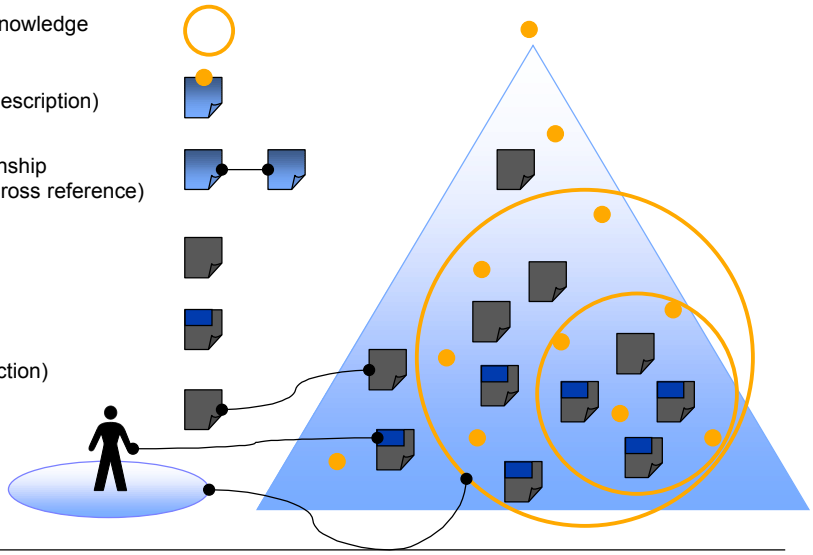
Semantic Relationship
(Classification / Cross reference)

Document

Instructions and
sample exercise
(Knowledge for action)

Link & Literature

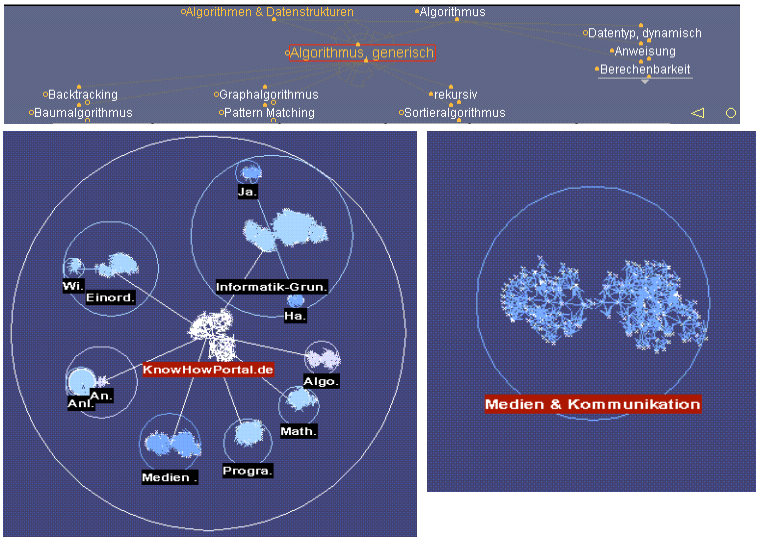
Expert &
Group profile



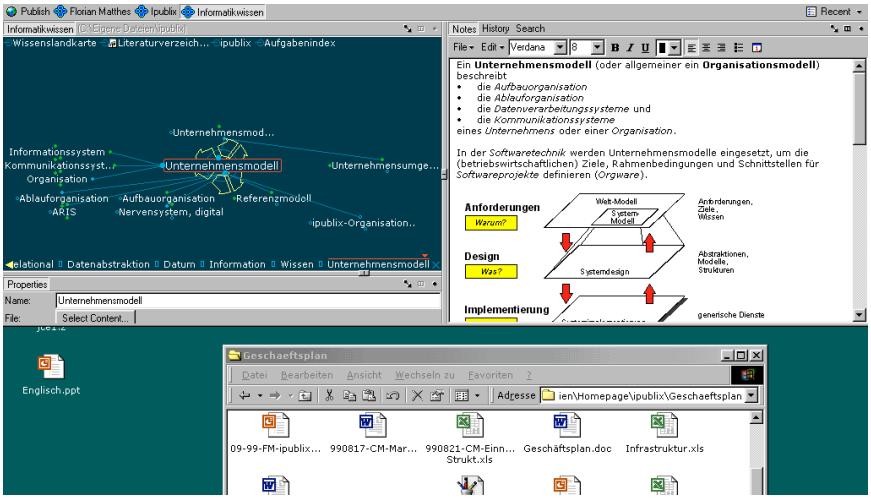
Topic Maps: Challenges

- There are complex relationships between concepts:
  - **Simple strict hierarchies:**
    - „is a“ *TUHH* is a *University* *(Specialization)*
    - „is part of“ *Chapter 6* is a part of the *ECommerce teaching material* *(Decomposition)*
    - „is an instance of“ *Florian Matthes's Laptop* is a *Dell Inspiron 5000e* *(Instantiation)*
  - **Overlapping hierarchies:**
    - A *Knowledge Base (KB)* is a special kind of *Database*
    - A *Knowledge Base (KB)* is a system for representing knowledge
  - **Cross references and associations**
    - *Florian Matthes* uses *these slides*
    - *Knowledge* and *Know-How* are related concepts
- Staff and departments use different topic maps!
- How to orientate on a changing topic map?

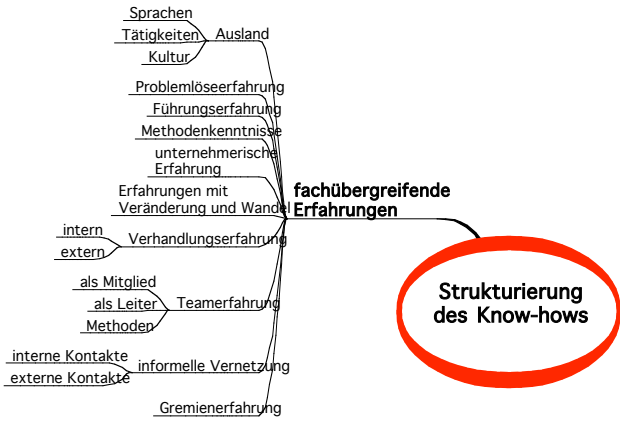
Example: Concept Navigator and Topic Map



Example: Interconnecting using Drag & Drop



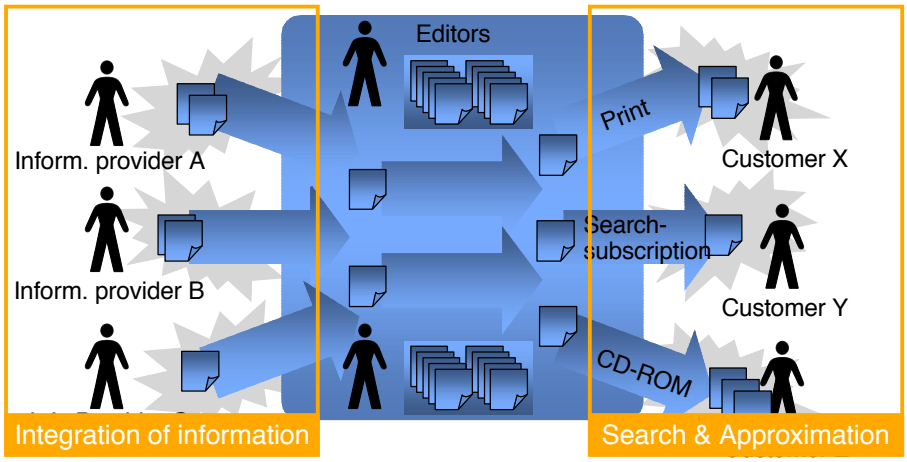
Interdisciplinary Experience



Fuzzy Information Retrieval & Case-Based-Reasoning

Core process: Acquisition → Value-adding editing → Utilization

Examples: Product catalogs, Service catalogs, FAQ-Lists, Portals, ...



Fuzzy Matching: Application Domains

Structured document archives (Digital Libraries)

„An article in politics regarding low-wage jobs which contained a chart diagram"

„A true color figure regarding mobility that can be scaled to A1 with a license fee of approx. 4000 DM and a process time of less than 48 hrs"

Product catalogs (ECommerce)

„The cheapest Stereo-VCR including a Jog Shuttle"

„A manufacturer of ship's screws made of titanium in Northern Europe"

Classifieds Search

„A good Japanese restaurant in the city center that accepts Master-Card"

Service catalogs (E-Brokerage)

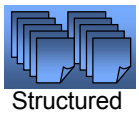
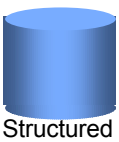
„A low-price auto damage insurance for a BMW that allows two drivers"

„A young fellow employee with work experience abroad and sophisticated programming skills"

Heterogeneous collections + fuzzy categories + autonomous information providers

Electronic Commerce (WS-02/03) 4-87

Digital Content: Coarse-Grain Classification

	Regularity	Storage	Retrieval	Structure
 Structured Documents	*n of x kinds*	Editorial system	Combined full-text and DB queries, Hyperlink navigation	Dynamic document types & metadata
 Structured data	*N of a kind*	Database system	Database queries & joins	Fixed DB schema
 Free	*one of a kind*	Document manager	Hyperlink - Navigation, Full-text search	Free annotations

Enterprise Information Portal: Seamless Integration of all Content

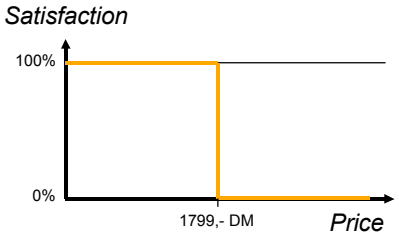
Shortfall of Traditional Solutions

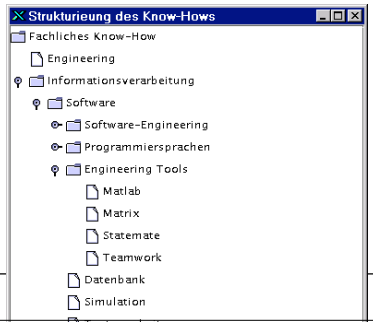
- Relational Databases allow (precise) boolean queries.

  ➔ **near misses**

- Hierarchical catalogs force all customer to use one static navigation structuring.

- Full-text search engines ignore semantic structure of information objects:
  - Price
  - CPU-Type
  - ...





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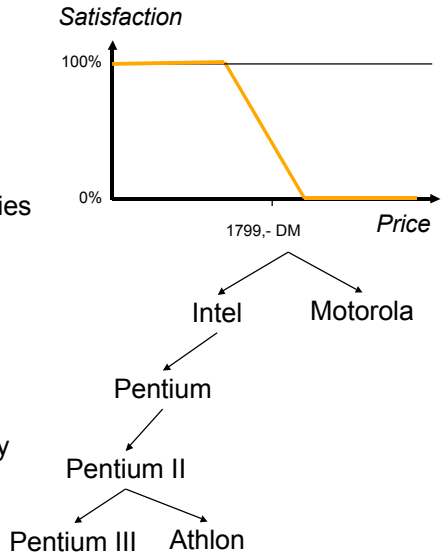
Fuzzy Predicates

1. Semi-structured documents
2. „User-friendly" fuzzy predicates
   - ❷ for continuous domains
   - ❷ for full-text domains
   - ❷ applicable on concept hierarchies
3. Configurable predicates
   - ❷ NULL semantics
   - ❷ denomination
   - ❷ domain-bound
4. Seamless integration by use of fuzzy operators (*and-like*, *or-like*, negation, weighting)



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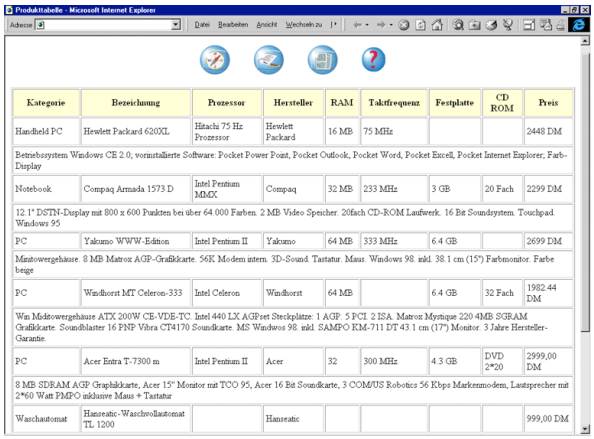
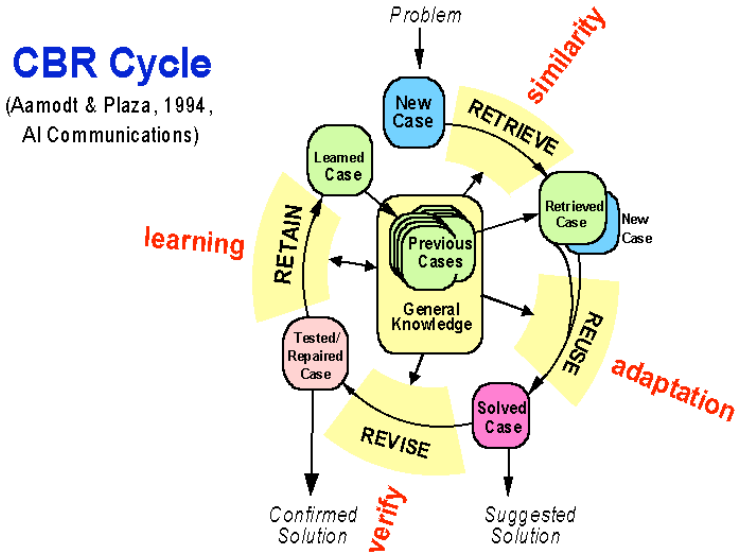
Fuzzy-Information Model

- A **catalog** is a set of documents.
- A **document** is described by a set of properties.
- Properties can be defined individually for each available document
  - Documents of a single category can have different properties
  - Documents of different categories can share properties

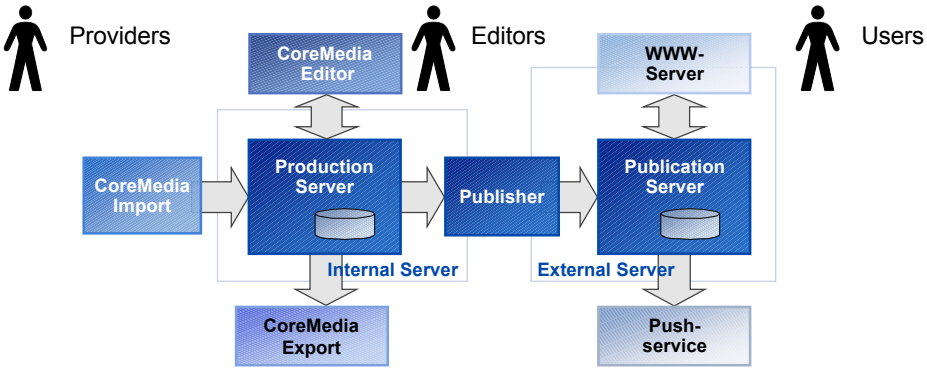


Kategorie	Bezeichnung	Prozessor	Hersteller	RAM	Taktfrequenz	Festplatte	CD ROM	Preis
Handheld PC	Hewlett Packard 620XL	Hitachi 75 Hz Prozessor	Hewlett Packard	16 MB	75 MHz			2448 DM
Betriebssystem Windows CE 2.0; vorinstallierte Software: Pocket Power Point, Pocket Outlook, Pocket Word, Pocket Excell, Pocket Internet Explorer, Farb-Display								
Notebook	Compaq Armada 1573 D	Intel Pentium MMX	Compaq	32 MB	233 MHz	3 GB	20 Fach	2299 DM
12.1" DSTN-Display mit 800 x 600 Punkten bei über 64.000 Farben. 2 MB Video Speicher. 20fach CD-ROM Laufwerk. 16 Bit Soundsystem. Touchpad. Windows 95								
PC	Yakumo WWW-Edition	Intel Pentium II	Yakumo	64 MB	333 MHz	6.4 GB		2699 DM
Minitowergehäuse. 8 MB Matrox AGP-Grafikkarte. 56K Modem intern. 3D-Sound. Tastatur. Maus. Windows 98. inkl. 38.1 cm (15") Farbmonitor. Farbe beige								
PC	Windhorst MT Celeron-333	Intel Celeron	Windhorst	64 MB		6.4 GB	32 Fach	1982.44 DM
Win Midtowergehäuse ATX 200W CE-VDE-TC. Intel 440 LX AGPset Steckplätze: 1 AGP. 5 PCI. 2 ISA. Matrox Mystique 220 4MB SGRAM Grafikkarte. Soundblaster 16 PNP Vibra CT4170 Soundkarte. MS Windwos 98. inkl. SAMPO KM-711 DT 43.1 cm (17") Monitor. 3 Jahre Hersteller-Garantie.								
PC	Acer Entra T-7300 m	Intel Pentium II	Acer	32	300 MHz	4.3 GB	DVD 2*20	2999,00 DM
8 MB SDRAM AGP Graphikkarte, Acer 15" Monitor mit TCO 95, Acer 16 Bit Soundkarte, 3 COM/US Robotics 56 Kbps Markenmodem, Lautsprecher mit 2*60 Watt PMPO inklusive Maus + Tastatur								
Waschautomat	Hanseatic-Waschvollautomat TL 1200		Hanseatic					999,00 DM

By Comparison: Case Based Reasoning (CBR)



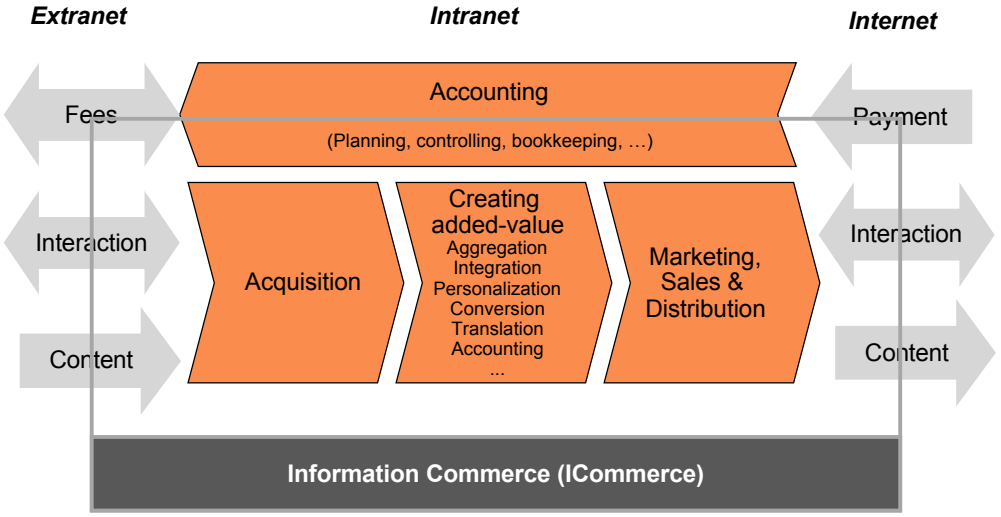
Media-Neutral Content-Management



- Flexible, interactive management of semi-structured content
- Layout templates
- Automatic Link management
- Workflow-Support
- Role concept; Rights are granted / revoked
- Distributed Data Input
- Framework for personalized services

4. B2C,B2E Systems: Concepts and Architectures

Information Commerce: ECommerce with Information Assets



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Informatikwissen.de: Project Background & Motivation

Increasing Demands on Academic Education

- ❑ Shortening of half-life period renders content faster obsolete
- ❑ Increase of overall knowledge obliges lecturers to define new specializations
- ❑ Increasing demand for multi-media presentation of content increases the price of content creation
- ❑ Internationalization requires multi-lingual teaching material
- ❑ Modularization and interdisciplinary orientation requires cooperation

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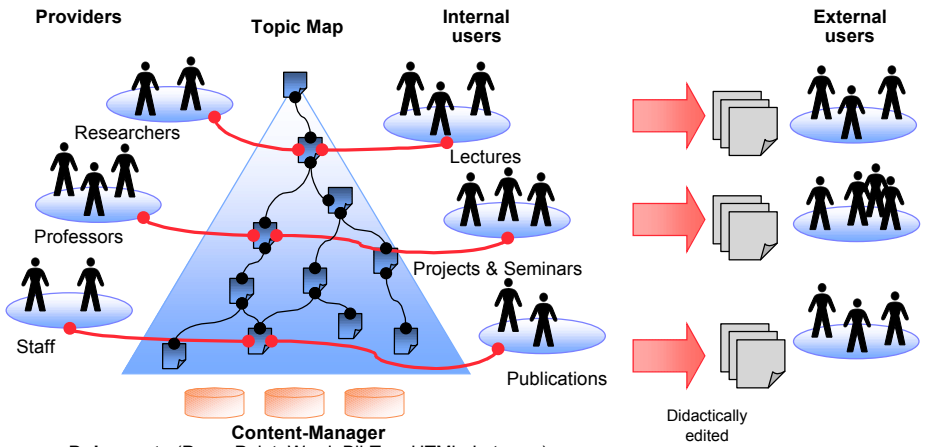
Project Goal: A Co-operative Digital Library for Teaching Material



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