Afterword: Ontological, Epistemological and Sociological Dimensions of Domains

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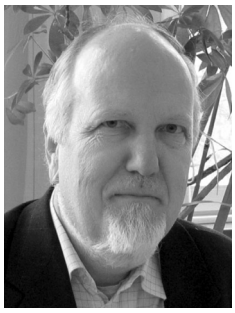

Hjørland, Birger, and Jenna Hartel. (2003). **Afterword: Ontological, Epistemological and Sociological Dimensions of Domains.** *Knowledge Organization, 30(3/4).* 239-245. 30 refs.

ABSTRACT: Domains are basically constituted of three kinds of theories and concepts: (1) ontological theories and concepts about the objects of human activity; (2) epistemological theories and concepts about knowledge and the ways to obtain knowledge, implying methodological principles about the ways objects are investigated; and (3) sociological concepts about the groups of people concerned with the objects. There are complicated relations between these elements. Basic theories about those relationships are, for example, forms of philosophical realism and social constructivism. In this paper these concepts and theories are introduced, and their implications for knowledge organization outlined, with illustrations drawn from this special issue of *Knowledge Organization*.

Ontological dimension

Ontology has been defined as "the science of what is, of the kinds and structures of objects, properties, events, processes, and relations in every area of reality" (Smith, 2004, 155). Theories of ontology imply assertions of what constitute the world and its objects. Ontological theories describe or explain reality and how it is structured. If, for example, one believes in the existence of God as something different from the material world, then God and the material world form different areas or dimensions of reality. Ontology is closely related to metaphysics (some authors define them in an identical way, other authors make some distinctions). Ontology and its cousin metaphysics got a bad reputation during the positivist period of influences. Today ontology has regained its status as an important field both in its own right and in relation to the construction of ontologies in computer science, which function in a similarly organizational capacity as classification systems in library and information science (cf. Soergel, 1999). Metaphysics and ontology should not be taken just for issues related to God or other religious entities. These concepts extend beyond mysticism or superstition to engage important questions in every field of science, e.g., to the question of whether social science phenomena can or cannot be reduced to psychological phenomena. It has been argued that the attempts of positivism to avoid metaphysical and ontological issues resulted in a complex system of assumptions of the kind it was meant to avoid. We cannot go into details here, but we want to say that attempts to avoid ontological issues in science were counterproductive. Science stands to benefit by raising difficult questions about the kinds and nature of its objects of study. It should be said that ontology is not just *a priori* philosophical speculation. The chemical and physical discovery that everything in the world consists of about 100[1] chemical elements is probably the most important advancement in our ontological knowledge. Important ontological theories are, for example, the many versions of idealism, constructivism, materialism, nominalism, phenomenalism and realism.

An introduction to ontological problems in many domains such as chemistry, music and psychology can be found, for example, in Burkhardt & Smith (1991). When issues of ontology are addressed within domains, it often involves explication of terms like these:

– "areas"
– "domains"

– "elements"
– "fields"
– "kinds"
– "objects"
– "problems"
– "subject matter" ("substance" / "substantial differentiation")
– "topics"

Epistemological dimension

Epistemology is the study of knowledge and how to obtain knowledge, e.g., the roles of observation, theoretical analysis, languages, traditions, sex and values in the production of knowledge. If knowledge is defined, following Plato, as "verified, true belief," then knowledge must reflect parts of reality. Knowledge is true if there is a correspondence between a claim and reality. Knowledge (and science) is seen as a verified system of true claims corresponding to reality. The implication is that our knowledge (as represented in scientific literature) should map ontological structures.

Today, however, the general tendency among scholars is skepticism regarding scientific literature as verified true belief. It is far more common to believe, as did Karl Popper, that science produces theories, which are subject to revision by other scientific theories. Science is not cumulating "facts" but is trying to construe better theories. There are today different theories about the (best) methods to attain knowledge. Different epistemologies have different views about the roles of, for example, observation, theoretical analysis, languages, traditions, sex and values in the production of knowledge. Among the epistemological theories discussed in standard encyclopedias such as *Routledge Encyclopedia of Philosophy* (1998) are:

– [Social] Constructivism
– Critical rationalism (Karl Popper)
– Critical theory
– Eclecticism
– Empiricism
– Epistemological anarchism (Paul Feuerabend)
– Feminist epistemology & Standpoint epistemology
– Hermeneutics
– Historicism
– Marxist philosophy of science
– Paradigm-theory (Th. Kuhn)
– Phenomenology
– Postmodernism and poststructuralism
– Positivism
– Pragmatism
– Rationalism
– Social epistemology

Epistemology is of course a complicated field to enter. It seems, however, to be very important for library and information science, and is a central concern of domain analysis. To illustrate this, Hjørland (2002b) outlines four basic epistemologies and their varying expression in a matter that shapes information phenomena, "relevance."

This figure is of course a simplification of the complex field of epistemology. It provides, however,

Figure 1 (Hjørland, 2002b, p.269)
Simplified relevance criteria in four epistemological schools

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.

a basis for understanding some of the primary epistemological positions and their undeniable influence on the work of library and information science. The chart could be extended to illustrate the determinative force of epistemology not just on relevance, but on other matters in LIS such as classification systems, genres, and documents.

There are connections between ontological and epistemological assumptions. Classical empiricism maintained that all knowledge derives from the senses. If taken seriously (as did Berkeley and Hume), the implication is called phenomenalism: that only observations exist. From this view, talk about any reality beyond sense impressions is talk about the unknowable and hence unnecessary and unscientific. Consequently, empiricism can be taken to an extreme ontological view known as "subjective idealism" or "solipsism." In this perspective the only thing that really exists is in one's own mind, all other things are subjective constructions. This may seem strange to many readers, for normally empiricism and positivism are seen as realist theories that assert the existence and primacy of the physical world. This is, however, not the case. [This afterword is not the place to go deeper into this issue. Readers are referred to Hjørland (2004a) for further information about this question.] The point is (surprisingly) that empiricism and positivism implies ontological views related to anti-realism.

> Key positivist ideas were that philosophy should be scientific, that metaphysical speculations are meaningless, that there is a universal and a priori scientific method, that a main function of philosophy is to analyze that method, that this basic scientific method is the same in both the natural and social sciences, that the various sciences should be reducible to physics, and that the theoretical parts of good science must be translatable into statements about observations. In the social sciences and the philosophy of the social sciences, positivism has supported the emphasis on quantitative data and precisely formulated theories, the doctrines of behaviourism, operationalism and methodological individualism, the doubts among philosophers that meaning and interpretation can be scientifically adequate, and an approach to the philosophy of social science that focuses on conceptual analysis rather than on the actual practice of social research. Influential criticisms have denied that scientific method is a priori or universal, that theories can or must be translatable into observational terms, and that reduction to physics is the way to unify the sciences. These criticisms have undercut the motivations for behaviourism and methodological individualism in the social sciences. (Kincaid, 1998).

We see that there have been connections between positivism (an epistemology) and ontological views; that social reality may be studied via individuals, thus reducing and limiting the meaning of the term "social" (cf. Danziger, 2000). In other words, in an attempt to live up to some beliefs, ideals or ideologies concerning scientific methods, positivists have tended to reduce their ontological understanding of social phenomena.

How various epistemological views influence the definition of a domain, its culture and practices, and its information forms is clearly demonstrated in Ørom's and Abrahamsen's papers in this issue. Abrahamsen (2003) states:

> Each paradigm tends to develop, to some extent, its own terminology, its own system of periods, its own system of musical genres, as well as its own theoretical view on the causes that have formed the history of music, the functions that music have, the value of different kinds of music, what music is considered worthy of study and – in the end – different definitions of what music is.

This quotation may be interpreted as a kind of anti-realism, that researchers construe their own objects. Hjørland (2004), however, defends a version of realism based upon, among others, an interpretation of a statement by Thomas Kuhn (1970). While Kuhn emphasized how our ontologies are implied by our theories and paradigms, he nevertheless pointed out that we cannot freely invent arbitrary structures: "nature cannot be forced into an arbitrary set of conceptual boxes. On the contrary . . . the history of the developed sciences shows that nature will not indefinitely be confined in any set which scientists have constructed so far" (Kuhn, 1970, p. 263). The world provides "resistance" to our conceptualizations in the form of anomalies, i.e., situations in which it becomes clear that something is wrong with the structures given to the world by our concepts. In this way Kuhn's view may be interpreted as (pragmatic) realist, although he is often interpreted as anti-realist (e.g., Niiniluoto, 1991).

Different epistemologies are connected to the different schools of thought that populate academe. The following list of terms may be considered helpful as query terms for locating epistemological issues in domains:

- "approaches"
- "metatheories"
- "movements"
- "paradigms"
- "philosophies" (of discipline X)
- "regimes" (e.g., treatment regimes)
- "schools" (of thought and research))
- "systems" (of thought and research)
- "traditions" (academic)
- "trends" (in a field)
- "views" ("points of view")

Epistemological dimensions may be uncovered by studying historical developments in a domain (as Hjørland, 1998 and Ørom, 2003) or they may be uncovered and visualized by bibliometrics (Chen, 2003; Hjørland, 2002b). Attempts to classify a domain in knowledge organization without considering how different "paradigms" have considered the field may be problematic. Tennis (2003) demands that

> the notion of *domain* must be defined in a transferable definition – one that can be used by more than one researcher, to allow for a shared understanding of what the object of domain analysis is. Thus a domain analyst must provide a standardized definition of a domain, a definition that is easily understood by other domain analysts.

However, while it seems easy to select one "turn-key" definition of a domain, such a definition will always be more related to one view or paradigm, and relatively unsatisfactory for other paradigms. In our view, quality research in the spirit of domain analysis should begin with a high-level interpretive study of a subject or community of interest. An early requirement is to uncover the interests underlying different conceptions of that area and then negotiate for an ideal definition of the domain. In this process, the researcher entertains various contemporary notions of the domain, as well as their recent histories, before coming to a conclusion of the domains substance and boundaries. Ørom's article in this issue is an illustration of this approach. He did not start by defining art, but considered different conceptions of art. Although his own view is related to the materialist view, he carefully describes other definitions as well. Any attempt to bypass such analysis by direct empirical or logical studies is a kind of positivism based on a naïve realism that confuses phenomena with reality. People in general, as well as researchers, tend to find the dominant view as the natural and the only possible or serious view. It is important to consider different horizons. What we are claiming here can be seen as a kind of hermeneutical approach to ontology and to the research process: That the most informed way of construing ontologies is by the fusing of horizons, considering the different views of the field (cf. Fonseca & Martin, 2004).

Sociological dimension

The third dimension is about the groups of people working with some objects by applying some approaches. This dimension may be expressed by concepts such as:

- "disciplines" (of research, of teaching)
- "subdisciplines"
- "discourse communities"
- "epistemic communities"
- "professions"
- "specialties"
- "social system of science"
- a variety of everyday life collectives (i.e. "hobbies," "amateurs," "enthusiasts")

Disciplines are educational units as well as organizational units in universities and also an important organizing factor among publications such as journals. Disciplines and professions are social divisions of labor. They are very often competing, while a given classification is often the result of stronger disciplines and professions dominating weaker ones (cf. Hjørland, 2002a, p.427). In this issue Sundin (2003) emphasizes such professional aspects and draws on theory of professions.

The sociological dimension is central in domain analysis, as revealed in the formulation by Hjørland & Albrechtsen (1995. p. 400): "This approach [domain analysis] states that the most fruitful horizon for IS is to study the knowledge-domains as thought or discourse communities, which are parts of society's division of labor." The structure of social domains is explored by Mattei Dogan, who finds that few researchers today master a whole discipline while the important units are the specialties, which are very

often cross-disciplinary: "There is more communication between specialties belonging to different disciplines than between specialties within the same discipline" (Dogan, 2001, p. 14852). He also states that specialties are constructed "along substantive, epistemological, methodological, theoretical, and ideological lines . . .The division of disciplines into specialties should be distinguished from their fragmentation into schools and sects. The term 'school' refers to a group of scholars 'who stress a particular aspect' (Dogan, 2001, p. 14852).

The dynamics of specialties and disciplines is addressed by Tengström (1993 p. 12), who emphases that cross-disciplinary research is a process, not a state or structure. He differentiates three levels of ambition regarding cross-disciplinary research:

1. The "Pluridisciplinarity" or "multidisciplinarity" level
2. The genuine cross-disciplinary level: "interdisciplinarity"
3. The discipline-forming level "transdisciplinarity".

What is described here is a view of social fields as dynamic and changing. Library and information science, for example, can be viewed as a field that started as a multidisciplinary field based on literature, psychology, sociology, management, computer science, etc., which is developing towards a discipline in its own right. This might illuminate what Albrechtsen & Mark Pejtersen (2003) say about the work centered design approach, which focuses on the actual dynamics in a work situation for the construction of classifications based on the "deep semantics" of the work group. Such work groups may be seen as more or less multidisciplinary, interdisciplinary or transdisciplinary fields, and their "deep semantics" should reflect the actual stage of development of the work group. In the pluridisciplinary stage the semantics should reflect the different disciplines from which the team has been recruited. In the transdisciplinary level, a new semantic structure has possibly evolved.

Whitley (1984) named his book *The Intellectual and Social Organizations of the Sciences*, implying that there are two different ways of organizing sciences. We might say that an ontological principle constitutes an intellectual way of organizing knowledge, while a sociological principle constitutes a social way of organizing knowledge. A biological taxonomy and the periodical system of chemical elements are examples of intellectual knowledge organization based on scientific theories. They are not reflecting social structures (although some social constructivists might claim an indirect social influence even on such systems).

In library and information science, disciplines have often been used as organizing units in classification. As stated in the DDC:

> .. A work on water may be classed with many disciplines, such as metaphysics, religion, economics, commerce, physics, chemistry, geology, oceanography, meteorology, and history. No other feature of the DDC is more basic than this: that it scatters subjects by discipline (Dewey Decimal Classification, 1979, p. xxxi).

The importance of this principle is discussed in Hjørland & Albrechtsen (1999). Another view regarding the importance of the social dimension has been put forward by Jesse Shera:

> *Thus it is the external relations, the environment, of the concept that are all important to the act of classifying.* A tree is an organism to the botanist, an esthetic entity to the landscape architect, a manifestation of Divine benevolence to the theologian, a source of potential income to the lumberman. Pragmatic classification, then, denies the existence of the "essence" of the tree… (Shera, 1951, p. 85, emphasis in original).

Given the importance of disciplines and other social organizations as units of knowledge organization, it is strange that this perspective is almost totally absent in knowledge organization. There are no attempts to list the disciplines or to describe trends in their developments as a basis for designing and updating classifications.

The relation between ontology and sociology is considered in theories of realism and social constructivism. Both positions exist in many versions. The extreme version of social constructivism maintains that the world is a social construction (i.e., ontological antirealism). The realist position claims the opposite: that the world exists independent of human minds, and that the scientific theories and the social organization of the sciences cannot be freely constructed because the world provides resistance to human conceptualization. Human knowledge is thus a product of both the world itself and of human interests and capacities. It may be the case that different kinds of sciences may be more influenced by ei-

ther the world or by human interests. If we compare the development of computer science with the development of library and information science (LIS), it looks as if the founders of computer science (such as Church, Gödel, Kleene, Post, and Turing) discovered principles which established not only computer science and the computer industry, but a new organization of society (globalization, outsourcing, etc.). LIS on the other hand seems to be based on the social institutions of libraries and library schools. Its content seems much more "constructed" to fit the professional interests of the library profession (e.g., the construction of cataloging rules). Particular professional groups use research methods and epistemologies to construe knowledge of importance to that profession.

Another example of a combination of a specific group of people and a specific epistemology is the existence of specific national traditions in some fields (cf. Crothers, 2001). Regional traditions are important to consider in information science.

Conclusion

It is critical to realize that domains are dynamic. Knowledge production and knowledge organization are not just about the addition of new elements into a pre-established classification. As knowledge develops and evolves, the view of structures of the world and the relations between different concepts changes symbiotically. Parts of the world that were previously regarded as unconnected may suddenly turn out to be strongly related. In this way, ontological theories change as conceptual and social structures (e.g., by the development of new interdisciplinary fields) change. It is an old rationalist dream to uncover the structure of the world as well as the structure of our knowledge in an *a priori* way, once and for all. This is related to the dream of a perfect language and perfect systems of knowledge organization. Few people today regard this dream as based on solid grounds (cf. Eco, 1995). The implication for library and information science and knowledge organization is that studies of domains should consider the complex interaction of ontological, epistemological and sociological factors influencing the development of fields of knowledge.

Note

1 The exact number of chemical elements is unknown as new elements are still discovered in physical laboratories. Claims for elements 113 (ununtrium) and 115 (ununpentium) were made in February 2004. Such new elements are very unstable and live for a small fraction of a second. Everything on earth outside physical laboratories consists of less than 100 elements.

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