The complexity challenge
A contribution to the epistemological reflection regarding information science

Abstract
An epistemological reflection regarding information science (IS), aiming to better understand its development as a science, in order to promote the area identity construction as well as the recognition of essential concepts to accurately specify the “being” and “making” of IS. Following such perspective, at first, a study on concepts of terms such as epistemology and science was carried out. The genesis and development of the area was revisited as well as some concepts generated throughout its development were identified. The epistemological reflection, itself, initially considered a positivist approach to science, because, according to some authors, this is the starting point of IS to build up its theoretical and methodological groundings. The shortcomings of positivist models showed, however, that the research problems of IS must be thought in the inherent complexity of the broader field that it is part of – the social sciences. Thus, Edgard Morin’s complex thought was explored aiming to find alternate ways to better understand the field. Complex thought contributes to strengthen IS field research, because this approach proposes the “connection and the reconnection” of things that make the whole picture, based on the very term complex, which means “something which is inseparable”. Therefore, a theoretical reflection on IS, based on the concept of complexity, according to Morin’s proposition, strengthens the necessary interdisciplinary dialogue in the contemporaneous science.

1: The importance of epistemological reflection
The main goal of this study is to make an epistemological reflection regarding information science (IS), trying to better understand its development as a science field. It is believed that such reflection may promote the area identity building-up as well as the establishment of the necessary concepts to clearly define the “being” and “making” of IS, so that it may conquer its true “role” as a scientific field (Rojas 2008). A conceptual body would perfect the way IS deals with other disciplines, since it would display its theoretical limits more clearly, preventing discomfort caused by invasion or noncritical appropriation of knowledge coming from other areas.

Before starting to present this very epistemological reflection regarding IS, it is necessary to define the words epistemology and science, in order to better structure this paper.

Epistemology, according to Rojas (2005), is a specific field in philosophy that has the reflection over scientific knowledge as its study subject. Therefore, an epistemological reflection requires a philosophical doctrine. Its function is to question reality in order to find the true meaning of being and the reality that surrounds the being and its making. It also requires a methodic and reflective study over the science in study, including its organization, formation, development, functioning, procedures and intellectual products, as stated by Japiassu (1986).

When it comes to the term science, Edgar Morin (2005) points out that it is nowadays an everchanging activity, one that follows the ethics flow of modern life and the human beings themselves, and it is almost impossible to predict the future. Then, science is an adventure, one that goes on in the real world, though – while reality is the owner of the basic elements for its very existence.
Scientists believe, even before unpredictability, that science systematizes the building-up process of the scientific knowledge and, to do so, effective supporting elements are necessary. This way, Lakatos (apud Rojas 2005) states that knowledge building-up happens historically, by means of an investigation program, one that requires the following supporting elements: a theoretical background of general laws, defined concepts, study objects and hypotheses.

These elements are essential to carry out strict investigations. The vision of science, stated above, allows us to say that the epistemological reflection regarding IS is necessary, mostly when we take into account that it is a brand-new evolving science, with a history focused on few practices that have to do with services to the use and storage of informational registers. Its structure, as a scientific discipline, requires a systematic analysis of the usefulness of procedures followed in order to produce scientific knowledge.

Since it is a recent science, it is a consensus the idea that IS is still on the stage of identifying its own theoretical limits; it does not have any specific paradigm and, consequently, there is no social scientific activity decided. In other words, IS is an area that does not have a common research objective shared by researchers. Kuhn (2001) calls such stage pre-science, one that does not have a language of its own yet, not to mention that its ontological, theoretical and methodological hypotheses are slightly precise.

To better understand the reality in the area, we shall go back to its origins. Rojas (2005, xiv), states that “the characteristics of the historical development (of the area) were always related to practice” and library science-related knowledge, those directed to “the use and register of information, which came out linked to the specific processes of writing invention”. Therefore, library science started based on ideas related to the perception of library as a social organization, selecting as priority action objects register and retrieval of bibliographical stocks, by means of classification and logging of documents (Mostafa 1994, 35). Placing the questions related to collections organization as central concerns, library science, again and again, did not show attention to aspects related to informational flow and the cognitive appropriation of information, in order to produce knowledge.

The idea that library science and IS are very similar, although they constitute knowledge fields oriented by distinct paradigms, is shared by plenty of authors, as literature shows (Miksa 1991; Mostafa 1994; Saracevic 1996; Pinheiro 2002). And, as for library science, a field linked to the idea of public service, IS started due to pragmatic demand of an epoch: the necessity to generate knowledge and methods in order to allow more accurate analysis of phenomena related to organization of documents and the use and handling of the information in them. Thus, IS research objects are strictly related to finding ways to study the flow and appropriation of information in different spaces (Rojas 2005).

It is clear, though, that IS has not established its research guidelines yet. Truth is it has gathered concepts and has defined objectives randomly, sometimes with a broad point of view of the area, other times with a narrow one, as it is clear in the writings of some important authors in the area. To Borko (1968), for instance, IS has a knowledge body related to production, gathering, organization, storage, retrieval, interpretation, transmission and use of information. On the other hand, according to Goffman (1970),
IS objective is to establish a unified scientific approach to study several phenomena that cover the concept of information, such phenomena being found either in biological processes of the human existence or in machines created by mankind. Yet Mikhailov (1980, 75), following a more restricted vision, named it “informatika”, defining it as “scientific discipline that studies the structure and general properties of scientific information, as well as the regularities of every single process in scientific communication”. According to Mikhailov’s point of view, therefore, IS is a discipline mostly linked to the creation of information systems to scientific communication.

Wersig (1991) and Saracevic (1996) follow a more contemporary point of view over IS. The former states that the area “cannot be seen as a classic discipline, but as a prototype of a new kind of discipline”, and that it is has to be far from traditional conceptions regarding knowledge. Similarly, it has to outdo the conceptions proposed by classical disciplines, those that understand the changes in science conception promoted in post-modern times. Saracevic, on the other hand, defines it as a field dedicated either to scientific matters or to professional practice. Its objects would be problems related to effective communication of knowledge and registers of knowledge among human beings, in the social, institutional or individual contexts of use and need of information.

The issues above can provide an approximate idea of the difficulties met to establish guidelines that promote the development of scientific affairs in the area. According to Araújo (2006), at times, ontological and epistemological gaps prevent theorization and problemize information phenomena. Thus, it highlights not only the necessity, but also the urgency of epistemological reflection over IS, mostly in order to let it become a sensible, structured and properly defined discipline.

2: Elements for an epistemological reflection regarding information science

An epistemological reflection could be carried out through different approaches and methods, such as positivism, hermeneutics, dialectics, pragmatism, falsificationism, among others; each approach offers different answers to reflection in the area. Nevertheless, literature shows that none of them, in isolation, has the necessary range to furnish answers to IS questionings.

Positivism was a starting point for modern sciences to build up their methodological basis. By following the orientation of the nature science model, a specific method came out in social and human sciences, showing important features such as empiricism, search for objectivity, experimentation, law enforcement and prediction, aspects considered fundamental for the elaboration of knowledge around mankind and our relation in society. Yet, different from facts of nature, concrete and objective-ridden, human and social facts present more complexity, for two reasons, at least: (a) they cannot be isolated for observation in laboratorial experiments, and (b) the subjectivity of the being that researches interferes in the observations, because the last ones are not far from ideology, considered here as a system of ideas. In other words, the predictability and the precise meaning of the results are very problematic in research over social facts, what leads to the idea of objectivity and determinism, the ones that promoted the development of nature science and seem not to apply to the range of social and human sciences.
Similarly to other sciences, IS started under the orientation of methods proposed by positivism. Thus, it is possible to comprehend, to a certain extent, the criticism of the theorists of the area who compared the limits and fragilities of scientific issues of the area to the noncritical adoption of theories and methods offered by positivism (Wersig 1991; Dervin 1992; Mostafa 1999; Francelin 2003; Araújo 2006).

It is understood that the positivist approach, neutral, objective and rational since its beginning, has long benefited field research in nature sciences. Yet, human and social sciences, in general, within a positivist model, face difficulties at times impossible to explain the facts relating to society. Contemporary configurations of these sciences must be credited to the breaking up with positivism and the search for new epistemological perspectives. In the same way, positivism placed blockage to the development and consolidation of IS. Then, it is believed that research problems in IS must be thought according to the complexity inherent to a broader field it is part of – social sciences. Besides, interdisciplinary complexity must be taken into account, an aspect inherent in the production way of scientific knowledge, in modern times. However, if on the one hand, relations of solidarity and dependence between knowledge may enrich the processes of research, on the other hand, turn the choosing of theoretical references harder, the definition of methodological options and interpreting processes.

In order to overcome them, it is necessary to identify, in modern relations over science, the varieties that try to bring out alternatives to research. French thinker Edgar Morin, for example, in his reflections over science and philosophy, presents the complex thought as a new way to face the challenges of knowledge production:

“It is a trip in pursuit of a way of thinking likely to respect the multidimensionality, the richness, the mystery of reality; and the knowing that the determinations – cerebral, cultural, social, historical ones – which impose every thought, always determine the object of knowledge. It is what I call Complex Thought.” (Morin 1980, 14)

It is a conception that goes against the reductive, linear and simplifying thought, highlighting the relations of multidimensional dependency of knowledge. From this matrix on, different ways of thinking must be integrated, considering the internal and external aspects of the study object, the necessary living with uncertainty and contradiction, not losing sight of the real phenomena that surround the being, not in the sense of managing every piece of information over the mentioned phenomenon, but respecting the various dimensions that compose it (Morin 2005; Araújo 2006).

To IS, this seems to be the way to be followed, in order to break with the tradition coming from the absolutist reasoning. The area needs parameters that respect the subjectivity and the multidimensional order of its main element of discussion, information itself, an element that permeates every sector of society, whose approach needs to involve reflection from several knowledge areas, aiming to know its different faces.

Rojas clarifies such complexity in the investigation of IS when he points out that

“Para investigar en Ciencia de la información es necesario recurrir a diversas disciplinas porque el objeto de estudio es complejo, se entrecruza con otras áreas del saber. Así por ejemplo si se estudia la información, entonces se tiene que recurrir a la lógica o a las matemáticas; si se analiza el conocimiento, entonces la epistemología o la psicología son las que nos ayudarán.” (Rojas 2008)

The “complex thought” contributes to strengthen IS field research because its approach proposed the “linking and relinking” of things that make it a whole, based on
its first term, complex, that means “what is knitted altogether” (Morin 2001). How would such task be possible? Morin describes the ways to be put into action:

“The real problem (thought reformulation) is what we learned to separate so well. It is better to relearn to relink. Relinking means not only to establish a complete connection but to establish a connection that makes a whole circle. Rather, in the word relink there is the particle “re”, link again. [...] It [relinking] is a vital necessity to thinking, to the opening of human beings, especially those who need friendship and love and that, without them, feel down and die away.” (Morin 2001, 52-53)

In this context, it is possible to identify the linking and relinking of knowledge, areas and domains that can help redefine IS scientific issues, having such exercise as acquisition of interdisciplinary knowledge, including continuity of knowledge and its breaking up as well.

It is affirmative to say that several fields and lines of research, made up of post-graduation programs, follow this path. Examples of interdisciplinary approaches already consolidated may be found in studies carried out in the area of organization of information and knowledge, which find support in language and logic sciences, to build up their theoretical models. Another field to be highlighted are the social studies of science, which benefit the conjugation of bibliometrical techniques and sociological theories to produce and conceptualize the scientific activity indicators. The communication and information technologies (CITs) are also highly integrated to researches in the area. They do not only show up as auxiliary resources; on the contrary, they are knowledge that have allowed the revealing of new fields of research in IS, mainly concerning information structures to remote control. Sociological and anthropological approaches have also allowed to dive into findings over forms of institutionalization of scientific activity and power fields, the same way as information political economy has permitted to find ways to reflect on the production, distribution and consumption of information, identifying the various forms of private appropriation of a socially produced assets. If the approaches mentioned above are examples of effective interdisciplinary work, when the main point is the production of knowledge truly innovative, there are research areas that still give great support to positivist conceptions, which little contribute to the consolidation of IS as an autonomous field of knowledge production. These are areas whose epistemological turning point requires the acquisition of the sense of complexity.

3: Expected results from an epistemological reflection regarding IS

This paper aims at pointing out the importance of epistemological reflection for the development and consolidation of IS. Due to the way scientific knowledge is gathered nowadays, showing unpredictability and adventure, focusing on the fertile sharing of knowledge, it is necessary to constantly re-elaborate theories, able to embrace different theoretical fields that are interconnected in the production of scientific knowledge. It is clear that, without reflection, a science tends to repeat itself for being hard to realize the limits of the theoretical references it is based on, unable to share a critical point of view on the results obtained, yet unable to renew itself to be understood.

A theoretical reflection regarding IS, based on complexity, as proposed by Wersig, Rojas and Morin, would open the so much necessary dialogue to the scientific scene available today. Actually, by means of linking and relinking, findings coming from different fields of knowledge would be complete in this constant pursuit of truth, which
is the adventure of science. It is finally observed that Brazilian literature already has significant original contributions, as some examples highlighted here (Araújo 2006; Francelin 2003; Mostafa 1994; 1996; Pinheiro 1997), a fact that allows us to be optimistic in relation to the future of the area. It is expected that these steps, once followed by the thinkers cited above, promote not only a safer definition of IS identity, but, above all, the building-up of theoretical and methodological basis that effectively shapes itself as scientific discipline.

References