Lecture 02:

Definitions of Knowledge and Concepts of Organisational Memory

Learning Objectives

Students should be able

- to explain the difference between ‘data’, ‘information’ and ‘knowledge’ but also their interdependencies
- to give examples for different knowledge types
- to distinguish which knowledge is organizational, which is personal?
- to explain the concept of intellectual capital
- to understand the difference between knowledge and competence
- to grasp the concept of organisational knowledge as well as organisational and transactive memory

Content

- From Data to Knowledge
- Knowledge and types of knowledge
- Relationship between data, information and knowledge
- Intellectual Capital, Knowledge Assets and Competence
- From individual to organisational knowledge: Organisational Memory and TMS
- Summary

(1) From Data to Knowledge

Knowledge is a key to (global) success

85% of jobs in US and 80% in Europe are knowledge-based

Quinn, B.J., Anderson, P., Finkelstein, S., 1996, Leveraging Intellect, *Management Executive*, 10 (3):7-27

- Managers need to understand the knowledge requirements for their business
- Managers need to understand knowledge processes and culture
- KM managers are the main hubs for efficient operations – but also for innovations – in production and service enterprises

Key questions from an organisational perspective

- Which knowledge does an organisation have?
  - Outcome (e.g. how to build a car)
  - Process (e.g. which steps are necessary to build a car)
  - Competencies (e.g. how to design an engine fulfilling certain constraints)
- Which knowledge is critical?
- Which knowledge needs to be shared?
  - Between people, groups, departments, organisations
- How can this knowledge be represented?
  - Making knowledge and relations explicit
  - Providing opportunities for knowledge identification and creation (searching, inference mechanisms / data mining)

(2) Knowledge and Types of Knowledge

Defining "Knowledge"

"Knowledge comprises all cognitive expectancies – observations that have been meaningfully organized, accumulated and embedded in a context through experience, communication, or inference – that an individual or organizational **actor** uses to interpret situations and to generate activities, behavior and solutions no matter whether these expectancies are rational or used intentionally." (Maier 2002)

"A set of data and information (when seen from an Information Technology point of view), and a combination of, for example know-how, experience, emotion, believes, values, ideas, intuition, curiosity, motivation, learning styles, attitude, ability to trust, ability to deal with complexity, ability to synthesize, openness, networking skills, communication skills, attitude to risk and entrepreneurial spirit to result in a valuable asset which can be used to improve the capacity to act and support decision making." (CEN 2004)

Defining "Knowledge" (cont.)

- Knowledge consists of truths, and beliefs, perspectives and concepts, judgments and expectations, methodologies and know-how.
- Knowledge is the whole set of insights, experiences, and procedures that are considered correct and true and that therefore guide the thoughts, behaviors, and communications of the people.
- Knowledge is reasoning about the information and data to actively enable performance, problem-solving, decision-making, learning, and teaching.

Source: MOCURIS

Types and Classes of Knowledge

Declarative / conceptual Knowledge:
knowing what or that

- Facts, easy to transfer
- Eg. Year of an important event, revenue within a certain period

Procedural Knowledge:
knowing how

- Routinized, learned by practising
- E.g. driving a bicycle

Explicit Knowledge:
codified knowledge that can be easily shared and understood

- verbal expressible
- Can be seperated from knowledge owner
- Easy to transfer
- Context free

Implicit / tacit Knowledge
knowledge that people carry in their minds and is, therefore, difficult to access

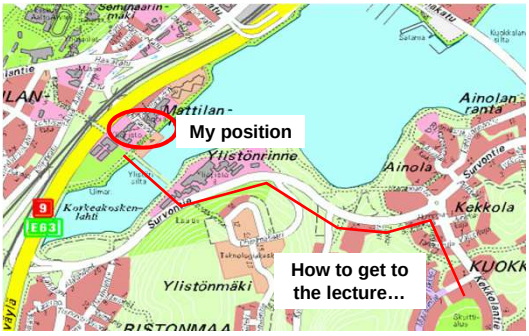
- verbal description
- Depending on experience
- Separation from knowledge owner difficult
- Context specific

Types and Classes of Knowledge

Declarative Knowledge:
•knowing that

Procedural Knowledge:
•knowing how

- Position, room
- Lecture time
- Traffic rules



- Navigation
- Lecture behavior
- Traffic behavior

[Source: http://kartta.jkl.fi]

Contrasting explicit and implicit (tacit) Knowledge

- Explicit knowledge
  - Objective (facts!), rational, often technical (eg. digital representation)
  - Policies, goals, strategies, papers, reports
  - Codified
- Tacit or implicit knowledge
  - Subjective, cognitive, experience and experiential learning
  - Highly personalized
  - Difficult to formalize
  - routinized

Types and Classes of Knowledge

Explicit Knowledge:
- codified knowledge that can be easily shared and understood

Implicit / tacit Knowledge:
- knowledge that people carry in their minds and is, therefore, difficult to access

- Traffic rules
- Driving instructions
- …

- Traffic customs
- Interpretations
- …

Global / cultural differences

[Picture Source: http://commons.wikimedia.org]

Types and Classes of Knowledge

Internal Knowledge:
- knowledge from within the organisation

External Knowledge:
- knowledge accessible for an organisation but stored outside

Organizational Knowledge (collective, institutional):
- consists of the critical intel-lectual assets within a group or organization, eg norms

Individual Knowledge:
- knowledge of a single person (employee)

Types and Classes of Knowledge

Organizational Knowledge:
- consists of the critical intellectual assets within an organization

Individual Knowledge:
- knowledge of each person (employee)

- Building cars….
- Steering / using production facilities

[Picture Source: http://commons.wikimedia.org]

Further classification schemes

Blackler's classification of knowledge

- Embrained knowledge
- Embodied knowledge
- Encultured knowledge
- Embedded knowledge
- Encoded knowledge

Cognitive psychologists classification of knowledge

- Declarative knowledge
- Procedural knowledge
- Strategic knowledge

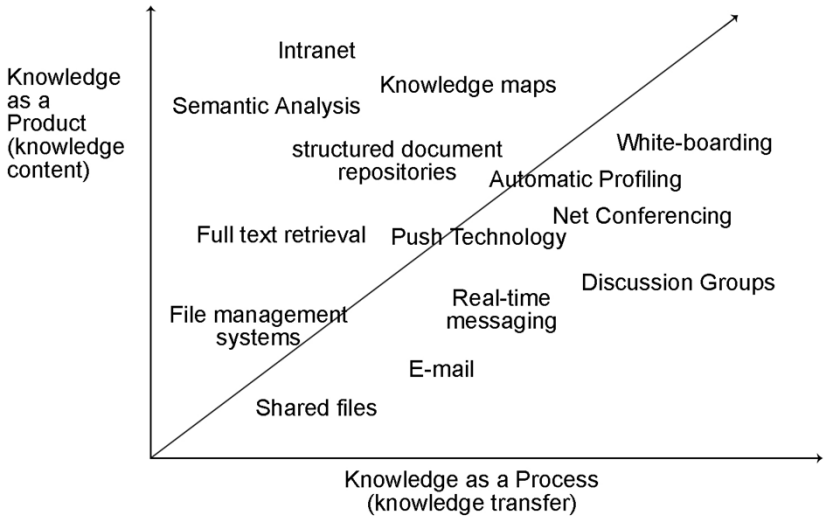
Source: MOCURIS

No common understanding about the essence of knowledge!

Two antithetic conceptions about the essence of knowledge

- Knowledge as something given in actuality
  - Can be communicated and multiplied
  - Is needed for task fulfillement, decision making or problem solving
- Knowledge as result of social construction processes or social interactions
  - Is changed by use and transmission
  - Emerges from task fulfillement and therefor is volatile or identical with the process

Product vs. Process Orientation



(3) Relationship between Data, Information and Knowledge

Data, Information and Knowledge

- Data
  - refers to isolated facts such as individual measurements, representation of objects or events in reality
  - Independent from time, person and location
  - Useless unless placed in some sort of context.
  - Examples: 10,1.6, Frank, green etc

Data, Information and Knowledge

- Information
  - Consists of symbols such as text or numbers (= data), with some meaning associated with the symbols.
  - Thus, has some benefit or value
  - Can be time and location dependent
  - Examples: 10º C, 1.9 m, Oscar – name of the project manager, green – color of a product …

Data vs. Information

Data

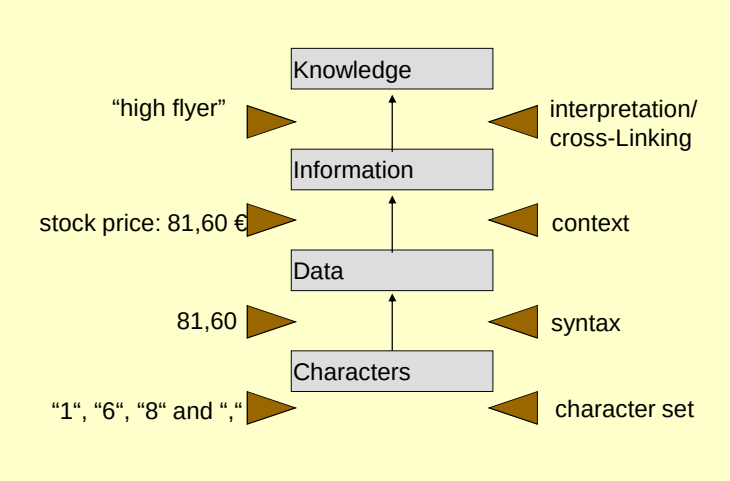
Raw, un-summarized and unanalyzed facts, electronically stored and representing objects, events etc. within reality

Data and Information often are confused or used synonymously - BUT

Information is different from data

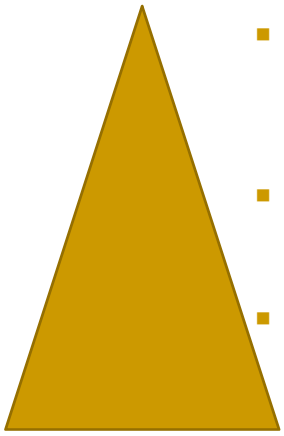
- data with meaning (semantics)
- and especially in business context: relevant for decision making or carrying out an operation

Hierarchical Relationship



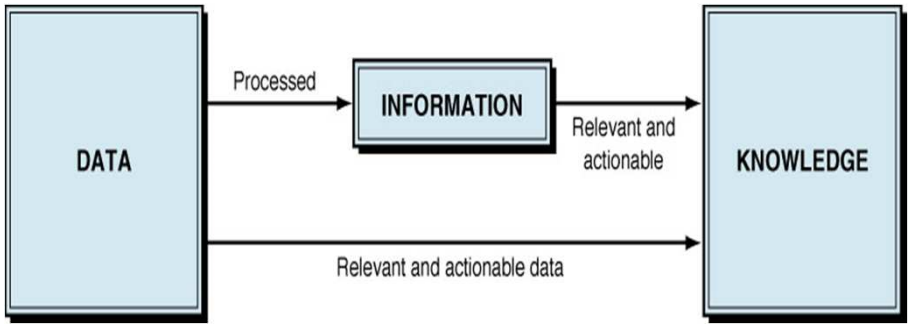
(Krcmar 2005)

Pyramid Model – too simple to explain the complex relationships



- Knowledge
  - Knowing what information is required
  - Knowing what the information means
  - Knowing when and how to apply knowledge
- Information
  - Data processed into a meaningful form
  - One person's information can be another's data
- Data
  - Raw, un-summarized, and unanalyzed facts

Knowledge is relevant for action and decision making



Information

- Useful information characteristics:
  - Hardness (*reliability*)
  - Richness (*breadth / depth*)
  - Class (*type*)
- Users of information also should be aware of the context which is relevant for the interpretation (viewpoint)

Source: Middup

Information Characteristics: Hardness

Hardness	Scale	Data
Soft	1	Unidentified source-rumors, gossip, and hearsay
	2	Identified non-expert source - opinions, feelings, ideas
	3	Identified expert source - predictions, speculations, forecasts, estimates
	4	Unsworn testimony - explanations, justifications, assessments, interpretations
	5	Sworn testimony - explanations, justifications, assessments, interpretations
	6	Budgets, formal plans
	7	News reports, non-financial data, industry statistics, survey data
	8	Unaudited financial statements, government statistics
	9	Audited financial statements, government statistics
Hard	10	Stock exchange and commodity market data

- Soft information can be as valuable as hard, but is rarely kept or presented because it is unreliable.

Source: Middup

Information Characteristics: Richeness and Classes

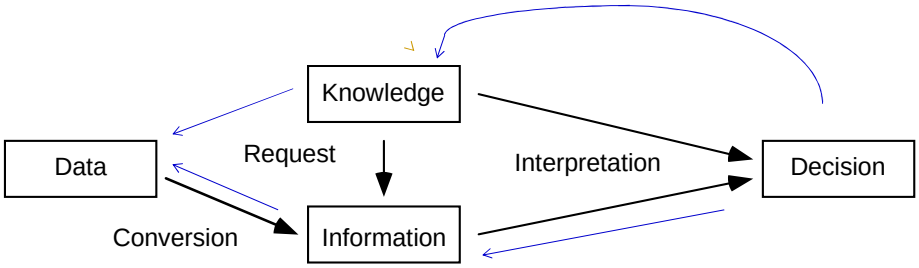
- Managers seek rich information to resolve equivocality
- Information systems typically deliver lean information

Richest	...	...	...	Leanest
Face-to-face	**Telephone**	**Personal documents (letters and memos)**	**Impersonal written documents**	**Numeric documents**

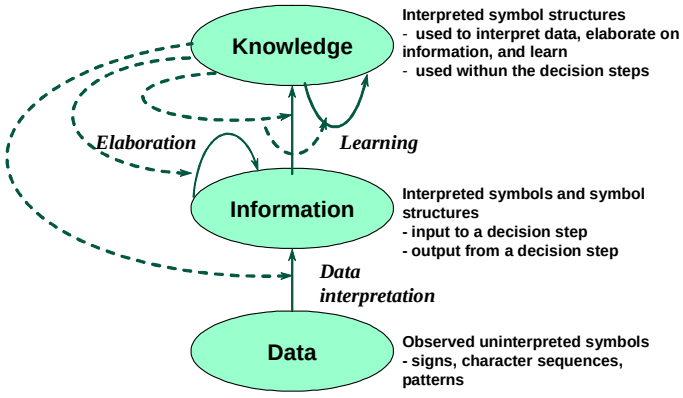
Class	Description
Content	Describes quantity, location, & types of items
Form	Describes shape and composition
Behaviour	Predicts the behaviour of a physical object
Action	Enables creation of sophisticated action

Source: Middup

Dynamic relationship between data, information, and knowledge



From static to dynamic model of relationship



Aamodt A., Nygärd M. *Different roles and mutual dependencies of data, information and knowledge - An AI perspective on their integration.* Data &Knowledge Engineering, 1995.

Source: MOCURIS

(4) Intellectual Capital, Knowledge Assets and Competence

Intellectual capital

Definition

Intellectual capital is defined as knowledge that can be converted into value

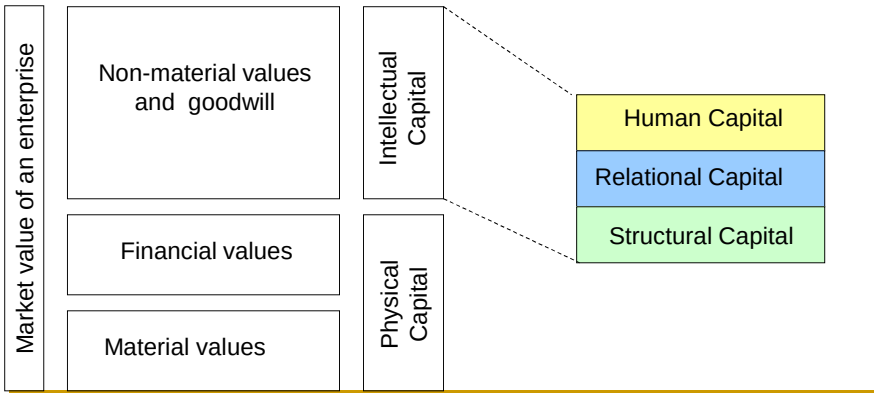
Intellectual capital consists of

- Human capital – the tacit knowledge embedded in the minds of the employees;
- Relational capital – the knowledge embedded in the relationships established with the outside environment.
- Structural capital – the organizational routines of the business;

Source: MOCURIS

Intellectual Capital

Intellectual Capital reflects the expectations by investors about economic utilisation of capabilities in the future. Financial and physical assets are also called tangible assets, while the rest (among them property rights, reputation and image) are called intangible assets.



Definition of knowledge assets

- Knowledge assets are the knowledge regarding markets, products, technologies and organizations, that a business owns or needs to own and which enable its business processes to generate profits, add value, etc.
- Knowledge asset is a guidance and support information, “owned” by the organization, that enhance stakeholders’ ability to accomplish work processes.
- Knowledge assets include all the underlying skills, routines, practices, principles, formulas, methods, heuristics and intuitions, whether explicit or tacit; and all the data-bases, manuals, reference works, textbooks, diagrams, displays, computer files, and artifacts in which both facts and procedures are recorded and stored.

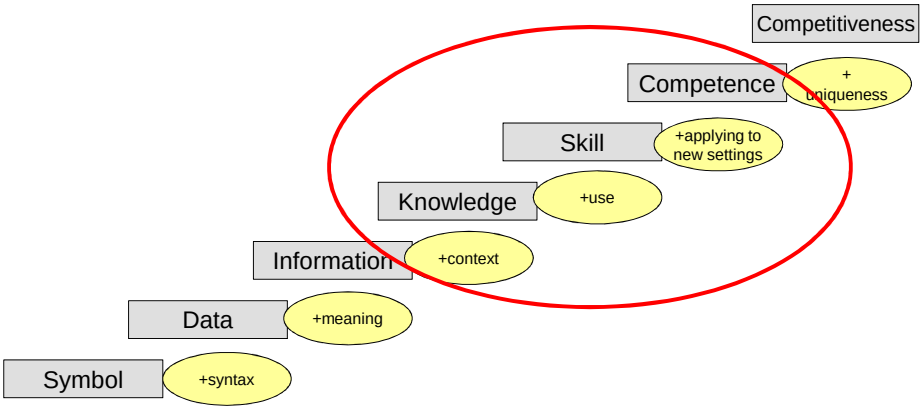
Source: MOCURIS

Types of knowledge assets

- **Human** knowledge assets - capabilities of the individuals
- **Structural** knowledge assets - organizational capabilities to meet market requirements
- **Market** knowledge assets - to knowledge about the market, the company's clients, partners, competitors, etc

Source: MOCURIS

"Knowledge staircase" (North, 1998)



Personal Competencies

Competency is an underlying characteristic of a person which enables him or her to deliver good performance in a given job, role or a situation.

Individual competency consist of clusters of

- knowledge (cognitive dimension),
- attitudes (personal characteristics or traits) and
- skills (physical dimension)

that affect a person's ability to perform. In other words: Competencies are generic knowledge that enable a person for a certain performance.

Core Competences – the corporate view

- Hamel and Prahalad (1994) have defined a core competence as: "…a bundle of skills and technologies that enables a company to provide a particular benefit to customers".
- Competences therefore are activities and processes through which an organisation deploys its resources (tangible and intangible) effectively into products or services so that they are of value to customers.
- Some define "competence" as collective learning of the Organization, especially how to coordinate diverse production skills and to integrate multiple streams of technology (eg. Hamel and Prahalad, 1990)

Competitive advantage is related to the market-based view – the positioning of the firm in terms of competitors while core competence is related to the resource-based view – the underlying capability that is the distinguishing characteristic of the organization.

(5) From individual to organisational knowledge: Organisational Memory and TMS

Organisational Memory as Key Concept

Several functions of ″memory“ are inherently present in every organization without software-technical support of any kind (e.g. in the form of search- and recall processes as carried out by telephone surveys or brainstorming during meetings). Typical demands on such a ″memory“ are:

- Haven’t we already had a similar experience?
- How have we done that up to now?
- Can anyone remember how...?
- Does anyone have experience in this area?
- How can the corporation’s experiences be used in the development of new projects?
- Which product might manifest similarities to the new design?
- Which problems arose while the project was being carried out?
- How can the most important competitor’s potential be estimated?
- etc.

Do "firms" really have knowledge?

- An important question! Herbert Simon, Robert Grant suggested otherwise (reductionist perspective): "All learning takes place inside individual human heads; an organization learns in only two ways: (a) by the learning of its members, or (b) may ingesting new members who have knowledge that the organization didn't previously have."
- Meaning, "firms as such", not individuals.
- Meaning, "beyond the easy ***yes*** answer from the fact that a firm may be a legal person, hence an owner of patents, software, etc."
- A strong ***yes*** answer is based on the simple point that firms are creators of stable context for knowledge processes (store, extend, advance.)

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Knowledge and the firm

- Recent treatments reaffirm the merit of the traditional perspective – while seeking to avoid overstatements.
- Arguments: firms are central to the social arrangements
  - for *storing* productive knowledge
  - for *extending* its application,
  - and for *advancing* it

  three very closely related economic functions.

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Individual knowledge vs. Collective (organisational) knowledge

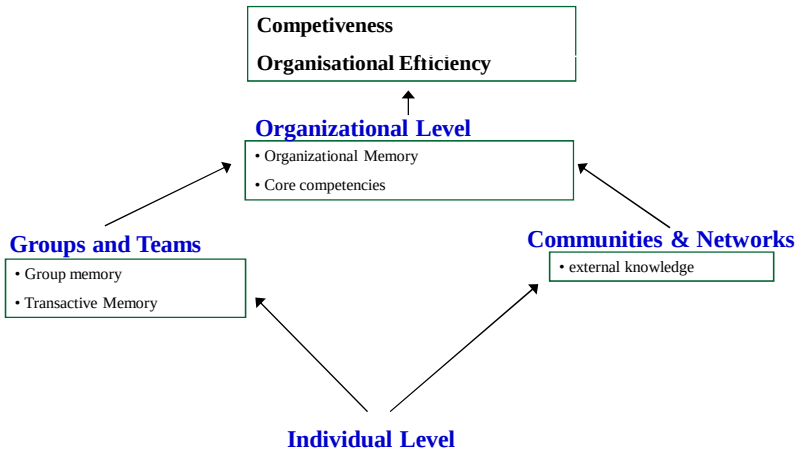
Arguments supporting the existence of organisational knowledge

- Group knowledge is more than the sum of the group member´s knowledge
- Without knowledge that goes beyond personal knowledge (= organisational knowledge) no bigger firm will succeed

Different kinds of organisational knowledge

1. Organisational / Corporate knowledge
2. Collective knowledge
3. Systemic / transactive knowledge

Knowledge in Organizations



Forms of collective resp. organisational knowledge

Form	Occurrence	Example
abstract/soft	structure, culture, roles	corporate culture informal power structure
Semi-abstract	tales, myths	customer reports, firms image, anecdotes
Semi-concrete	technical know-how, business rules, standardised procedures	business processes problem documentation
concrete/hard	facts, data	technical norms, workflow-model, sales data

Definition

- Organizational Memory
  - Means by which knowledge from the past is brought to bear on present activities, resulting in higher / lower levels of organizational effectiveness.
- Organizational Memory is persistent

E. W. Stein, 1995

Some more reasons to explore the concept of organisational memory

- The concept provides insight into organizational life (as a metaphor)
- Embedded in other management theories
- Is relevant to management practices and can assist managers in solving issues related to retention of knowledge in the organization

As a metaphor, organzational memory

- Can steer an organization by using
  - Information from the outside world
  - Information from the past
  - Information about itself
- Implies that long term autonomy is dependant on memory

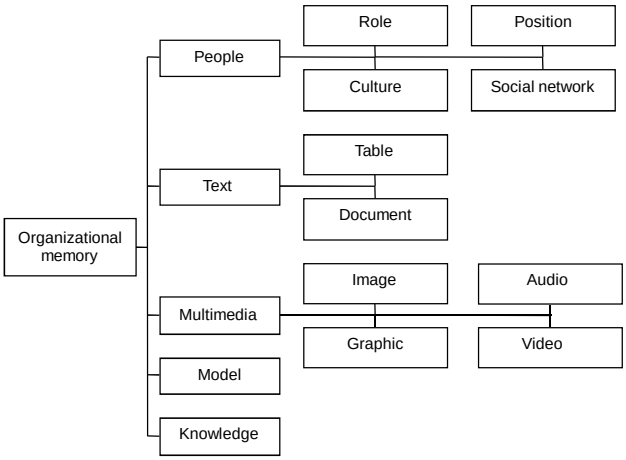
Relevance to management theories

- Relates dialectics of
  - Learning vs. unlearning
  - Flexibility vs. stability
  - Human resources vs. info resources
- Required for the decision making and planning processes!

Relevant to management practices

- Significant during times of restructuring and employee turnover
- Loss of employee = leaves hole in the social interaction network
- Undermines the competitiveness and competence of the firm

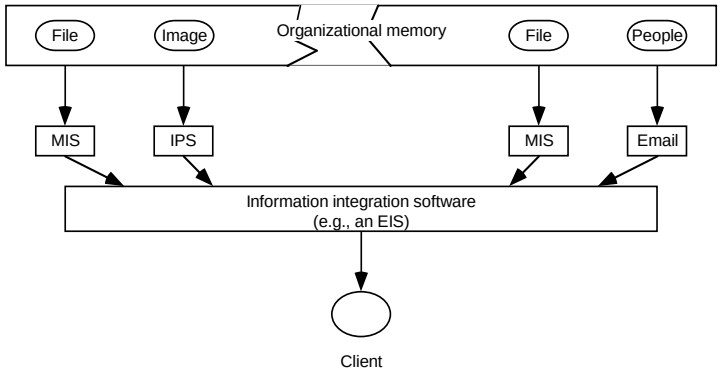
Organizational Memory – Components



The problem

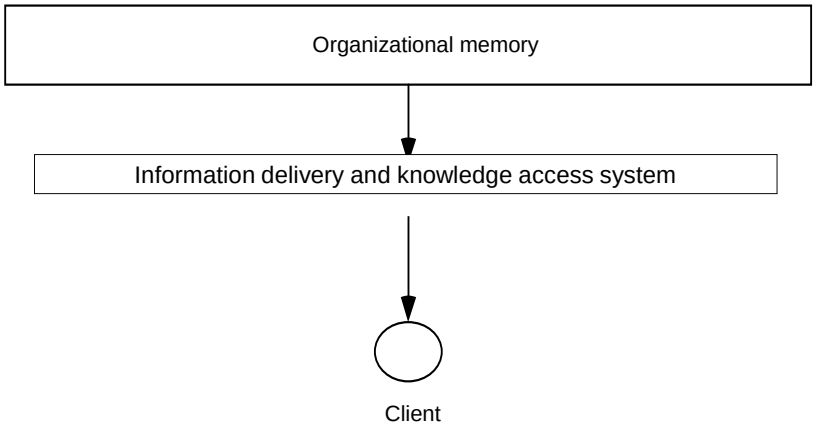
- Organizational memory is fragmented
  - Different systems
  - Different database technologies
  - Different locations
- It is an underused intelligence system containing undetected key facts about customers, markets …

Organizational memory is fragmented



OM provides support for transaction processing, decision making but the low degree of information integration is an important barrier

The ideal system



Organizational memory - definition

- Repository for the knowledge developed jointly by multiple individual firm members in the amplification of individual learning to firm level learning
- Involves the use of five storage bins: individual firm members, organizational culture, transformation, structure, and ecology
- organizational memory has four dimensions:
  - level – refers simply to the amount of knowledge an organization has accumulated
  - dispersion – the extent to which memory is shared and spread across the organization by the organizational members
  - accessibility – refers to the extent to which memory can be retrieved for use
  - content – concerns the meaning of memory in terms of whether it is procedural (involving skills and competencies) or declarative (involving facts or events).

Source: MOCURIS

Organisational Memory - Concept or Fact?

„OM is a concept that an observer invokes to explain part of a system or behavior that is not easily observed“ (Krippendorg 1975, quoted from Rao/Goldman-Segall 1995, 333-334).

Organizational memory „ ... is the knowhow of a business recorded in documents (reports, ideas, concepts, etc.)“ (Morschheuser 1997, 19).

Comparison of memory and storage systems

Memory	Storage
No influence on internal storage	Influence on structure of internal storage
Forgetting is an autonomous process	Delete is externally triggered
Recall of knowledge is supported by associations	Data recalled will be replicated (duplicated)
Form and dynamics of the system are not determined	Form and dynamics of the system are deterministic
Extension by reorganisation and change of structures	Extension by growth of data amount, primarily quantitativ
System cannot be switched off	System can be switched off

Theory of Transactive Memory

A good performance is more likely to happen in a group when ...

- Group members know "who knows what" and "who knows who knows what"
  - Reduces workload for each member
  - Lessens redundancy of information
- Teams are more effective if they have high knowledge differentiation: different members have expertise in different areas

Transactive memory system (TMS)

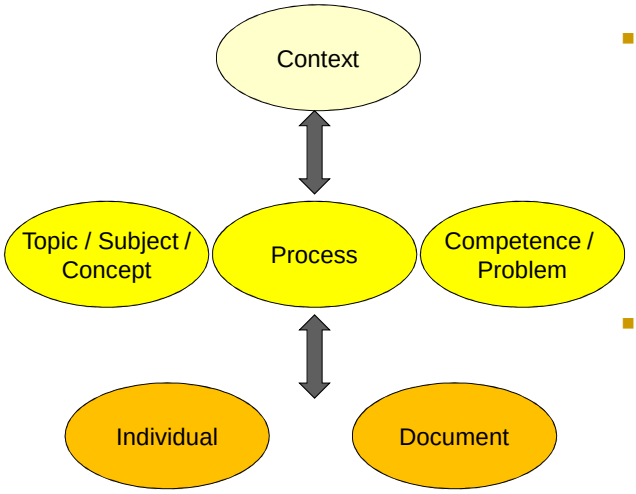
TMS can be defined as shared division of cognitive labor with respect to learning, remembering, and communicating information

- *transactive processes affect individual and collective knowledge as well as group performance*

Transactive memory means the perception of others knowledge and permanent communication to locate and allocate information. Without a group-level understanding of who knows what, dyadic reciprocal exchanges can lead to redundant information exchange and impede the performance.

(6) Summary

Representation of Knowledge Entities

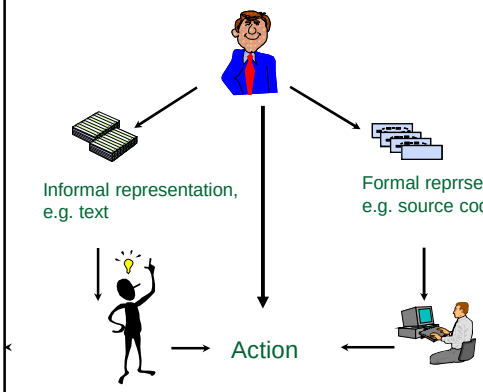


- Personal knowledge is always related to a certain context and can be categorized
  - by topic,
  - by process, or
  - by problem
- It can be represented through
  - Individuals and competences
  - Documents of any format

From individual to organizational knowledge

- Organizational Memory can benefit a firm in many ways:
  - Assist managers to maintain strategic direction over time
  - Avoid reinventing existing solutions
  - Facilitate learning
  - Strengthen the identity of the organization
  - Provide newcomers with access to experts
- Organizational Memory is pre-condition for learning of organisations
  - organizational memory is the way to save and share knowledge within an organisation
  - Is necessary for the ability to learn from past
  - Is the container while knowledge is the content

From knowledge to knowledge management



- People are knowledge owner
- Knowledge enables to acting and decision making
- Explicit knowledge can be either formal or informal and documented

  Result of documentation is data and information
- Information will be transformed into knowledge by interpretation within a domain specific context

"Knowledge can and should be evaluated by the decisions and actions to which it leads" (Davenport & Prusak, 1998)

Recommended readings

- …
- Ergänzen: 2 allgemeine oft zit. Bücher + Lit zu KBV
- Lehner OM

- Wijnhowen F. Managing Dynamic Organisational Memories, Boxwood Press, 1999.
- Davenport Th. H. and Prusak L. Working Knowledge, Harvard Business School Press, 1998
- Brooking A. Corporate Memory: Strategies for Knowledge Management, International Thomson Business Press, 1999
- Kirikova M., Grundspenkis J., Types of Knowledge and Knowledge Sources, Scientific Proceedings of Riga Technical University, Computer Science, 2002.