



Users' relevance behavior and information ecology for digital libraries

Jela Steinerová
Comenius University Bratislava
Slovakia

Faculty of Philosophy

steinerova@fphil.uniba.sk

The presentation is developed as part of the research project **VEGA 1/0429/10**



Outline of presentation

1. Introduction: basic research questions
2. Information ecology – concepts, principles, definition
3. Research results of two projects aimed at users of libraries and electronic resources
 - Information styles
 - Relevance 2.0
4. Information ecology of digital libraries
 - Concept maps as an ecological tool
5. Conclusions



1 Introduction: Questions

- *How can we use data on users for new services and systems?*
- *How to connect user experience with digital services and interfaces?*
- *Is information ecology a productive concept for digital libraries?*

Background - context

- Science 2.0 (Schneiderman)
- Digital scholarship
- Linking social sciences and technological sciences
 - new partnerships
- Social aspects and social networks in web (Web Science)
 - Ethical, legal, security aspects and personal data protection
- Users' information behavior: activities in the information environment

2 Information ecology - concepts

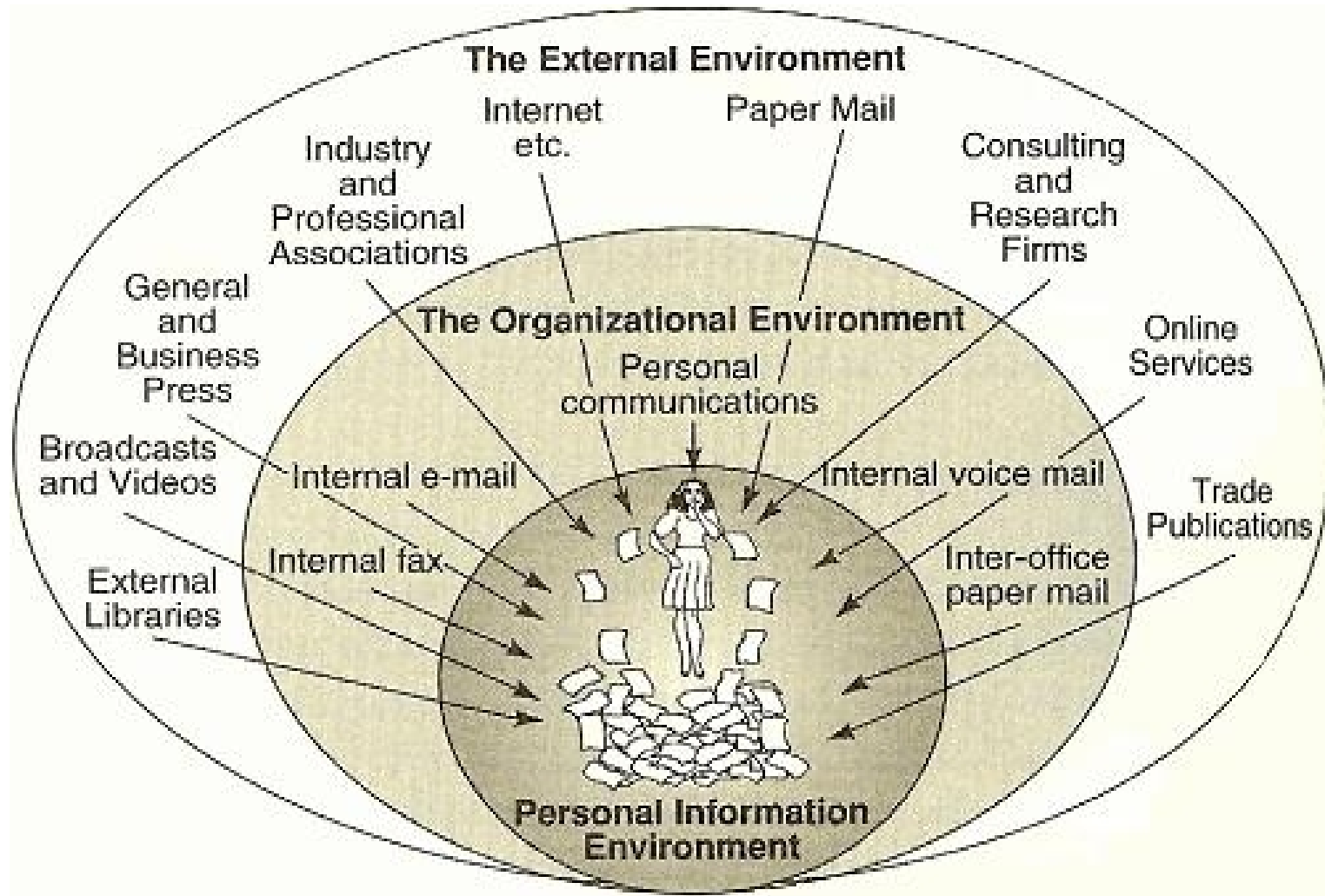
- Many concepts in information science
- Our approach – new paradigm of information science (cognitive, social):
 - ***Cooperative, inter-connected relationships between people and electronic environments (digital libraries)***
 - ***Interactive evolution, construction of meanings, sense-making***



Concepts of information ecology

- Biology, law, information ethics
- Information management
 - (Davenport, Prusak 1997)
- Social informatics, ICT
 - (Nardi, O' Day 1999)
- Information seeking (Williamson 2005), affective information behavior (Nahl, Bilal 2007, Given 2007)

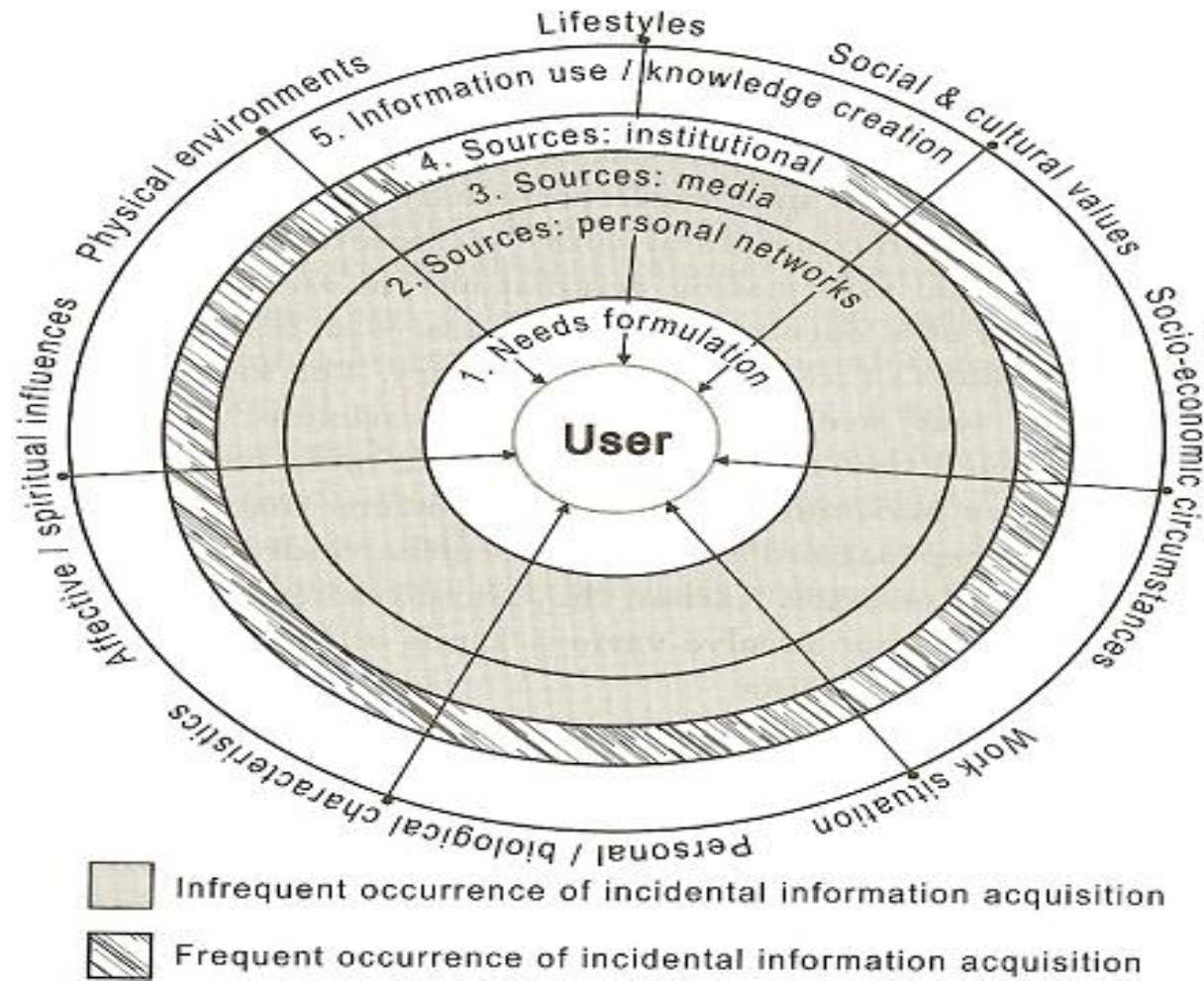
Information ecology: information management



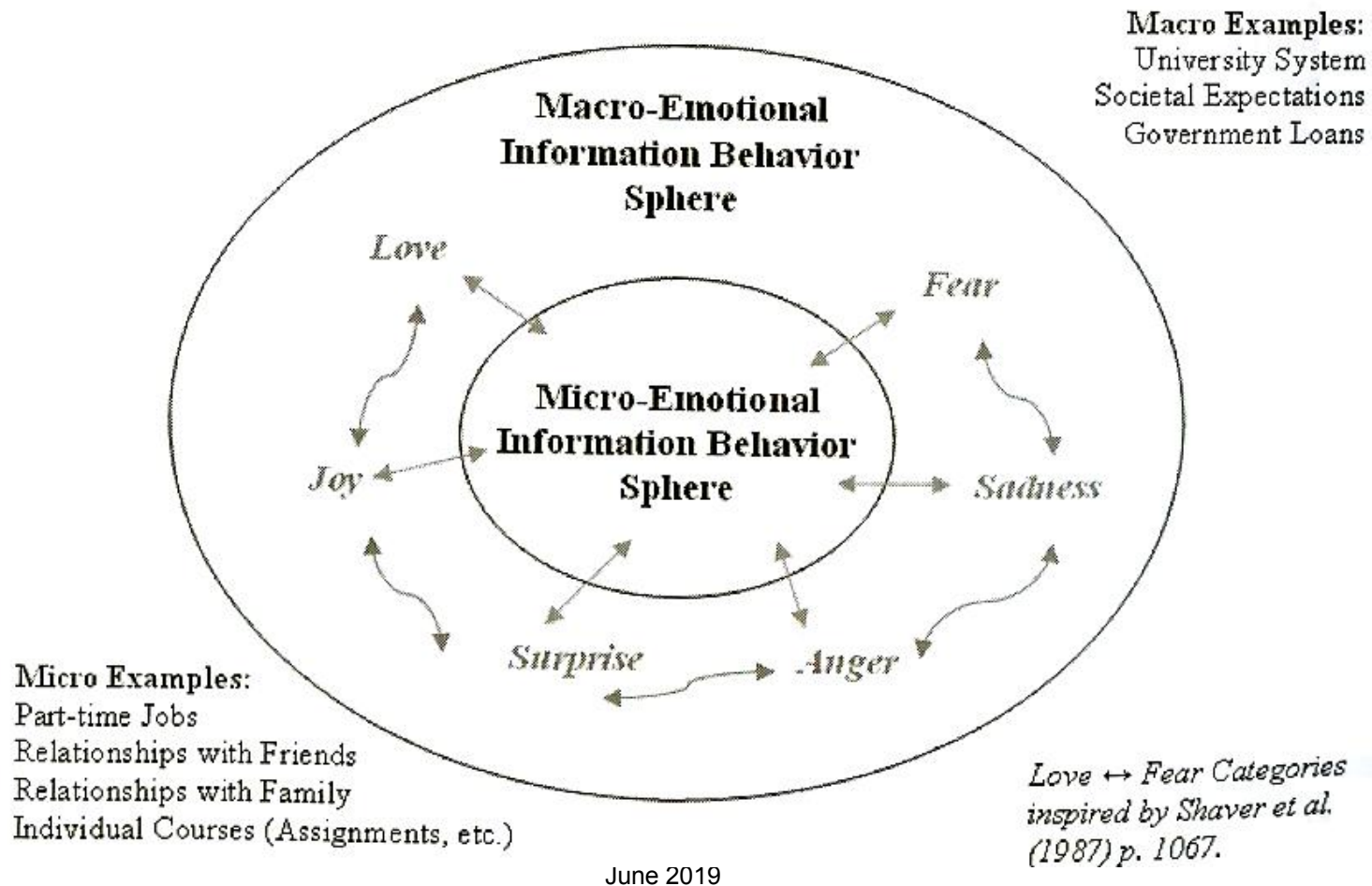
Information management – ecological model



Ecological model of information seeking (Williamson)



Affective information ecology (Given)





Information ecology of digital libraries

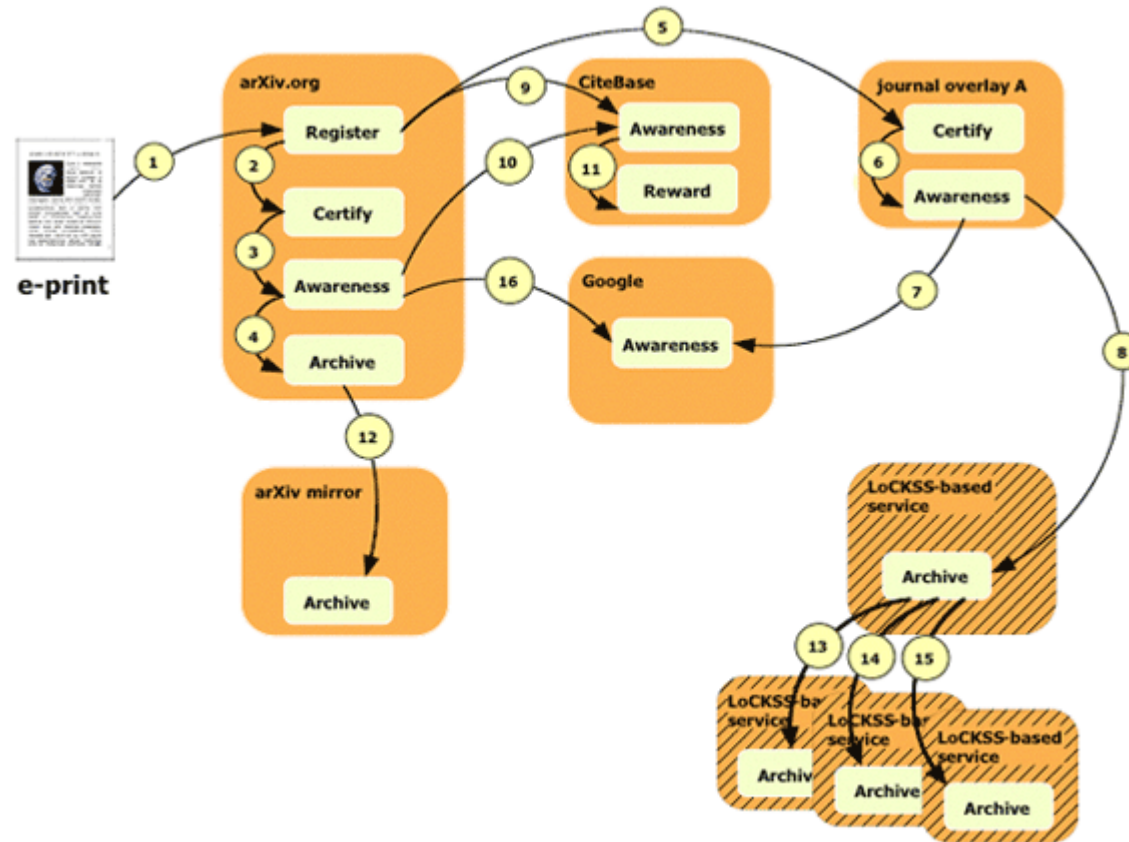
- Relationships of information objects and users' cognitive state (*learning*) in situations of information use (*everyday seeking, learning, scholarship, publishing*)
- Management of these relationships (access, rights, interactions)
 - Evolution of information objects
 - Special representations, activities, interactions
 - Object re-use
 - Interactive visual environments



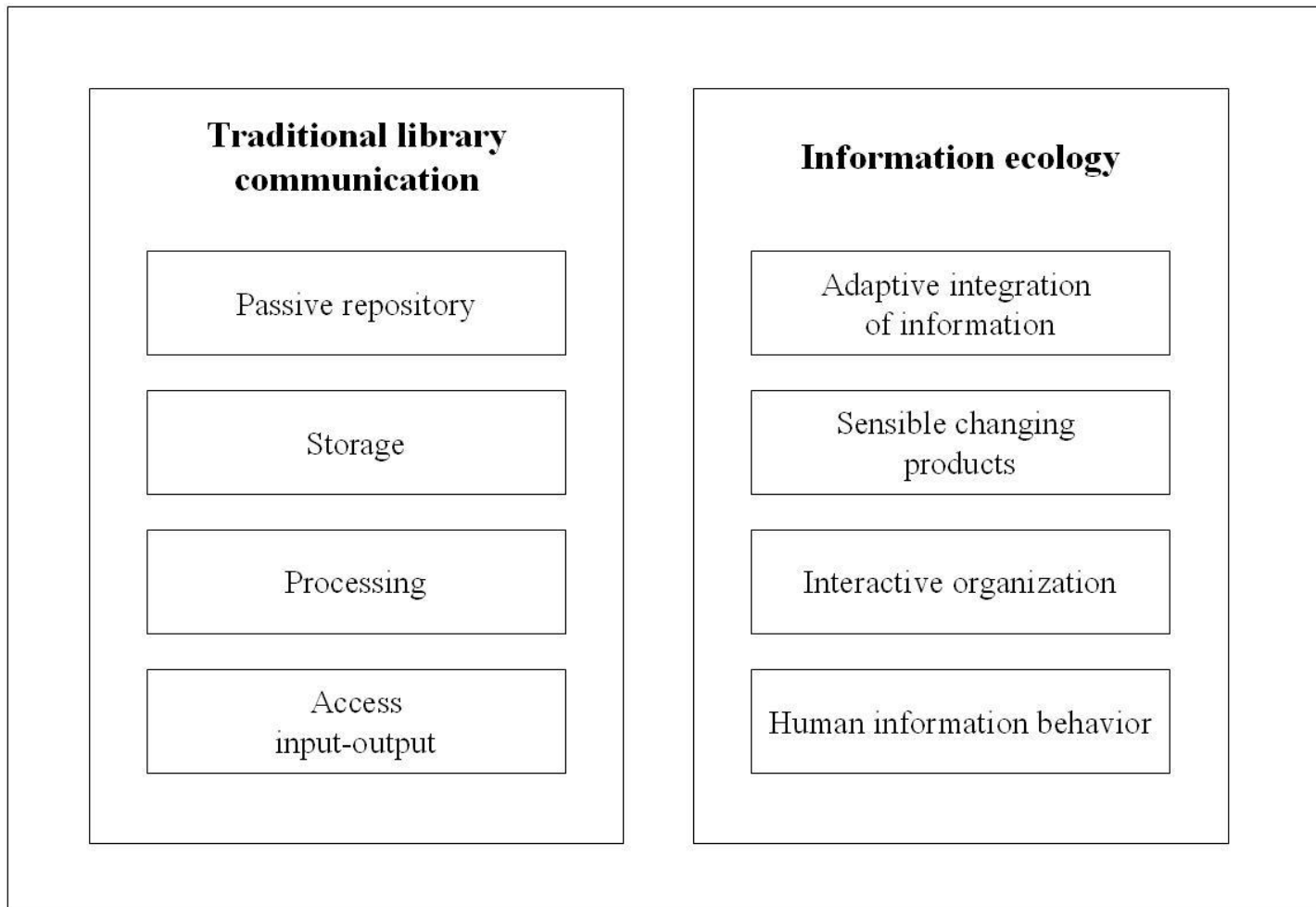
Scientific ecology

- Information flows in the electronic environment
- Models of information flows – creation, access, publishing, archiving
- Example: ecological model of **arXive.org**

Ecological model - arXive.org



Why can digital library be ecological



Incentives for information ecology of digital libraries

Active information use

More interaction

- Collaboration
- Social tagging
- Blogosphere
- Folksonomies
- Wiki (pedia)

More context

Deeper representations, structures

- Communication
- Discussions
- Comments
- Annotations
- Evaluation
- Visualization

Studies of users (net generation)

- Digitally literate
- Fast response time
- Images / text
- Parallel processing

- ***Does it change thinking?***
- ***How and why is information used?***
- ***Does it change the concept of relevance in digital library (services)***

3 Our studies of users – two projects

- **Interaction of Man and Information Environment (2002-2004)**

 - Information styles in electronic environment

 - Information behavior of net generation

 - Easy access

 - Quick online reading

 - Social networking

 - Cognitive mapping

 - Visualization

- **Information styles: stable patterns, preferences**

Information styles – results of first project

	pragmatic	analytic
seeking	horizontal	explorative
terminology	clear, simple	multidisciplinary
assessment	surface, serendipity	experience in relevance judgments
organization	surface, field dependence	integrative, based on expert knowledge and experience
planning	intuitive, simple queries	complex queries
purpose	orientation	intellectual processing
emotions	trust, optimism	doubts
motivation	fast solution	understand contexts
access	navigation	interpretation

Study of relevance behavior – results of the second project

- Project Information use (2005-2007)
 - Information behavior in assessing relevance (doctoral students), concept maps
- Results:
 - value, utility, importance
 - discover, make decisions, participate
 - multidimensional, multicriteria in electronic environment, users ADD VALUE:
 - recommend, relate, ranking, discover
 - origin of source, authority
 - preliminary relevance, analytical relevance



Reconsideration of relevance

- Reconsideration of relevance based on results of analyses:
 - Active cognitive process, interaction with information in contexts, emotional experiences of discovery, finding value, learning, inspiration, self-confirmation
- Different ways of experiencing relevance
 - Relevance as cognition, inference
 - Intersubjective (subjective and objective parts)

Relevance 2.0

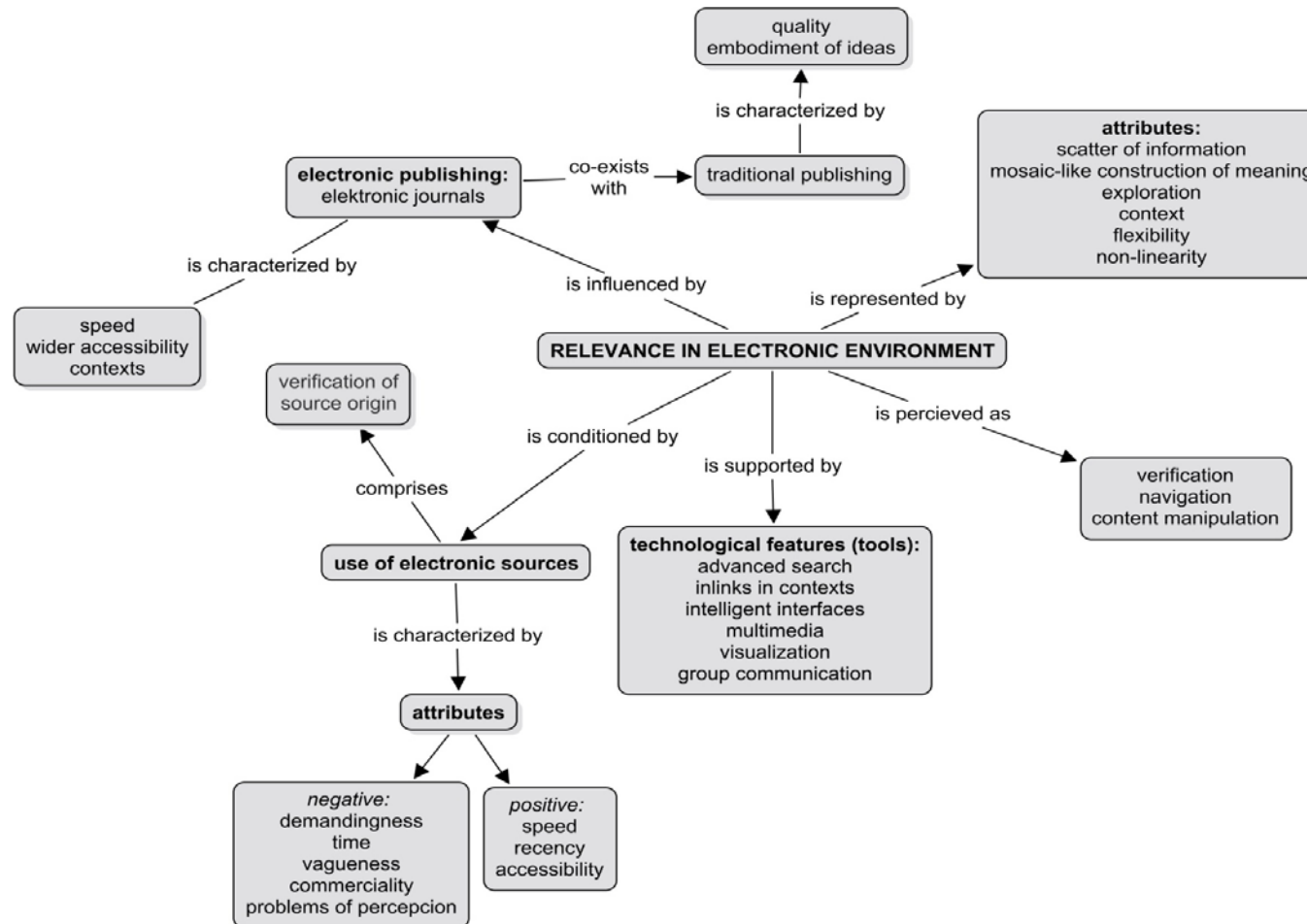
	Traditional library environment	Electronic environment (internet, web, digital library)
System relevance	Bibliographic level, formal match	Interactivity, complexity of relations
Topical relevance	Orientation, navigation to sources	Content, intellectual - knowledge
Criteria	One-dimension	Rich multi-criteria
Organization of Information	Linearity	Non-linearity
Added value		Context, visualization, collaboration
Cognitive relevance	Cognitive state, style, user categories	Personalization, intelligent interfaces
Information structures	Deterministic	Flexible, concept linking, mosaic-like
Communicative relevance	Reference interview, communication styles	Group sorting, recommendation, dialogue
Situational relevance	Tasks, problems, situations	Uncertainty reduction by contexts, links, organization
Motivational relevance	Preferences, goals	Easy access, service forms, discovery, creativity

Relevance 2.0



- In-built mechanism (cognition-system):
 - Integrated assessment features
 - links, recommendation, sorting
 - intuitive revelations of relevance in interaction, communication, collaboration*
 - navigating, flexibility, serendipity (discovery)
- Dispersed criteria are integrated into a **mosaic**
 - Validation, verification of sources
- Manifold criteria: *visualize contexts, links*

Concept maps - relevance



Relevance 2.0 for digital libraries

- Information styles
- Electronic environment (web 2.0)
- Models of information ecology
- People
- Technologies
- Information
- Orientation /analysis
- Construction of meaning, knowledge organization
- Contexts, communities

Information ecology



- Organize knowledge based on information behavior
 - *tools – concept maps: C-Maps, etc.*
 - *tools of digital repositories: D-Space, E-Prints, etc.*

Ecological tools:

- clean information environment
 - decrease information overload
 - semantic interoperability (ontologies)

4 Information ecology for digital libraries

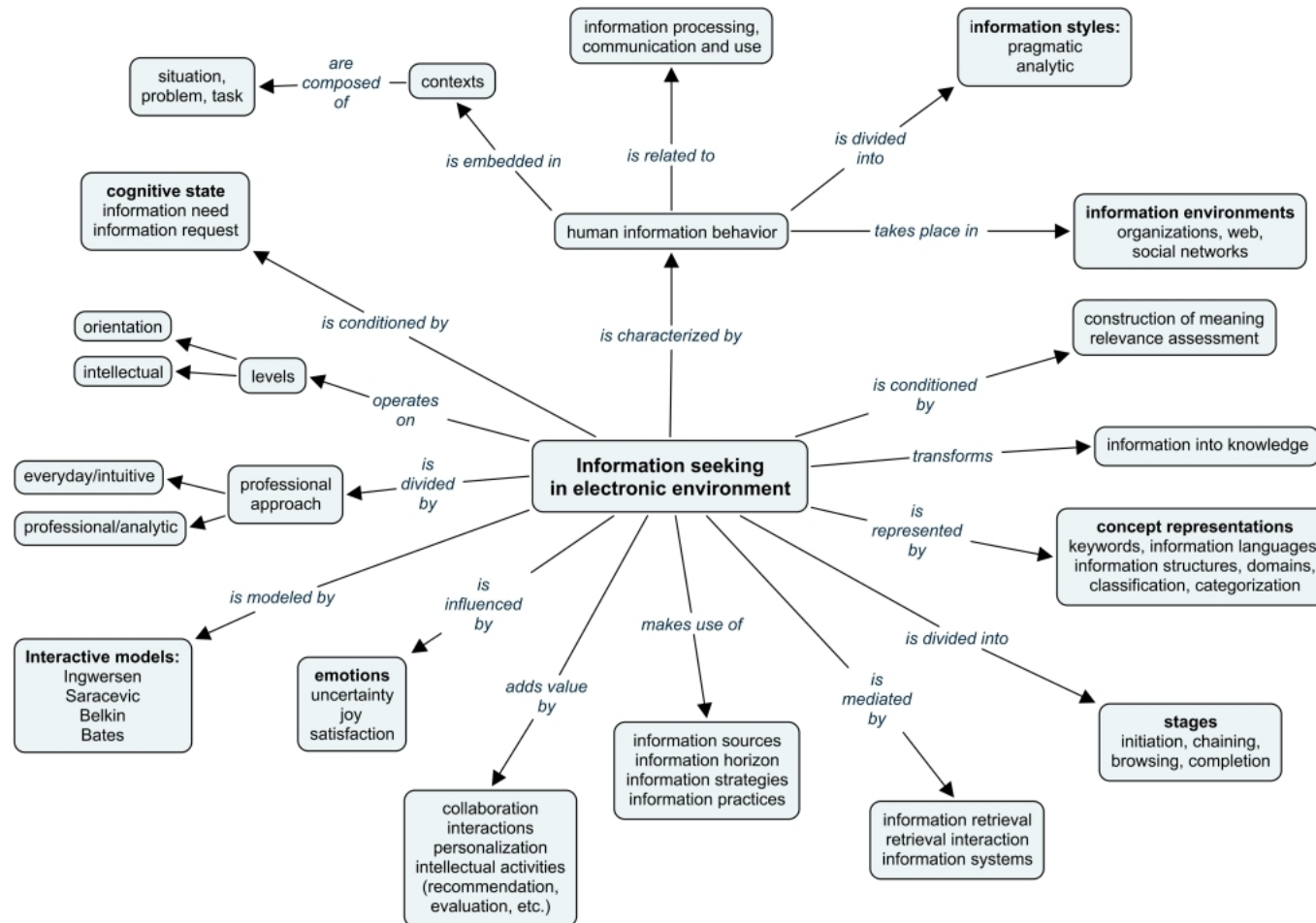
- *Facebook, Twitter, Google, Wiki(pedia)*
 - Parallel interactions (e.g. read and write, listen and watch),
 - user-generated content
 - **integration** of alerting, security services
 - **creativity**: classification, tagging, comments, annotating, discussions, blogging, wiki pages
 - **decentralization** – dynamics, interaction, sharing
 - Still in movement



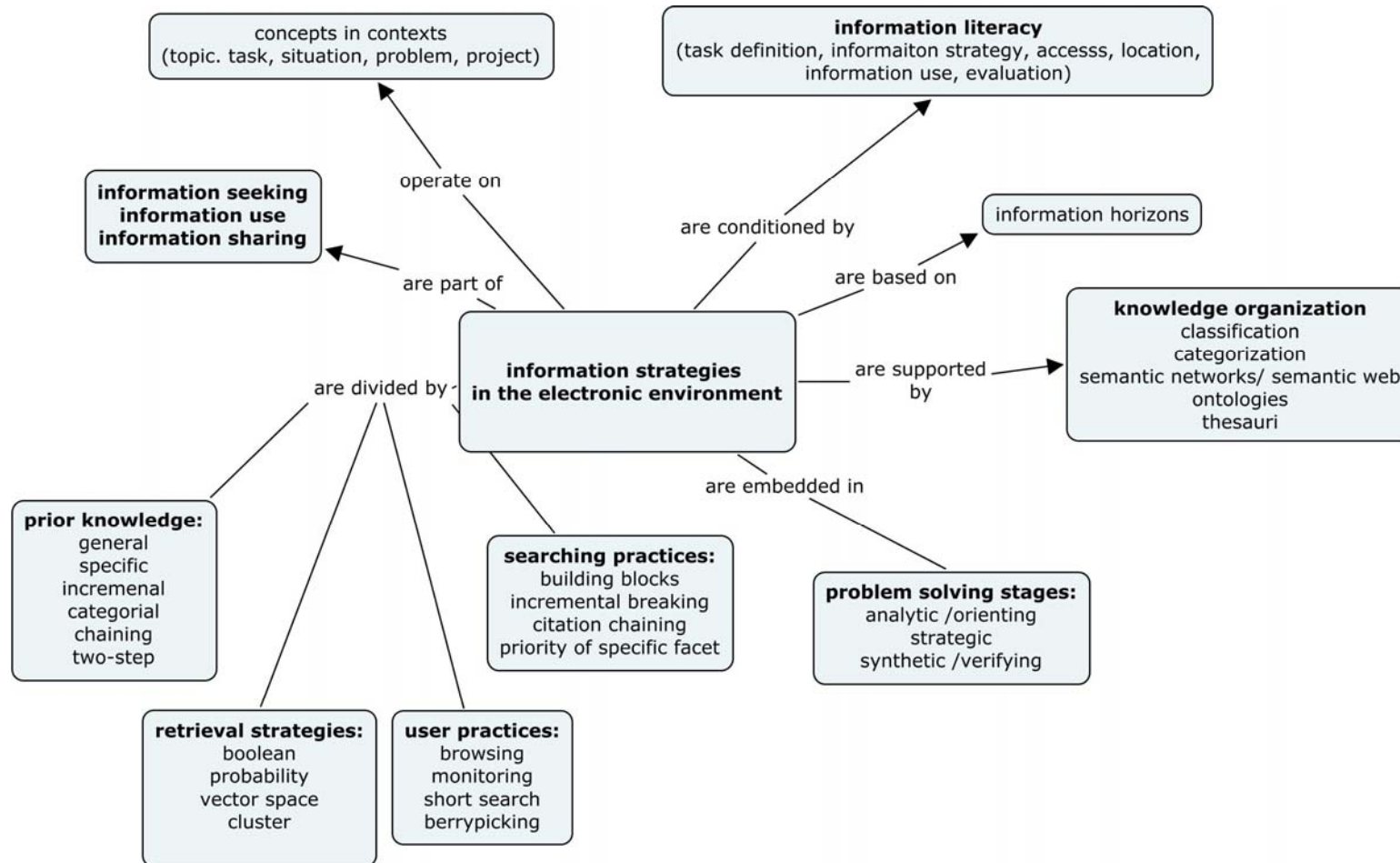
Features of information ecology

- Information services, products, systems – part of holistic environment (organisms)
- Links between external and internal knowledge, emotions and social networks
- Reuse of objects, services, products

Concept mapping as ecological tool – example from textbook



Concept mapping as ecological tool – example from textbook



5 Conclusions – benefits of information ecology for relevance

- Features of relevance:
 - embedded in concept maps, ontologies, topic maps
 - Building information styles into user interfaces
 - Building tools for discovery, construction of meaning, relevance assessment into digital library features
 - Integrate information styles with data structures in: **resources discovery, e-memory**

Conclusions: ecological aspects of relevance in digital libraries

- Semantic
 - construction of meaning, relevance building
- Visual
 - concept maps, mind maps, etc.
- Social
 - information behavior styles
- *Build these aspects into: interfaces (e.g. AquaBrowser, Europeana, etc.) and data structures (FRBRoo)*
- *Develop FILTERS (affective, cognitive, social)*

Ecological features of digital libraries

- Apply theories of information science:
 - Cognitive construction (cognitive styles, semantics)
 - Sense making (situations, contexts)
 - Activity theory: personalization, social networking
- Pragmatic information style: fast response, less context
- Analytic information styles – deep information processing, more context

Conclusions – trends in relevance behavior

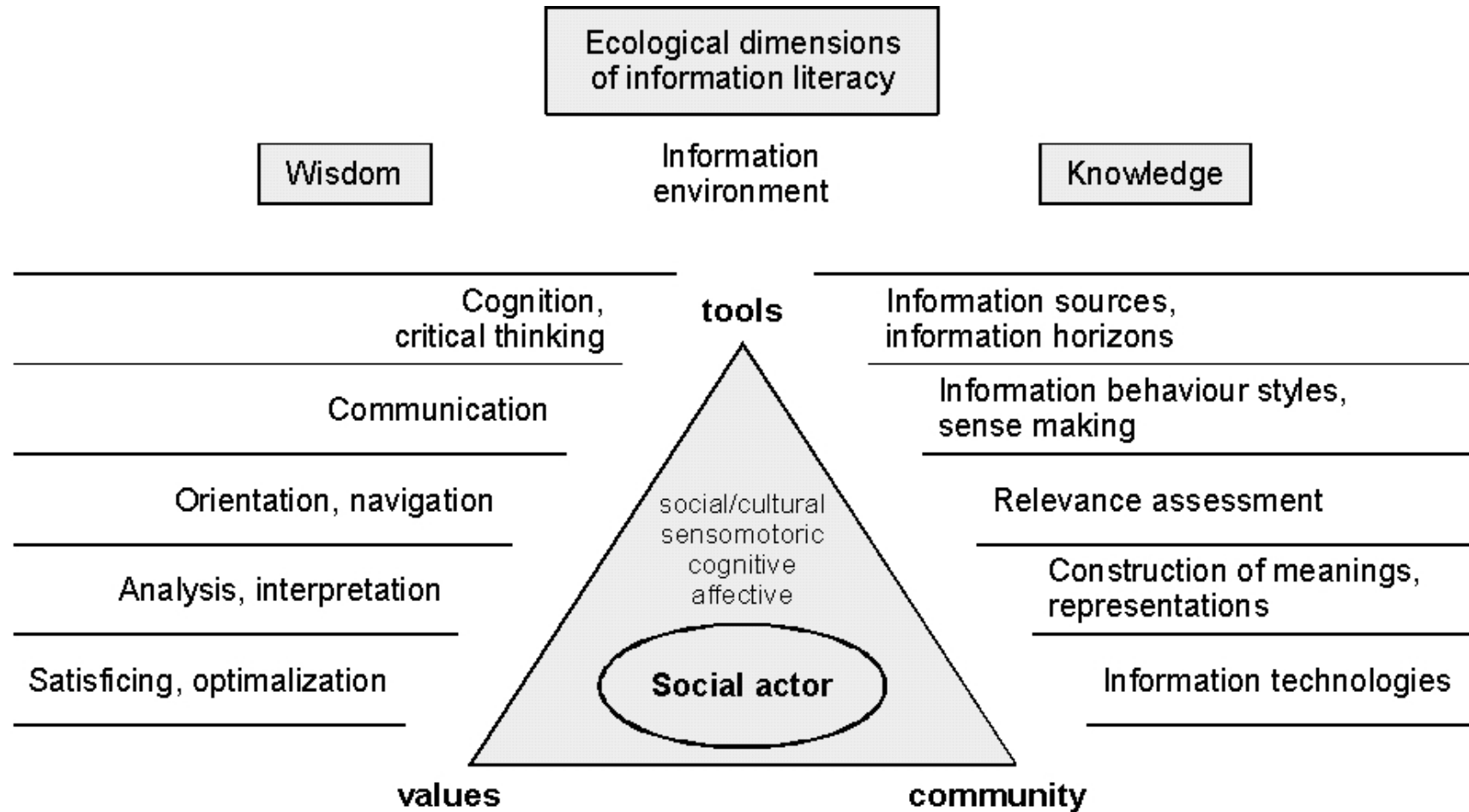


- Relevance: apply sense-making in the electronic environment
- Features:
 - Adapt, filter, process
 - Interact, link/relate, visualize
 - Personalization, navigation, social networking
- Digital natives: visual, contextual clues
 - More activities, relationships (versus products)
- Digital libraries: participation: social aspects of relevance
- Personal digital libraries (building personal relevant collections)

Conclusions – information ecology

- Integrate new information structures into services /interfaces
- Ecological information use: tools for cleaning information environment
- Integrate pathways of users into features (satisfy, optimize)
 - Micro-level (HCI) (interactions: personal, social)
 - Macro-level (digital library as an environment for integration of sources, links, styles, pathways)

Conclusions – model of information ecology for further research



References

- DAVENPORT, Thomas H., Prusak, Laurence. 1997. *Information Ecology : Mastering the Information and Knowledge Environment*. New York : Oxford Univ. Press, 1997. 255 s. ISBN 0-19-511168-0.
- DEMPSEY, Lorcan 2009. Always on: Libraries in a World of Permanent Connectivity. In *First Monday*, Vol 14, No. 1 - 5, January 2009.
- NARDI, B. A., O'Day, V.L. 1999. *Information Ecologies: Using Technology with Heart*. Cambridge: MIT Press. ISBN 0-262-64042-2.
- GIVEN, Lisa. 2007. Emotional Entanglements on the University Campus: The Role of the Affect in Undergraduates' Information Behaviors. In *Information and Emotion*. Ed. By D. Nahl, D. Bilal. Medford: Information Today, 2007, p. 161-175.
- NAHL, Diane, BILAL, Dania. 2007. Eds. *Information and Emotion: the emergent affective paradigm in information behavior research and theory*. Medford, NJ: Information Today 2007. 359 s. ISBN 978-1-57387-310-9.
- WILLIAMSON, K. 2005. Ecological Theory of Human Information Behavior. In *Theories of Information Behavior*. Medford, Information Today 2005, s. 128-132.

References

- STEINEROVÁ, Jela. 2008. Relevance assessment for digital libraries. In Mousaion. 2007. Vol.25, No.2, p. 37-57.
- STEINEROVÁ, Jela. 2008. Seeking relevance in the academic information use. In: Information research. Vol. 13, No. 4, 2008, s. 1-11- Available at: <http://InformationR.net> Also published: Information seeking in context. Vilnius: Vilnius university, 2008, p. 77-91.
- STEINEROVÁ, J., Grešková, M., Šušol, J. 2007. *Prieskum relevancie informácií: Výsledky rozhovorov s doktorandmi FiFUK. [Survey of relevance. Research report.]* Bratislava: CVTI, 2007. 150p.
- STEINEROVÁ, Jela a kol. 2004. Správa o empirickom prieskume používateľov knižníc ako súčasť grantovej úlohy VEGA 1/9236/02 Interakcia človeka s informačným prostredím v informačnej spoločnosti. Autori: J. Steinerová, J. Šušol, S. Makulová, M. Matthaidesová, J. Verčeková, P. Rankov. Bratislava: FiF UK KKIV, 2004. 113 s. Available at: <http://kkiv.fphil.uniba.sk>
- STEINEROVÁ, J., Šušol, J. 2005. Library users in human information behaviour. In: *Online Information Review*. 2005. Vol. 29, No.2, pp.139-156. ISSN 1468-4527
- STEINEROVÁ, Jela, Šušol, Jaroslav. 2007. Users' information behaviour – a gender perspective. In *Information Research*. Vol. 11, No. 3, paper 251. Available at: <http://InformationR.net/ir/11-3/paper251.html>