

Knowledge Management and Information Systems – Finding a Sociotechnical Golden Mean

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KM and Information Systems

- Knowledge and Information Species
- Four paradigms and two interpretations
- Semantics
- KM Systems and Technologies
- Finding the sociotechnical golden mean

KM -- Searching for a Sociotechnical Golden Mean

- System-theoretical approach to Knowledge Management
Management of Information
- Humanistic approach to Knowledge Management
Leadership, Management of People
- Sociotechnical approach to Knowledge Management
Combining the advantages of both approaches

- What are the philosophical categories for information and knowledge?

CONCEPTS:

- **Ontology** (in philosophy) concerns beliefs about the form and nature of reality
- **Epistemology** concerns the nature of knowledge and the relationship between those who know and knowing

Four Paradigms and Two Interpretations

- Paradigms [Yolles]
 - 1) Positivism
 - 2) Post-positivism
 - 3) Critical Theory
 - Postmodernism
 - Poststructuralism
 - 4) Constructivism
- Interpretations of Information [Virtanen]
 - Quantitative, based on probability
 - Qualitative interpretation in
 - Communication,
 - Presentation, and
 - Processing

Positivism

- Ontology:
Reality can be apprehended,
Observer independent data: facts
- Epistemology:
Objectivity,
Possibility to find universal truths
- Simple belief in science in Western industrial history
- Mechanistic science extended to behaviourism in psychology
- Naïve systemic thinkers

Post-positivism

- Ontology:
Objective reality
Apprehended imperfectly and probabilistically
- Epistemology:
Only an approximate image of reality is possible

"Engineering View" [Fivaz]

- Observers can have their own perspective that can influence the way they see things.
- Observers have consciousness which (in extension to simple behaviourism) is seen to be a set of engineering processes that converts information acquired as observation from "outside" into information implemented.
- People can be better or worse at this engineering process, and at least fuzzy optimisation becomes relevant.
- Mind is biased machine, reality is actually out there, and knowledge is objective.

Critical Theory

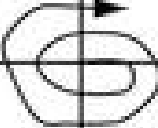
- Ontology:
Reality is virtual
Social, political, economic, ethnic and other factors shape reality
- Epistemology:
Subjectivist
Findings are value laden with respect to the world view of an inquirer
- Inquiry is value determined in both postmodernism and poststructuralism

Constructivism

- There exists both local and specifically constructed realities
- Ontology:
Reality is relative phenomenon
- Epistemology:
Knowledge is created in interaction between inquirers in a situation and its participants
Subjectivist epistemology, relates to created findings
- There are no observers, only viewers. Views, like behaviours are derived from worldview.
- Interaction of different worldviews occurs through a semantic communication process [Luhmann]
- Interaction occurs in a framework, "lifeworld" [Habermas]
- Cognitive oriented constructivist theories and socially oriented constructivist theories.

SECI Model – two paradigms

<i>From \ To</i>	Tacit	Explicit
Tacit	<p><i>Socialisation</i></p> <p>Creates <i>sympathised</i> knowledge through the sharing of experiences, and the development of mental models and technical skills. Language unnecessary.</p>	<p><i>Externalisation</i></p> <p>Creates <i>conceptual</i> knowledge through knowledge articulation using language. Dialogue and collective reflection needed.</p>
Explicit	<p><i>Internalisation</i></p> <p>Creates <i>operational</i> knowledge through learning by doing. Explicit knowledge like manuals or verbal stories helpful.</p>	<p><i>Combination</i></p> <p>Creates systemic knowledge through the systemising of ideas. May involve many media, and can lead to new knowledge through adding, combining & categorising.</p>

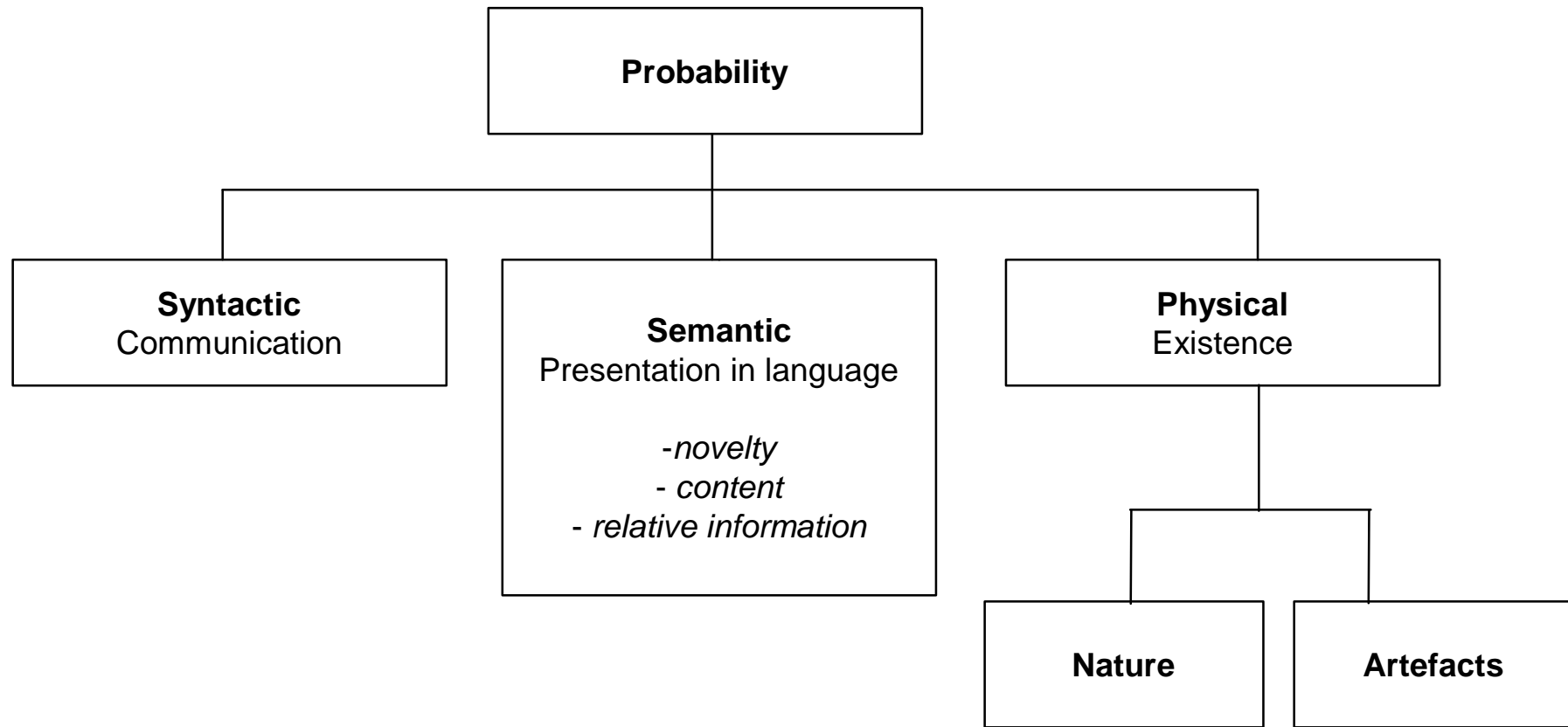


Source: Nonaka and Takeuchi, 1995

The cycle or process of SECI model is constructivist [Meehan 1999]
 The structure is positivist [Yolles 2000]

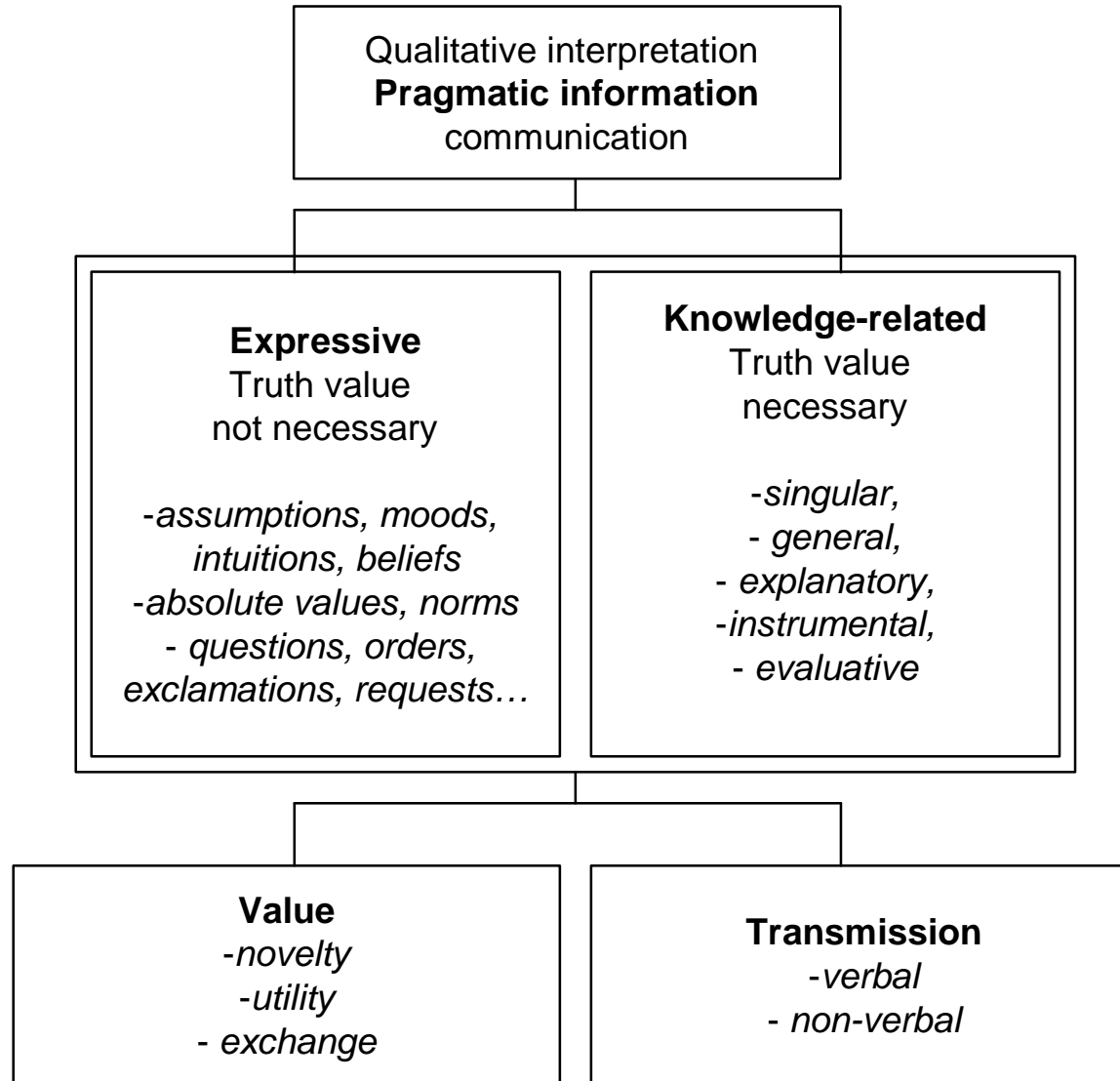
Explicit knowledge is originally objective, positivist
 Tacit knowledge is subjective, constructivist

Probability

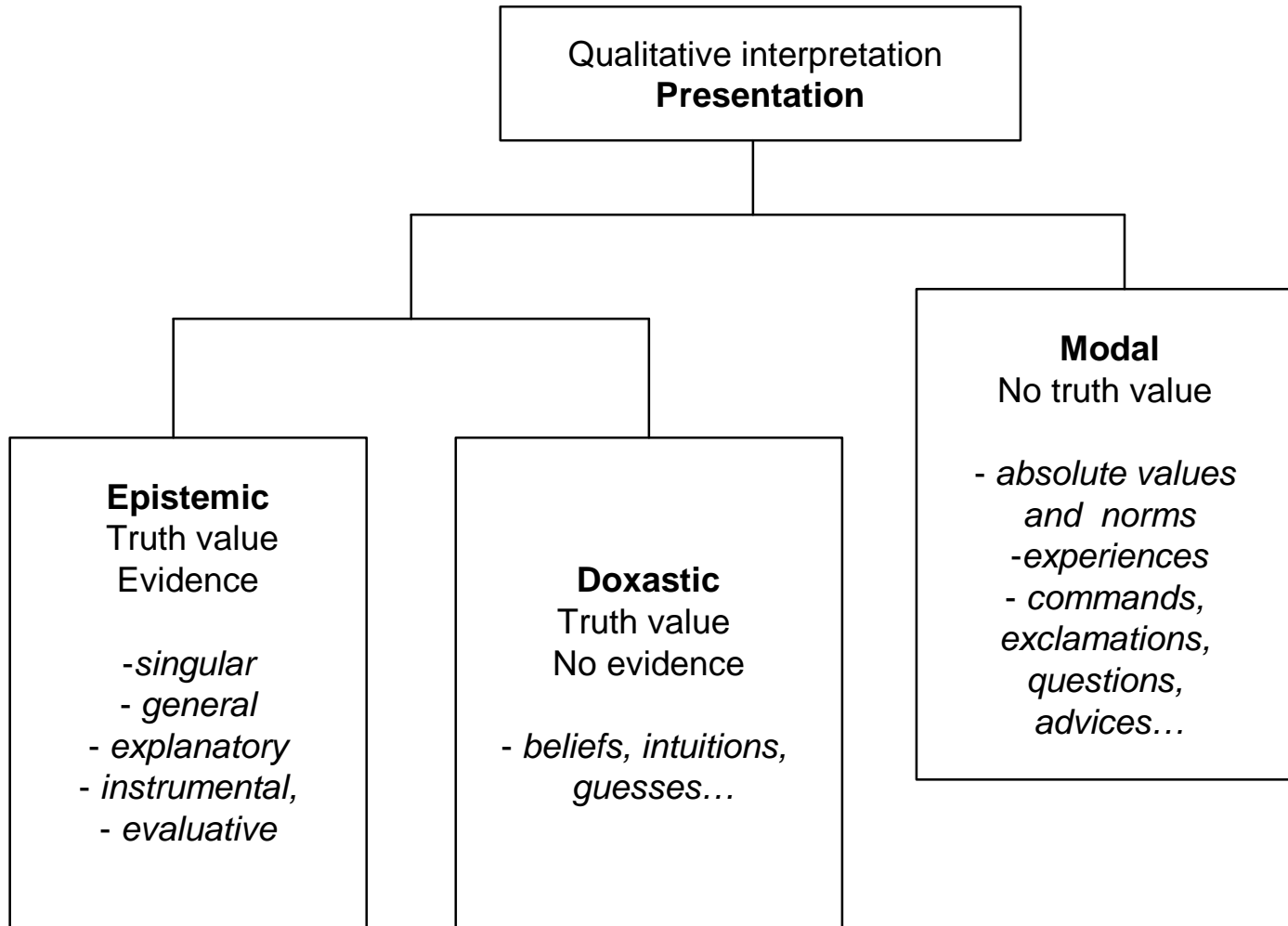


Information Species based on probability – Quantitative interpretation

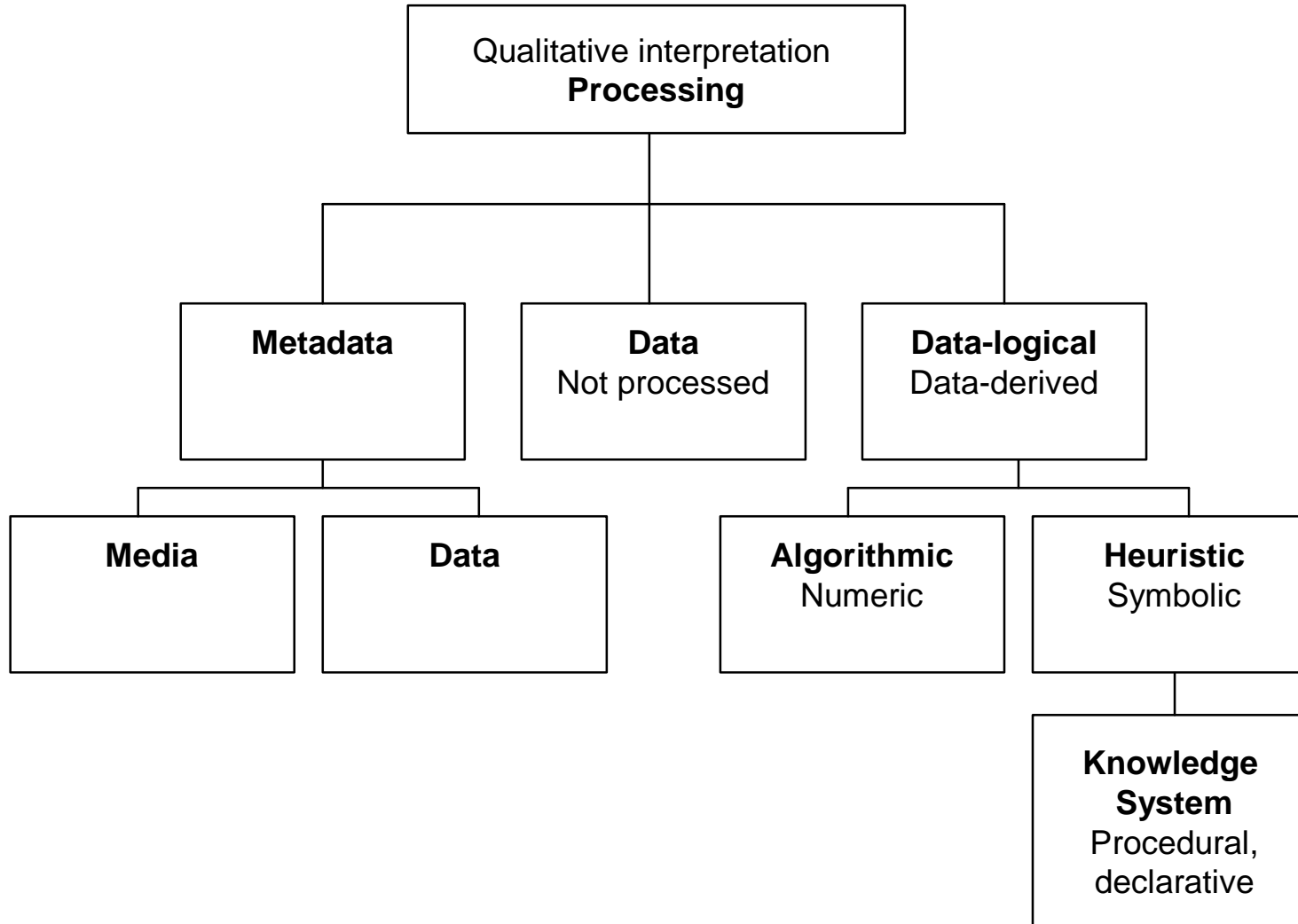
Communication



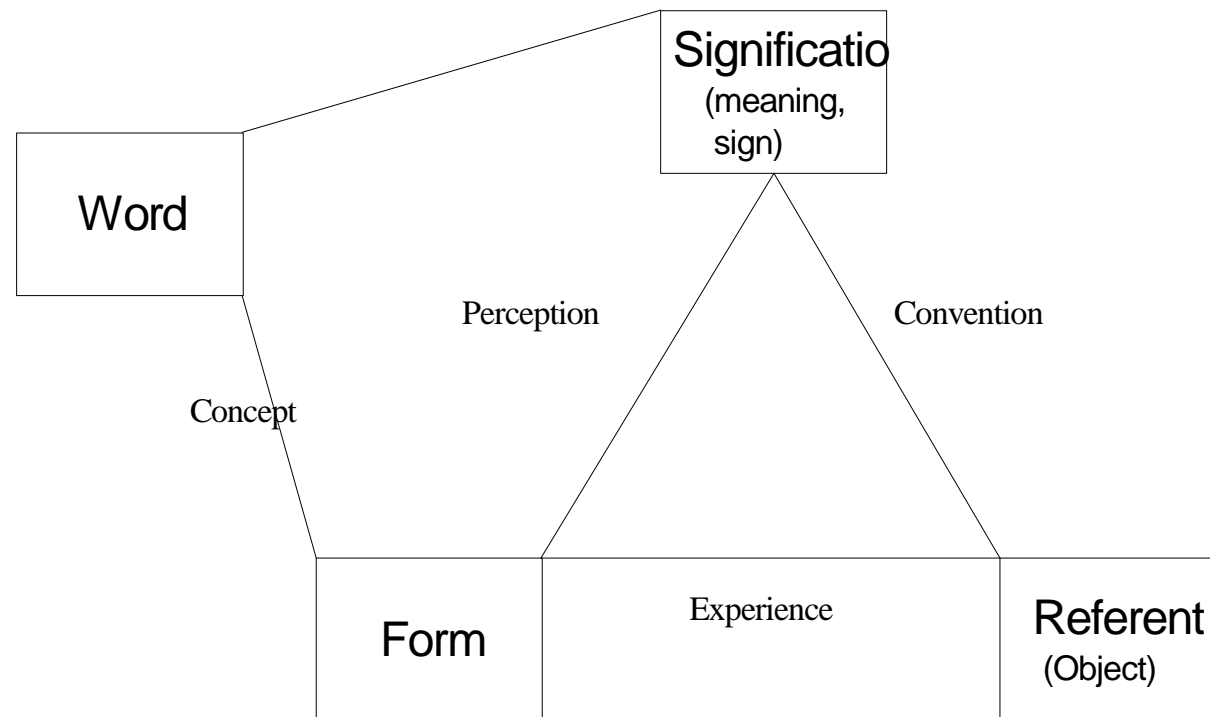
Presentation



Processing

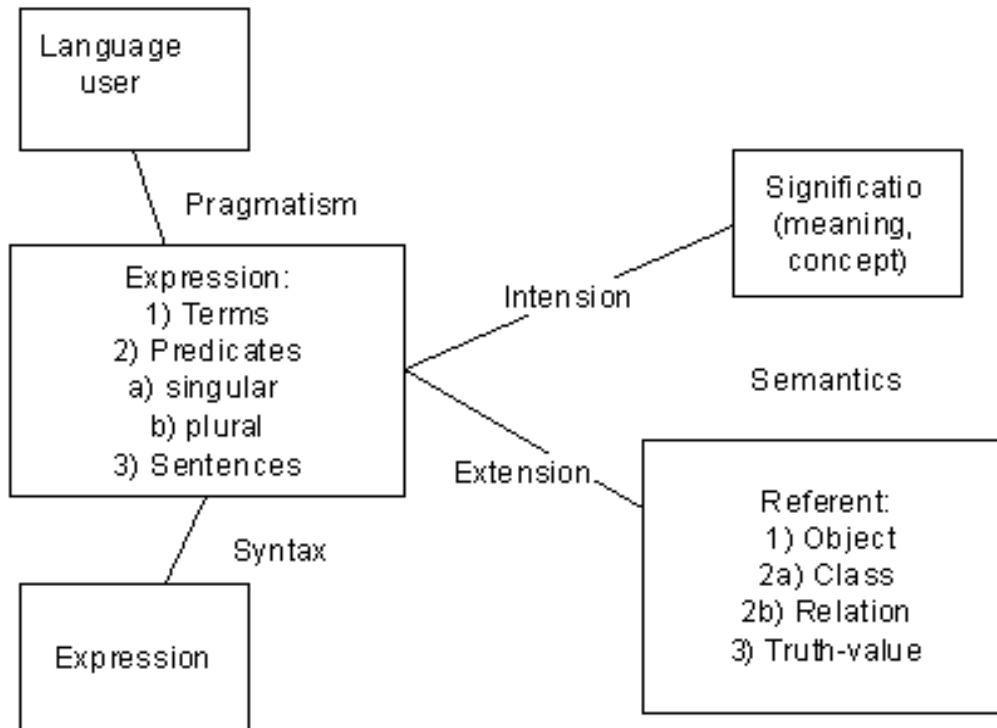


Semantics and semiotics



Cognitive oriented constructivist theories emphasize the **exploration** and **discovery** on the part of each learner as explaining the learning process. Knowledge is still very much a symbolic, mental representation in the mind of the individual. But collaborative system for engineering needs a **socially** oriented approach.

Philosophy and information systems



KM system based on object-oriented analysis can utilise the concepts from qualitative information species.

Knowledge resides in human beings - not in the media. However, in sociological constructivism the context is part of the knowledge.

KM System Technologies – Roots

- Information technologies for managerial and professional workers evolved already several decades
- Roots are in Analytical Applications
 - Management Information Systems (MIS)
 - Decision-Support Systems (DSS)
 - Executive Information systems (EIS)
 - Information Management Systems
 - Artificial Intelligence
 - Semantic Network
 - Collaboration (Groupware...)
 - (Re)engineering

KM System Technologies – Nowadays

- Scope of Technologies for KM
 - Portals
 - Business Intelligence – Data Warehousing, Data Mining...
 - Document Management
 - Intelligent agents
 - Search Engines
 - Knowledge Resource Directories
 - Customer Relationship Management
 - Messaging / e-mail
 - Groupware and Collaboration Technologies
 - Web Calendars / Reminders
 - Decision Support Systems
 - Workflow and Tracking
 - Web Casting
 - Content Management
 - Web / multimedia based training / e-learning

KM Applications and Technologies (Binney 2001: 38)

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	<ul style="list-style-type: none"> ▪ Case-Based Reasoning (CBR) ▪ Help Desk Applications ▪ Customer Service Applications ▪ Order Entry Applications ▪ Service Agent Support Applications 	<ul style="list-style-type: none"> ▪ Data Warehousing ▪ Data Mining ▪ Business Intelligence ▪ Management Information Systems ▪ Decision Support Systems ▪ Customer Relationship Management (CRM) ▪ Competitive Intelligence 	<ul style="list-style-type: none"> ▪ Intellectual Property ▪ Document Management ▪ Knowledge Valuation ▪ Knowledge Repositories ▪ Content Management 	<ul style="list-style-type: none"> ▪ TQM ▪ Benchmarking ▪ Best practices ▪ Quality Management ▪ Business Process (Re)Engineering ▪ Process Improvement ▪ Process Automation ▪ Lessons Learned ▪ Methodology ▪ SE/CMM, ISO9000, Six Sigma 	<ul style="list-style-type: none"> ▪ Skills Development ▪ Staff Competencies ▪ Learning ▪ Teaching ▪ Training 	<ul style="list-style-type: none"> ▪ Communities ▪ Collaboration ▪ Discussion Forums ▪ Networking ▪ Virtual teams ▪ Research and Development ▪ Multi-disciplined Teams
Enabling Technologies	<ul style="list-style-type: none"> ▪ Expert Systems ▪ Cognitive Technologies ▪ Semantic Networks ▪ Rule-based Expert Systems ▪ Probability Networks ▪ Rule Induction, Decision Trees ▪ Geospatial Information Systems 	<ul style="list-style-type: none"> ▪ Intelligent Agents ▪ Web Crawlers ▪ Relational and Object DBMS ▪ Neural Computing ▪ Push Technologies ▪ Data Analysis and Reporting Tools 	<ul style="list-style-type: none"> ▪ Document Management Tools ▪ Search Engines ▪ Knowledge Maps ▪ Library Systems 	<ul style="list-style-type: none"> ▪ Workflow Management ▪ Process Modeling Tools 	<ul style="list-style-type: none"> ▪ Computer-based Training ▪ Online Training 	<ul style="list-style-type: none"> ▪ Groupware ▪ e-Mail ▪ Chat Rooms ▪ Video Conferencing ▪ Search Engines ▪ Voice Mail ▪ Bulletin Boards ▪ Push Technologies ▪ Simulation Technologies
<ul style="list-style-type: none"> ▪ Portals, Internet, Intranets, Extranets 						

KM System as a Human Process

- Knowledge management system, however, does not have to be a computer system. It can be a process of

finding,
selecting,
organizing,
distilling and
presenting information in a way that improves comprehension in a
specific area of interest, and

acquiring,
storing and
utilizing knowledge for such things as

problem solving,
strategic planning,
decision making and
dynamic learning.

Characteristics of Knowledge

- Knowledge is a human act
- Knowledge is the residue of thinking
- Knowledge is created in the present moment
- Knowledge belongs to communities
- Knowledge circulates through communities in many ways
- New knowledge is created at the boundaries of old

[McDermott 1999]

Changes in dynamic knowledge are often

- Rapid
- Radical
- Discontinuous
- Non-linear

Finding the Sociotechnical Golden Mean

- Information systems are effective when applied to appropriate task, e.g.
 - storing
 - sorting
 - computing
 - comparing
 - visualising data
- A user profile is needed for information systems – but searching is difficult to profile: you don't know what you don't know
- Capture sufficient context to information systems
- When added with Communication Technology, the information level is reached
- The cutting edge knowledge is always changing – so the real task of is to connect people to people.
- When connecting people the knowledge level can be reached
- Mix and alternate tacit (e.g. meetings, discussions, job rotation) with explicit knowledge sharing (e.g. documentation) in the right proportion, scheduled right
- Mix the instrumental information exchange (replicative, imitative learning) with knowledge creation

E-learning goes mobile

- Not just a simulation of a class room but personalised services
- Bulletins
 - push technology
 - e.g. from engineering: product information
 - different technologies already piloted
- Text messages
 - e.g. series of questions and answers
 - answers after a few hours
 - more information for interested by e-mail
 - comparison with other students' answers
 - hints and favourites
- Voice data
 - delivery of content, best practices
 - e.g. product features for a reseller
 - recording of student's own comments
- Mobile news
- Mobile chat

E-learning Journals and Magazines

- International Review of Research in Open and Distance Learning
<http://www.irrodl.org/>
- Open Learning
<http://isacco.catchword.com/vl=39446670/cl=11/nw=1/rpsv/catchword/carfax/02680513/contp1-1.htm>
- Journal of Interactive Media in Education
<http://www-jime.open.ac.uk/>
- American Journal of Distance Education
<http://www.ed.psu.edu/acsde/index.html>
- Internet-Based Distance Education Bibliography (1997-1999):
<http://www.ed.psu.edu/acsde/annbib/annbib.asp>

Internet Databases about Education

- ERIC
International database for education
<http://ericir.syr.edu/Eric/>
- International Centre for Distance Learning - Literature Database
<http://icdl.open.ac.uk/>
- Opintoluotsi, a Finnish database for education
<http://www.opintoluotsi.fi/verkko-opiskelu>

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