

## KNOWLEDGE ORGANIZATION

Gabi Reinmann

Germany

reinmann.gabi@gmail.com

### Synonyms

Information organization, information classification, knowledge representation, knowledge structuring

### Definition

The term knowledge organization has at least two meanings depending on the concept of knowledge. If you concentrate on *personal* knowledge to which only the individual has direct access, knowledge organization indicates a *mental* and therefore internal process of structuring or transforming (e.g. visualizing ) knowledge. If you concentrate on *public* knowledge (synonym: information) which is materialized in documents (text, image, audio, video) so that principally all persons can access it, knowledge organization refers to the *technical* and external processes of describing and classifying information. A third definition takes a sociological perspective and indicates such social entities as knowledge organizations whose work primarily relies on knowledge (like universities); this latter meaning will not be included in this entry.

### Theoretical Background

The theoretical background as well as the history of the term “knowledge organization” has two disciplinary roots: (a) learning and cognitive psychology and (b) information and computer sciences. The preferred perspective depends on the underlying conception of knowledge. Therefore, the term knowledge organization only can be applied when considering the concept of knowledge. There are many understandings of knowledge which differentiate its special characteristics and forms. Among others, Jean Piaget (1897 – 1980) has had great influence on the conception of knowledge.

Piaget represents a theory of genetics of cognitive structures giving the individual a crucial and active role in constructing knowledge. But the theory also considers the strong interdependence between individual constructions on the one hand and external stimuli of the external world (and their experience) on the other hand. These two complementary processes which balance this interdependence are called accommodation and assimilation.

Against this background knowledge is a very personal and mental phenomenon to which only the individual has direct access. Under this perspective you can speak about *personal* knowledge (Seiler 2004). Personal knowledge can be of different specification (especially conceptual, visual and enactive) and is therefore more or less easy to articulate and to make explicit. Nevertheless persons can communicate and collaborate so that one must assume that there is not only implicit or idiosyncratic but also shared knowledge mostly conventionalized through language and often materialized in written, spoken or visualized documents like text, audio, image or video. Documented knowledge like this is of principally public access. Under this perspective you can speak of *public* knowledge or information (Seiler 2004).

To distinguish between personal and public knowledge is only one alternative of many to structure the domain of knowledge. But exactly this possibility can aid one to make the decision to either choose the psychological or technical discipline as the leading one for research of knowledge organization. Learning and cognitive psychology provides theoretical and empirical insights referring to personal knowledge organization which is always an internal process. Computer and information sciences in contrast deliver the scientific basis to organize public knowledge or rather information which always results in an external representation.

*Internal knowledge organization:* The growth of personal knowledge is part of human development and does not happen randomly but in some organized manner. There are three representational constructs describing this internal knowledge organization: semantic networks, theories and schemas (see Chi & Ohlsson 2005):

- Knowledge can be represented in *semantic networks* which consist of concepts (called nodes) and relations (called links). The organization of knowledge in semantic networks indicates that everything is related to everything. The quality of this organization is determined by the number and character of relations (e.g. hierarchical, temporal or causal) between concepts as well as by content similarity of concepts. So cognitive psychologists assume that knowledge in semantic networks is grouped by domain.
- Domain-specific knowledge can also be represented as *theories*: Theories in this sense can be well-articulated structures with core knowledge elements (big ideas) in the center and peripheral concepts around them. This attribute (that is different importance of elements) characterizes theories in expert knowledge as well as theories in novice knowledge. The latter however are rather intuitive theories lacking the depth of scientific theories of experts.
- The representation of knowledge in *schemas* results in the assumption that humans construct patterns of experience. A schema is a set of attributes (called slots) which can take on different values referring to phenomena in the external world. Schemas are typically abstract and organize knowledge about specific stimulus domains. They are retrieved as units and used to organize learning, thinking and acting.

To a certain extent internal representations like semantic networks, theories and schemas are the results of natural processes of personal knowledge organization which do not have to be externally instructed and controlled. Nevertheless there are some possibilities to foster and optimize the internal knowledge organization through educational support. Nearly all proposals which do this stem from the research of (cognitive) learning strategies and are based upon the principle of producing external representations. These external representations can be verbal, pictorial or something in between, e.g. maps and other logical pictures:

- You can foster internal knowledge organization by articulating knowledge verbally or in written form. To think out loud can help to structure knowledge because transforming implicit knowledge in conventionalized words fosters the construction or retrieval of schemas. Furthermore, specific programs have been developed to support knowledge generation and organization through writing and text production respectively.
- A widely used strategy in organizing knowledge recurs to visualization. Psychological research on memory shows that there are spontaneous productions of internal imageries probably influencing the internal knowledge organization. So you can use external imagery-strategies to foster these processes. But there is greater evidence in the surplus of logical forms of visualizations like diagrams and maps. Because of the structural similarity to assumed semantic networks (as internal knowledge representations) concept mapping is a widespread strategy or cognitive tool to produce effective external representations.

Processes and methods of internal knowledge organization are often integrated in educational settings (as learning strategies), but they are also part of so-called personal knowledge management strategies through which adults should optimize their personal growth as well as work performance (Holsapple, 2004).

*External knowledge organization:* The growth of public knowledge, or rather information, is part of the socio cultural development and needs sophisticated forms of organization because of the increasing amount of scientific knowledge focused in this context. There are traditional and technology-based forms for external knowledge organization in order to gather, describe, index, classify, store and find documents (e.g. Hjørland, 2008):

- Information can *manually* be indexed and classified like in former libraries or archives. This procedure is slow but brings the advantage that persons (librarians) work with meaning in practice. However today all information institutions are using computer systems for archiving, identifying and retrieving information relevant to specific purposes.
- So information also can *automatically* be structured in very different ways using insights of linguistics, logic, mathematic and philosophy. Information scientists know a lot of methods for organizing information, e.g. from the general to the specific, facet-analytical, bibliometric, user-oriented etc.
- Like personal knowledge information can be *visually* represented using new information technologies: Visualization presupposes well-structured information and greatly facilitates the retrieval of information which most notably is an advantage with huge amounts of information.
- For a short time even technology-based information can also be *socially* organized for example through social tagging or social bookmarking. Instead of expert taxonomies leading the external knowledge organization so-called folksonomies are structuring the public knowledge on the Internet.

Processes and methods of external knowledge organization are not only used in libraries and archives, but also in knowledge-based organizations engaging in organizational knowledge management where knowledge organization covers not all but an important part of management tasks (Holsapple, 2004).

## Important Scientific Research and Open Questions

Knowledge organization is an interdisciplinary challenge combining several disciplines which do not use the same concepts of knowledge or information. Communication between these disciplines is rare and difficult because there is little grounding referring to the underlying core concept. As a consequence, different scientific camps which widely ignore each other are developing although psychological and technical processes of knowledge organization should correspond in many contexts (e.g. education and work place). Beneath this practical argument there are strong theoretical reasons for collaboration between scientists of different origin: (a) Internal knowledge organization often needs external representations as well as technical tools to stimulate and support them. Further research has to analyze the interrelation between methods based upon cognitive and learning psychology on the one hand and computer and information science on the other hand. (b) External knowledge organization in contrast presupposes objectives and criteria which are only possible on the basis of internal representations of persons engaging in articulation, visualization other forms of externalization. Perhaps the field of visualization is a seminal research object of research which connects different disciplines working

on knowledge organization (see Tergan & Keller, 2005): Information and knowledge visualization share the common goal to organize information and knowledge for better access, search and understanding and use comparable techniques and methods. Joint research can be noticed with concept mapping as a method of graphical representation fostering internal and external forms of knowledge organization for different purposes.

## Cross-References

- knowledge representation
- schema(s)
- knowledge integration
- explicit knowledge
- implicit knowledge
- knowledge and cognition development
- knowledge management and organizational learning
- learning strategies

## References

- Chi, M. T. H. & Ohlsson, S. (2005). Complex declarative learning. In K. J. Holyak & R. G. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning* (pp. 371-400). Cambridge: Cambridge University Press.
- Holsapple, C. W. (Ed.) (2004). *Handbook of knowledge management*. Berlin: Springer.
- Hjørland, B. (2008). What is knowledge organization (KO)? *Knowledge Organization. International Journal devoted to Concept Theory, Classification, Indexing and Knowledge Representation*, 35(2/3), 86-101.
- Seiler, T. B. (2004). The human foundation of knowledge management. In J. Gardner, R. Buber & L. Richards (Eds.), *Organising knowledge. Methods and case studies* (pp. 43-59). Hampshire, U.K.: Palgrave, Macmillan.
- Tergan, S.-O. & Keller, T. (Eds.) (2005). *Knowledge and information visualization. Searching for synergies*. Berlin: Springer.

## Definitions

Accommodation: see Seel's entry of "schema(s)"

Assimilation: see Seel's entry of "schema(s)"

Concept mapping: Concept mapping is a method to construct graphic representations of information. There are several technical tools supporting the process of producing concept maps. Such maps include concepts (usually represented as circles or boxes) and relationships between concepts represented as lines which are specified by words. Unlike mind maps concept maps are hierarchically structured. Concept mapping has been shown to help different groups of persons in education, research and management.

Organizational knowledge management: Organizational knowledge management comprises a range of concepts, methods, tools and practices of systematically identifying, representing, organizing, searching, sharing and using especially public knowledge or information. As a management sector organizational knowledge management is connected to other management disciplines like quality, process, personal and strategic management. The term knowledge management usually means *organizational* knowledge management, which focuses on the goals and interests of an organization.

Personal knowledge management: Personal knowledge management comprises a range of concepts, methods, tools and practices of optimizing individual processes of handling all the information you are surrounded with and developing the personal experiences and competencies. Often personal knowledge management is seen as part of organizational knowledge management, but you can realize the concept in education and informal contexts, too. There are overlapping insights and practices in personal knowledge management on the one hand and strategies of learning, meta-cognition and problem solving on the other hand.

Social bookmarking: With social bookmarking Internet users organize bookmarks of web resources. As opposed to bookmarking on the own computer, you can share digital resources by publishing the references of the resources online with social bookmarking. Usually social bookmarks also contain meta-data and key words (called tags) so that other users may immediately understand the content of the resource.

Social Tagging/folksonomy: A tag is a keyword assigned to a piece of information. So tagging is the activity to assign tags. Social tagging means to do this online and collectively, that is within a principally open group of Internet users in order to share digital content. Social tagging is also called folksonomy. The term folksonomy should express the special characteristic that not experts, but all or many Internet users (the "folk") make their own taxonomies.