Epistemological dynamics in scientific domains and their influence in knowledge organization

Abstract
Scientific specialties are influenced by socio-cultural contexts. This influence is not homogeneous but, on the contrary, it varies depending on the specialty. The context can affect the theoretical and epistemological development of a scientific domain and, as a result, it may condition not only a robust, consistent theoretical framework but also good practice. Knowledge organization (KO) should be concerned with this situation and should consider these parameters for knowledge organization systems (KOS) design in order to create structures closer to reality. By doing this, there are possibilities to detect and avoid representing possible epistemological and theoretical biases in KOSs. As an example of what has been said, this paper take two domains: psychiatry and information science with emphasis in KO.

1: Introduction
Scientific specialties, understood as discourse communities, have a social dimension. This characteristic favours the interaction between socio-cultural contexts and sciences. Nevertheless, it was noted that this interaction varies depending on the specialty in a way that, in some instances, it significantly influences not only the development of theories generated within the fields and practice, but also the development of their own epistemology. Given this situation, there is a need for studying how scientific specialties are built and how they grow regarding external circumstances, because, depending on the case, this interaction may condition theoretical development. An evidence of this need could be the case of specialties whose theoretical corpus do not give satisfactory answers and/or do not globally explain the scientific field. Less consistent theories that live together in a given specialty without constituting a coherent theoretical body could be another sign of this (Hjørland 2003; López-Huertas 2008). Therefore, it is interesting to find out how external changes interact with theories within a particular specialty and to what extent a scientific domain is affected by those changes. On the other hand, it is interesting to study the nature of this interaction because, depending on this and the reflexivity on this fact, it may benefit scientific development to a greater or lesser extent. Science has always been influenced by society somehow.

Since the beginning of last century, a special concern in the contextualization of science has been developed. This is an increasing trend that nobody can discusses nowadays. One of the most obvious manifestations of this interest has been and continues to be the production of inter- and trans-disciplinary knowledge as a result of a specific kind of interaction between science and society. By saying that science interacts with society we mean the capacity of science to communicate with societal demands and the response of the former by producing contextualized knowledge to these demands. It means a two-way interaction in contrast to the traditional model that it is one way, usually from science to society. According to some authors, society is changing to what they call “Mode 2”, as opposed to “Mode 1” which represents the traditional disciplinary environment regarding society (Gibbons et al. 1994). There are several ways of interaction between science and society that go from weak to strong, having also the possibility of being middle ranged. According to this tipology, we may
have weakly, strongly and middle ranged contextualized knowledge (Norwotny et al. 2001).

By studying the nature and intensity of the science-society interaction, it could be possible to identify which are the domains more affected by these circumstances, to look at their theoretical foundation and to evaluate its response in the development of the field, and finally, to have a further foundation for the design criteria of KOS. Domains with high or low external impact can be identified and this parameter could also be considered as a design feature for KOS. At the end, we are talking about a metascience that cannot ignore “the sciences you are studying. Metascience is an interpretation of what good science is, based on the history of science” (Hjørland 2008). For this reason, external circumstances affecting specialties are also of concern to knowledge organization (KO). Theoretical construction of specialties and epistemologies should consider external interactions as well. Even more, it is first necessary to reflect on this interaction. This approach is in outright opposition to a reductionist, objective view. On the contrary, it should be seen as a complex conception of reality and of knowledge production.

This paper is devoted to analyzing two fields where the impact of external circumstances is considerable: LIS with emphasis in KO (Hjørland 2003; McIlwaine 2003; López-Huertas 2008) and psychiatry (Belloch 1995). There are two issues of special interest to the aim of this paper: the kind of interaction between each specialty and society, and the role of reflexivity on the interaction process.

2: KO and LIS
The last two decades have been a period of time where claims put forward by different specialists pointed to the theoretical problems detected in the field of KO and LIS. This is a trend that has been increasing over time until our days where there is a quite common feeling that is this a major research problem to solve. Besides personal positions and argumentations, some merging points can be detected in the publications: lack of theoretical coherence, theoretical weakness, a lack of well articulated body of theories and methods, a lack of novel theories that take to revisit and to reformulate basic questions in KO. As a small example, we can tell that subject (Hjørland 2001), KO (Smiraglia 2005; 2006; Dahlberg 2006; López-Huertas 2008) and concept (Dahlberg 2009) are old subjects that have been revised lately. To stress a little more this situation, it has been found that the term subject is a “totally empirical form and therefore do not configure a terminology specific to the area” (Kobashi et al. 2002, 83) although being a central concept in the field. This claim also points to the problematic situation of terminology in LIS, that we understand is in relation to its conceptual and theoretical foundations problems.

Two main issues that are influential in this state of affairs are the following: (1) the strong impact of external environments, in this case technology (Hjørland 2003) as the most visible one, and (2) the fact that KO and LIS are interdisciplinary (López-Huertas 2008). We see both aspects very much interrelated.

1. The five technology-driven stages considered as foundation of KO (Hjørland 2003) cause an effect of jumping from one platform to another without generating enough research to produce “new” basic knowledge. He concludes that the overall panorama is not a satisfactory circumstance for a discipline with the ambition of being a
science, as these stages do not define a cumulated fund of findings, theories or principles. On the contrary, they are often latent, conflicting views between those stages. As a consequence, the field is lacking any well articulated set of theories, and shows an absence of communication among the different viewpoints. This opinion is argued by others when they say that this situation is a shortcoming in information science (IS) as a specialty (Hirschheim & Klein 2003).

2. Interdisciplinarity of KO and LIS is an issue that has general consensus, but that has not yet been studied in depth. A further reflection on this point can be found in López-Huertas (2008). It is a fact that interdisciplinary fields show problems related not only to conceptualizations and terminology, but also to theoretical coherence and epistemology in general. So, we do recognize heterogeneity but we have not get integration yet. We all argue that there is a lack of integration of theories/paradigms merging from outside specialties. At this point, two questions arise: can we say we have a truly interdisciplinary field without this integration to happen? Will it be the case that we are focussing our field from a disciplinary point of view, so we cannot get integration?1 Some answers to those questions could be found moving toward what has been called Mode 2 knowledge production (Gibbons et al. 1994; Norwotny et al. 2001; Gibbons & Nowotny 2001). The new production of knowledge is characteristic of what they call Mode 2 society, which is characterized by “pluralism and diversity and also volatility and transgressivity” (Norwotny et al. 2001, 21). For instance, the State is undergoing deep transformation, the market concept describes now a wide range of activities (social, political, cultural, etc.), even it has invaded intimate domains. Culture has become a transgressive arena that, insulated form poltics and market, has become part of both. The State, market and culture have become fuzzy categories, science too has become fuzzy “because its success has pushed it into ever more contextualized and contextualizing arenas” (Norwotny et al. 2001, 29). These authors argue that, in Mode 2 society, there has been a change in the mode of knowledge production: knowledge is now produced in the context of application. This new knowledge is characterized by inter/transdisciplinarity, heterogenity, organizational diversity, social accountability, reflexibility and integration, quite opposite to Mode 1 production of knowledge, disciplinary oriented (Gibbons et al. 1994). If we accept that this change has taken place, science should react to this new setting and be reflexive about what is happening; even disciplines should be sensible to this situation. In fact, a trend towards a greater interdisciplinarity of disciplines has been observed in some instances, as reported by Ørom (2003) for the field of arts. Knowledge coming from this approach is produced by first having a context of application as a result of the two-way interaction between science and social demands, then recognizing the actors needed to solve the problem at hand who might come from different sectors, not only from the scientific one. From here on, there should be much communication and interaction and implication among actors in order to get an integrated design. Without this integration nothing can be started, because heterogeneity should be solved before starting reseach, before action. Methodologies, theories, etc., should be agreed beforehand. The knowledge produced in this way is integrated.

In several instances, it has been argued that classifications should take into account the theory of sciences, in special the epistemological dynamics of a given domain (Hjorland 2005). Being this point very important when designing a KOS, it seems not to
be enough in specialties where the epistemology is not given satisfactory answers. A further step is needed in order to find out what is missing, in this case it could be integration that may need new ways to approach research problems, as we indicated earlier. It could be that the lack of awareness of the need for reflection on the interaction with society, in the way that has been said, may take to the production of knowledge not oriented toward the solution of issues directed at solving problems raised by the specialty. This situation can prevent the generation of theoretical models necessary for the normal development of the field. As a result of the above, KOS reflects, in the best case, this conflict that the study of theoretical models cannot avoid, because these are the problematic parts of it. So, to categorize KOS epistemological problems worsens the situation even more. Other questions merge now: should KO simply be committed to study the paradigmatical environment of sciences in order to create contextualized KOS, or should it go beyond that? Should KO be also sensible to this situation and go a little further, in order to detect paradigmatical problems and to put some light on it before constructing KOSs?

3: Psychiatry

Psychiatry, knowledge halfway between the empirical sciences and the humanities with a strong technoscientific tinge, reflects in a privileged manner the challenges facing KO. To think that it can be conducted in a theoretical way, without taking socioeconomic and cultural contexts into consideration, is a naive position which increases the difficulty and complexity of psychiatric practice and research. To that effect an epistemological change is necessary to overcome this alleged atheoretical situation and to help to define precisely the proper object of study of this discipline, since we find a complex set of models, concepts and approaches without much internal coherence when defining what is psychopathic\(^2\). From this approach, KO cannot forget that the concepts and the categories constructed are merely optional and provisional tools in order to guide observation and interpretation of the natural world. Classification does not find its objects, but produces them since they are historical. In the same way, concepts and criteria we use are the result of a long elaboration over time. In this sense, the concept of mental illness is quite recent, but not so the concept of madness or possession that seems to have always existed. The conceptual burden that each word is adding to its semantic field is defined by a complex system of relationships composed of different social, historical, cultural and economic factors that passes through. The organization of knowledge cannot remain indifferent to this reality and, even worse, not to make it clear. Not avoiding this situation means to fall into serious mistakes that question the scientific validity of any research. Scientific progress is only possible from the interaction between conceptions and models that face one another, in an attempt to explain a fuller and deeper understanding of reality. This puts us in an epistemic scenario marked by a climate of uncertainty, which makes you feel the pressure of an emerging paradigm shift in order to respond to questions previously raised. We can not keep on thinking new developments with old organizations of concepts and categories\(^3\). It is necessary to build and revise, from a critical reflection, the language that set the various narratives about the mental. These narratives do not emerge outside a particular world view. These and the concepts that articulate them are not neutral. Behind every one of them, a complex set of goals hides, that are intended to establish some form of
bridge between the beliefs (prejudices) dominant at any given time and a few facts. Changes occur only by the construction of more plausible explanations with the sociocultural moment (Magaro 1976). That is why the images or referents or symbols that a society will understand as human will be crucial in constructing images of the psychopathological (Belloch 1993). There are therefore a need for more complex paradigms and new epistemologies that explain that. As a consequence, the criteria that underpin the organization of knowledge can be recalibrated by starting from questioning the epistemological basis, namely, the depletion of our classical, conceptual apparatus which is characterized by its centrality in the objectivity, determinism, testing, experimentation and the principle of causality, eliminating the uncertainties and chaos. This position is insufficient and inadequate for approaching problems that occur in a heterogeneous, multireferencial and paradoxical world.

For this reason, a carefully new reading of the sources, from where the organization of knowledge is built, is needed. Even more, it is imperative to highlight the criteria on which knowledge is constituted and organized. KOSs are epistemological tools that allow to understand the complexity of discourses and the difficulty of representing and grouping scientific theories. In doing so, they should not forget that a previous, supposedly objective interpretation exists, which conducts the science within the margins of the dominant culture. KOSs are artificial abstractions that have created categories in specific historical moments, that may need be broken despite the vertigo that this might generate. Only under this perspective transexuality, a sexual identity disorder which has grown from a serious delusional symptom to be treated as an appendage of our individual rights, can be understood. KO cannot remain indifferent to this need, much less construct itself ignoring it. It is in this process of enrichment and conceptual articulation where its pragmatic purpose lies.

4: Conclusions
This exploratory study has shown some weakness in two important aspects that are interrelated and affect KO much: epistemological problems in the analized domains, and a lack of awareness of KOSs with respect to this situation.

These domains are of different kinds (disciplinary and interdisciplinary) but they show similar epistemological behaviour, although the causes of this common pattern of behaviour are slightly different: in the case of KO and LIS, a lack of integration of theoretical models and a slow theoretical growth. In the case of psychiatry, the existence of a linear, dominant, reductionist theoretical model to approach the object of study. Epistemology should consider the complexity of the reality that it interprets and explains.

In both cases, there is little interaction between the production of knowledge and external circumstances, societal demands. It is known that they exist, but there is not any reflective attitude towards them that causes a change in models and methods to produce new knowledge. This dynamic prevents, as a consequence, an adequate scientific growth and practice.

LIS and KO should look for research methodologies capable of producing integrated knowledge, as it was previously said. KO and KOS designers should explore in a reflexive way the impact of external circumstances on the knowledge domain that will be represented and organized, trying to identify the bias that such a domain might have.
This aspect should be considered as a criterion for KOS design and construction. KO cannot ignore this factor. It cannot be forgotten that a weak interaction between external circumstances and knowledge production adversely affects epistemological development and good science.

Notes
1 Gatten (1991) argues that scholars are becoming increasingly interdisciplinary in their approach to research, but traditional structures of knowledge within the social sciences may limit their ability to view a phenomenon in its entirety. His conclusion is that interdisciplinary research into the applied disciplines of librarianship is inhibited by the paradigms that exist in the field.
2 No criterion separately is enough to take it as a reference point for determining the object of psychopathology. Not all models are of the same degree of scientific, coherence and explanatory and predictive power of abnormal behavior.
3 Related to the mental, what do we talk about when referring to the pathological? We talk about disorder, illness, inadaptation, disfunction…; we talk about something purely biological, social, moral, cultural, and even economic or politic. Psychiatry has adopted a linear vision regarding the pathological. It considers mental illness as an altered brain function leading to social inadaptation, to an alteration of behaviour. The problem arises when we appeal to a cerebral localization nonexistent in most cases. This takes us to a problem to be solved: if no disfunction, no symptoms; if no symptoms, how to talk about disease?

References
Cooper D., 1972, Psiquiatría y antipsiquiatría, Paidós, Buenos Aires.
Gatten J., 1991, Paradigm restrictions on interdisciplinary research into librarianship, College and research libraries, 52, n. 6, p. 575-584.


Ørom A., 2003, Knowledge organization in the domain of art studies: history, transition and conceptual changes, *Knowledge organization*, 30, n. 3-4, p. 128-143.

