ISKO – Knowledge Organization in a Changing World. Challeges, Programs, and Mission

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Abstract

Traditionally "Knowledge Organization" is the ordering of documents on a bookshelf and the indexing of these in a more or less one-dimensional catalog. Now with the Web, its many and hyperlinked, distributed and heterogeneous sources the plain terminological approaches are no longer sufficient. In the same way ISKO society has to rethink its mission.

The "New" Knowledge Organization, which aims at the "Semantic" Web 3.0 tries to combine different Knowledge Organization systems by shared meta data and formalized ontologies that are logical deductive. Whereas the semantic approaches have quite an opposite approach to the user driven systems the future might lay in a combination of logical descriptions and self-organizing principles, what could be named "Self Organizing Knowledge Organization Systems". But still there are open questions which might be solved in future by ISKO and neighbor societies.

1 What is Knowledge Organization?

Dahlberg (2006) defines Knowledge Organization as "… the science of structuring and systematically arranging of knowledge units (concepts) according to their inherent knowledge elements (characteristics) and the application of concepts and classes of concepts ordered by this way for the assignment of the worthwhile contents of referents (objects/subjects) of all kinds". More precisely, Dahlberg (1998) defines knowledge organization as:

> A subject area encompassing the organizing of a) units of knowledge concepts and b) all types of objects (minerals, plants, animals, documents, pictures, museum objects, etc.), related to particular terms or categories, so as to capture what is known about the world in some orderly form allowing it to be further shared with others.
>
> Knowledge organization encompasses the following nine sub-areas:
>
> 1. the epistemological, mathematical, system-theoretical, cognitive scientific and scientific theoretical premises of order of concepts as well as their historical background,
>
> 2. the knowledge of elements and structures of systems of concepts,
>
> 3. the methodology of intellectual construction, conservation and revision of this system and computerization; including questions of paradigmatic and syntactic relating of their elements and units as well as keeping the system compatible and evaluating this system,
>
> 4. the methodology of intellectual and machine applications of this system via classification and indexing,
>
> 5. the knowledge of existing universals and
>
> 6. special taxonomies and classification systems including documentation language (thesauri),

7. questions arising from the influential areas linguistics (~ linguistics mathematics) and terminology; including the retrieval problems, especially in online access,

8. the application of content indexing of all types of documents and in all subject areas,

9. the entire periphery of knowledge organization in the workplace, individual centers, societies, countries and in international areas, as well as the question of education, the economy, the user, etc.

With respect to e.g. social tagging, the systematic approach and the presumption of inherence of the knowledge elements are nowadays no longer obvious. Traditionally "Knowledge Organization" was understood as the ordering of documents on a bookshelf and the indexing of these in a more or less one-dimensional catalog. At least with more detailed documents (e.g. journal articles), the growth of data bases and the availability of sophisticated retrieval techniques, the concept approaches so far were not satisfactory and term based organization became increasingly important. Now with the Web, its many and hyperlinked, distributed and heterogeneous sources the plain terminological approaches are no longer sufficient. Zeng (2008) sees an increase of dimensionality and functions with the development from term lists, via metadata-like models and classifications, to relationship models (see Fig. 1). In principle this reflects a shift from more subjective views of knowledge and its order to more objective ones. Hence it has to be rethought how far e.g. ISKO (International Society for Knowledge Organization) has to change its mission.

There are many disciplines which are partially applied in Knowledge Organization or which are operating in close connection with it, e.g. Linguistics, Cognitive Science, Philosophy. As discussed above Knowledge Organization is more oriented to the labeling, arranging, and retrieval of knowledge in archived documents. Main frontiers exist nowadays with Knowledge Management and Knowledge Engineering (cf. Fig. 2). In Knowledge Management the main focus is to make profit out of the knowledge within an enterprise and its business. The codification and retrieval of knowledge for management processes are part of it. Knowledge Engineering tries to mechanize knowledge storage, its maintenance, and its integration. Human models of understanding the universe of knowledge are part of it. Whereas Knowledge Management and Knowledge Engineering are appropriate to shape the primary scope of Knowledge Organization, these are also neighbor disciplines worth to be considered as essential collaboration fields. E.g. "enhanced" and "electronic" hyphened application areas are more than a sum of all of these but a true progress if combined sophistically, like intended in the Semantic Web.

2 Challenges for Knowledge Organization

At several conferences the future of Knowledge Organization, resp. Information Science was discussed. 2006 on the Vienna ISKO conference (Ohly 2008a) Winfried Schmitz-Esser realized that a world model is needed that integrates means of organization and that can also detect and process knowledge in texts. And Gerhard Budin stated that Knowledge Organization nowadays comprises cognitive, epistemic, communicative, and automatic knowledge representation, creation, and processing. On the IKONE[22] conference 2007 in Bangalore Maxmilian Stempfhuber stressed out that aggregation of data resources in portals requires special treating of heterogeneity with respect to user demands. One of the most demanding statements given at this

[22] International Conference on Future of Knowledge Organization in the Networked Environment

conference was by Prasad Bhaarat Ram: “Give me what I want, not what I ask for” (Ohly 2008b). Means for that might be procedures that deal with misspellings, spam ranking, user models. A conference on ‘Scientific Communication of the Future’ in Jülich 2007[23] yielded in diversification of knowledge and types of knowledge communication distinguishing between mainstream knowledge and ingenious knowledge creation.

These discussions of the last decade shape clearly, that the users as well as the indexers have a fluid notion of knowledge and document contents to be useful for a certain application. These users are very different with respect to their individual or public tasks and their observing or constructing role, especially with the “Social” Web 2.0 (Trump 2007; see Fig. 3). Whereas in the pre-digital world the experts were dictating the values to the users, now in a native digital word the public and skilled users are setting the norms for the scientific experts (cf. Quoniam 2009). The information quality is in so far not static but must be able to adopt information sources from yesterday to arising questions of tomorrow (see Fig. 4). Prerequisite - though not sufficient - is the trust in the information creation and its creating institutions. The retrieval should apply sophisticated robust processing techniques which are able to mine important information from many and heterogeneous data bases. In favor of the current user a flexible adaption with selective narrative ranges for decision making have to be provided for. Hence the demanding question will be: How can outdated information be transformed and reused for future problems. Nevertheless unobvious user expectations can hardly be matched by a mechanical information system. At more recent conferences (ISKO France 2009, Lyon and 2011, Lille; ISKO Germany 2009, Bonn; UDC Seminar 2011, Den Haag; DGI 2012, Düsseldorf) had similar discussion rounds but picked out more the lacking of Web semantics, the conflict with new social media and the computer science dominance[24].

3 Theoretical Foundations of Knowledge Organization

One key question is the theoretical foundation of information and Knowledge Organization work. If we are going back to Dahlbergs definition we are finding also questions of application and periphery of Knowledge Organization. And the founders of classification systems, like Dewey or Otlet (Rayward 2010), went far beyond the question of positioning and distributing books. Such a focus on usability is accompanied by questions like: What kind of knowledge is worth being collected? Where should we get it from? How can we use and preserve it? Who should make profit out of it? There are many theories offered from Activity Theory to Design Theory, not to omit theories that include ecological and global aspects. A look only on Complexity Theory (Morin 2006)[25] shows the wide range of theories nested with it under different aspects (see Fig. 5): System Theory (Bertalanffy) and Cybernetics (Wiener) up to Global Network Society (Castells)[26]. Thus Knowledge Organization must be aware of different theoretical positions that enforce certain tasks and visions and must be able to lay its emphasis and principles on those theories that are appropriate in its special application area and for its user clientele. Certain positions determine the kind of offering information as well as expectations of the users. Not at least psychological theories, how we are attracted to use information (Berlyne: Activation Theory) and which design of information will be fashionable Bürdeck:

[23] Ball 2007

[24] < http://pro.ovh.net/~iskofran/?q=node/13 > and < http://liste.cilea.it/pipermail/isko/2010-January/000259.html >; < http://conferences.isko-france.asso.fr/en/programme.htm >; < http://www.mail-archive.com/wiss-org@gesis.org/msg00051.html >; < http://seminar.udcc.org/2011/programme.htm >; < http://dgi-info.informationsassistent.de/index.php?option=com_content&view=article&id=288&Itemid=122 >

[25] See also: Montuori 2004

[26] Bertalanffy 1957; Wiener 1948; Castells 2005

Design Theory), as well as sociological theories, how information and information norms are diffusing (Rogers: Diffusion Theory) and psycho-social dynamics of opinion leadership (Lewin: Group Dynamics) have to be considered[27]. Hjørland (2002; see: Fig. 6) distinguishes between Empiricism (induction from data), Rationalism (logical modeling), Historicism (historical background), and Pragmatism (goals and values of information and users). Hjørland (1997)[28] explains the "Pragmatic Theory of Knowledge"[29] among others as follows:

> "Since living and acting constitutes the a priori of knowledge, knowledge is constructed in such a way that an application of well constructed knowledge will directly or indirectly serve living and acting" […][30] "in a bio-physical, a socio-cultural and a subjective world". […] "There is a continuous interaction between knowledge and action so that knowledge is created in and through action and so that experiences that the actor acquires through action influences subsequent action."

4 New Knowledge Organization

The "New" Knowledge Organization, which aims at the "Semantic" Web 3.0 tries to combine different Knowledge Organization systems in the Internet by shared meta data and formalized ontologies which are logical deductive. Examples for these are the NKOS group with recommendations for thesauri description schemes (NKOS 1998) and SKOS which applies machine-readable resource description languages to knowledge organization systems such as thesauri, classification schemes, and other concept schemes (Miles/Bechhofer 2008). The SKOS data model provides basic sets of documentation properties, semantic relation properties, lexical labeling, label relations, concept collections, and concept mapping. These sets provide a framework that can be adapted to more specific needs.

Whereas the semantic approaches have quite an opposite approach to the user driven "social" systems[31] the future might exist in a combination of logical descriptions and self-organizing principles, what could be labeled "Self Organizing Knowledge Organization System" (SOKOS). A first attempt in harmonizing Knowledge Organization systems with a machine-readable world is given by the ISO norm 25964 Information and Documentation, part 1 and 2 (2011/2012)[32], that revises the existing international standards for retrieval adequate thesauri and is also intended for their interoperability with other vocabularies in a Semantic Web context.

Knowledge Organization has to turn back to formal, semantic approaches, such as facetted concept systems. But as well it has to be logically more precise and enable reasoning over multiple sources in the Web environment. But also self-adapting approaches, such as social indexing and its quantitative exploitation can be neglected no longer.

5 Conclusions for ISKO

ISKO as a specialized society in this field has to help its clientele to get orientation in an unclear offer of competing approaches and specific realizations. Means for this are international and interdisciplinary congresses, articles in its specialized journal (Knowledge Organization), access to classical texts, text books, repositories, and

[27] Berlyne 1967 (see also: Scott1966); Bürdek 2005; Rogers 1962; Lewin 1935

[28] Extract from Hjørland (1997): < http://www.iva.dk/jni/lifeboat_old/Positions/Pragmatism.htm >

[29] Under which he subsumes his information concept of Activity Theory (Leontev 1978)

[30] Order changed by the author

[31] See e.g. Flickr < http://www.flickr.com/ >

[32] See also: Dextre Clarke 2011 and 2011/2012

exchange relations with other societies (cf. ISKO 1989, Art. 4). Not at least the theoretical background of information, resp. knowledge, and its coding and exchange must be refurbished, especially it has to include the social dimension. A step forward into this direction are repositories with classical readings and old Knowledge Organization journal issues, as well as a specialized bibliography open to the community and the encouraging of norms and evaluations concerning the field of Knowledge Organization. Knowledge Organization textbooks have to include the question of ontologies, machine processing, and Web environment. Exchange with other disciplines or even special groups requires more active contacts with other scientific societies in the field as well as clear exchange rules with these. Nevertheless ISKO has to define its boundaries to other sciences.

But there are still open questions that might be solved in future by ISKO and neighbor societies:

1. What are indicators for "good" Knowledge Organization System?
2. How can Knowledge Organization System with different principles (facetted, social, etc.) be combined?
3. How can local heterogeneity be combined with the aim of a global e-science?
4. Who is the target for Knowledge Organization literacy affords?
5. What is the profile of a Knowledge Organization profession ?
6. Will Knowledge Organization only become a mere application of Knowledge Engineering in the field of information brokering?

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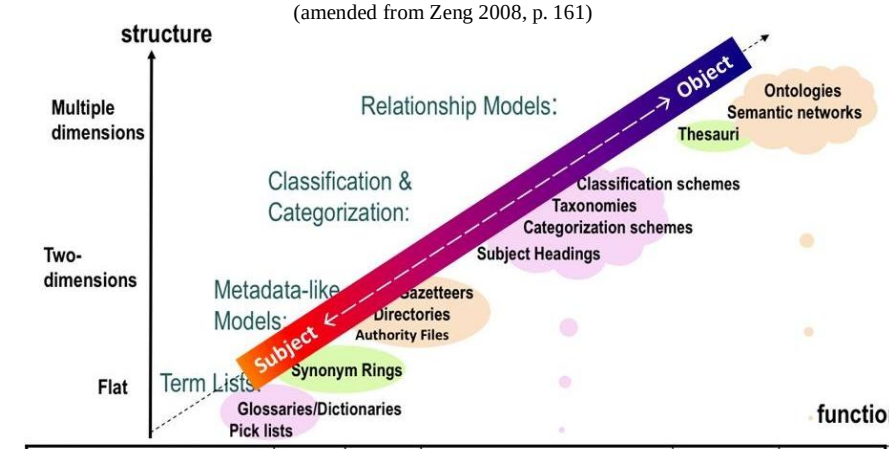
Figure 1: KOS Types
(amended from Zeng 2008, p. 161)



Major functions							
eliminating ambiguity	xxx		xxx	xx	xxxx	xx
controlling synonyms		xxxx	xxx	xx	xxxx	xx
establishing relationships: hierarchical			x	xxxx	xxx	xxx
establishing relationships: associative					xxxx	xxxxx
presenting properties						xxxxx

Figure 2: Characteristics of Knowledge Disciplines
(Ohly 2011a)

Discipine		Area	Methods	Applications
Knowledge Organization	(KO)	Library	Metadata	KOS
Knowledge Management	(KM)	Enterprise	Profit	BI
Knowledge Engeneering	(KE)	Informatics	Maschine Logic	AI KBS
KO+KM+KI ?		interdisciplinary	Semantic Web ?	eScience ? eCommerce ? eGovernment ? eDecision??

Figure 3: Web 2.0 Users Typology
(translated from Trump 2007)

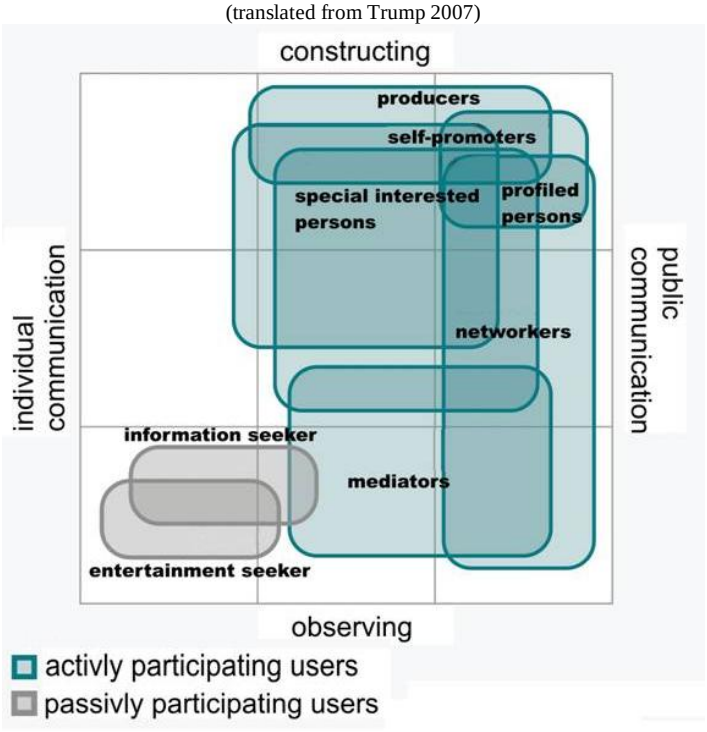


Figure 4: Past-Present–Future of Information
(Ohly 2011b)

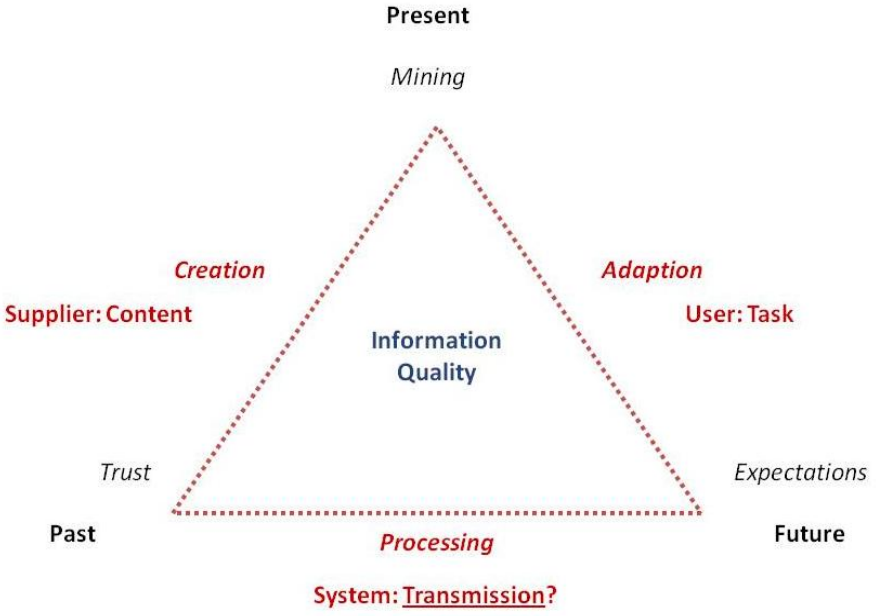


Figure 5: Complexity Map
(from Castellani 2009)

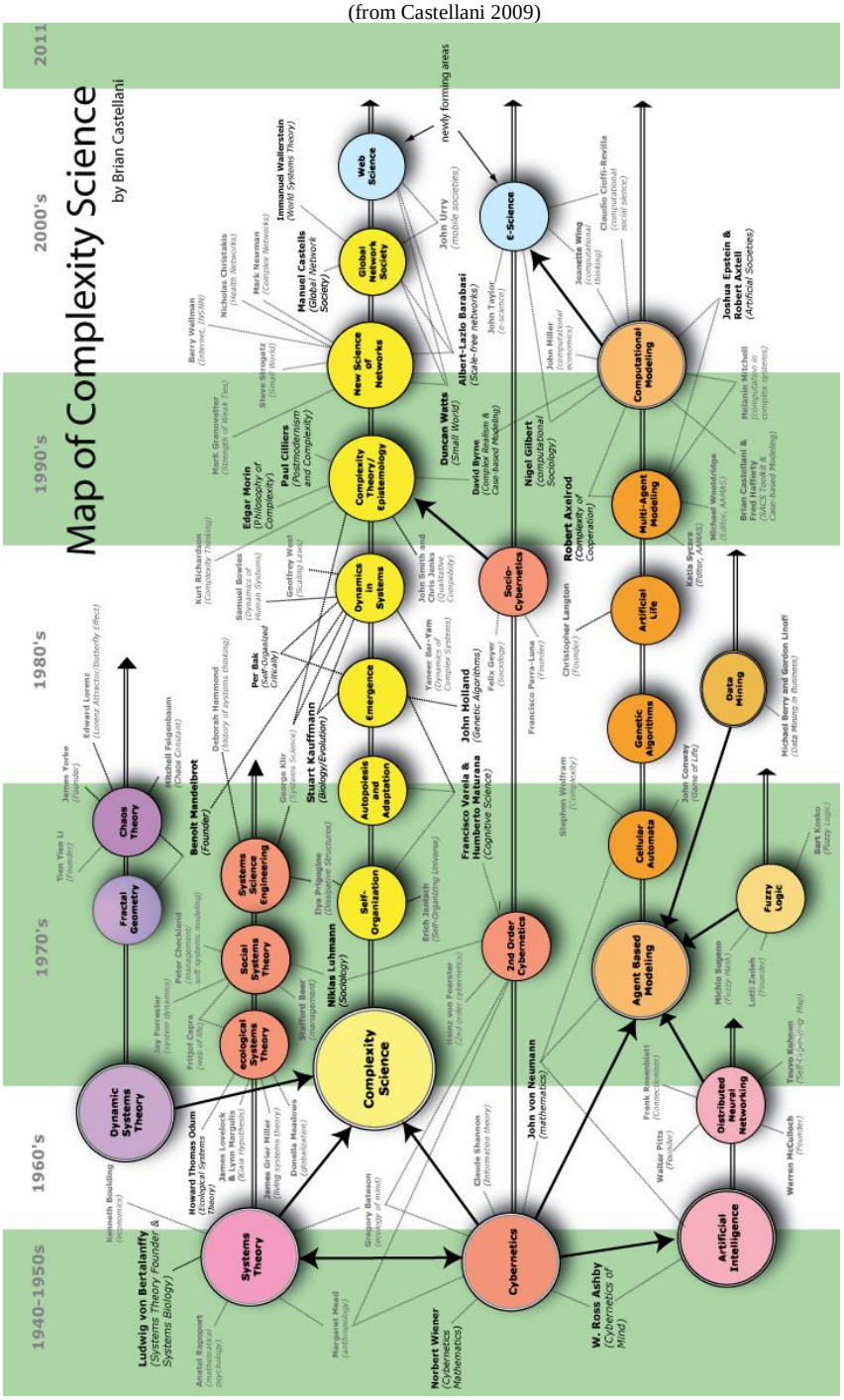


Figure 6: Epistemological Schools

(amended from Hjoerland 2002)

Empiricism	*Rationalism*	*Historicism*	*Pragmatism*
Relevant: Observations, sense-data. Induction from collections of observational data. Intersubjectively controlled data.	Relevant: Pure thinking, logic, mathematical models, computer modeling, systems of axioms, definitions and theorems.	Relevant: Background knowledge about pre-understanding, theories, conceptions, contexts, historical developments and evolutionary perspectives.	Relevant: Information about goals and values and consequences both involving the researcher and the object of research (subject and object).
Non-relevant: Speculations, knowledge transmitted from authorities. "Book knowledge" ("reading nature, not books"). Data about the observers' assumptions and pre-understanding.	Low priority is given to empirical data because such data must be organized in accordance with principles which cannot come from experience.	Low priority is given to decontextualized data of which the meanings cannot be interpreted. Intersubjectively controlled data are often seen as trivia.	Low priority (or outright suspicion) is given to claimed value-free or neutral information. For example, feminist epistemology is suspicious about the neutrality of information produced in a male dominated society.