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A non-linear model of information sharing practices in academic communities

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ABSTRACT
A new model of information sharing practices in academic communities is based on Latour’s circulatory system of scientific facts, and some elements of Foster’s non-linear model of information-seeking behavior. The main proposition of this model is that information-sharing practices and context simultaneously shape each other. The proposed model supports Foster’s conceptualization of information practices as non-linear processes, but its emphasis on the interdependence between context and information practices provides a more effective means to capture complex negotiations involved in information-sharing practices. The proposition is that the major reason for nonlinearity in information practices is a continuous shifting of actors’ interests, pressures, and concerns. Capturing these dynamic relations becomes possible through this model. The model also offers a way to generate a number of research questions and hypotheses, and as such it could be a useful tool for empirical studies on information sharing in academic communities.

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1. Introduction

Talja (2002) defines information sharing “as an umbrella concept that covers a wide range of collaboration behaviors from sharing accidentally encountered information to collaborative query formulation and retrieval” (p. 145). She argues that information-sharing practices in academic communities, although recognized in the literature on scholars’ information seeking as omnipresent, “have rarely been taken as objects of analysis in their own right” (Talja, 2002, p. 143). This might be partly due to the focus on individual information practices in existing models of information behavior (IB). IB “is conceptualized by many of these models as an intrinsically individual activity” (Reddy & Jansen, 2008, p. 257), and presented as “a linear process consisting of stages and iterative activities” (Foster, 2004, p. 228).

Although some authors (Cheuk, 1998; Erdelez, 1997; Swain, 1996) have already noted non-linear movements in information practices, and have suggested the limitations of traditional linear models, such as those by Ellis (1989), Kuhlthau (1991), and Wilson (1981; 1999), Foster’s (2004) non-linear model of information-seeking behavior was the first to be explicitly built on the concept of non-linearity. The main contributions of Foster’s model to IB research are his understanding of information practices as non-linear, complex interactions of activities and contextual elements, and his reinterpretation of the processes of problem definition and problem solving as occurring continuously through all stages of information seeking. However, a major limitation of Foster’s model is lack of clarity about how the contextual layers are linked to the information core processes. The proposition here is that actor-network theory (ANT) can provide the means to capture the complexity of the links between information practices and contextual elements by shifting attention from a predetermined existence of the connection to the action of network building.

Foster’s non-linear model of information seeking behavior is introduced, its contribution to IB research is outlined, and its limitations described. Then, in order to address these limitations, ANT and Latour’s circulatory system of scientific facts are introduced. An alternate non-linear model of information-sharing practices in academic communities is outlined, and the main elements of the model and its relation to information-sharing practices in academic communities explained. Finally, possible applications of this model, and future research directions are discussed.

2. Problem statement

Foster’s (2004) non-linear model of information-seeking behavior introduced a new perspective to the conceptualization of information practices, one in which “the unit of observation expands from the study of individual tasks, individual search sessions, and the study of activities in relative isolation, and becomes the study of activities within a mesh of complex interactions” (Foster, 2006, p. 165). However, ANT provides a more effective means to capture the non-linear movements of complex social, political, cognitive, and technological negotiations involved in information-sharing practices in academic communities. Latour’s (1999) circulatory system of scientific facts is used as a foundation for building a non-linear model of information-sharing practices in academic communities. The main proposition of this model is that although information-sharing practices are shaped by contextual elements, they simultaneously shape the contextual elements. The main difference between this model and other IB models,
including Foster’s model, is this focus on the interdependence between context and information practices. Instead of a priori placing actors in a context, this model follows the actors in information-sharing practices, as they create context for themselves. As such, the model may contribute to understanding information-sharing practices from the actors’ point of view.

3. Literature review

Based on a study of interdisciplinary information-seeking behavior among researchers, Foster (2004) developed a non-linear model of information seeking behavior (Fig. 1). His initial analysis of 45 in-depth, semi-structured interviews with academic and postgraduate researchers suggested that scholars’ information-seeking activities involved three sequential stages: initial, middle, and final. However, subsequent testing resulted in the emergence of additional underlying themes and activities that could not be explained by a stage model. This inability indicated a need for a conceptual shift from understanding information seeking as a linear process, consisting of stages, to a view of information-seeking activities “described in terms of concurrent, continuous, cumulative, and looped cycles occurring throughout a research project” (Foster, 2004, p. 232). Foster classified these emergent concepts and activities into three core processes: opening, orientation, and consolidation. These three core processes are situated within three levels of contextual interaction: external context, internal context, and cognitive approach.

Foster’s non-linear model of information-seeking behavior is a valuable alternative to earlier linear models, such as those by Ellis (1989), Kuhlthau (1991), and Wilson (1981, 1999). Although some authors (Cheuk, 1998; Erdelitz, 1997; Swain, 1996) have already noted non-linear movements in information practices, and have suggested the limitations of linear models, Foster’s model was the first to be explicitly built on the concept of non-linearity. Foster (2006) pointed out that this concept of non-linearity is used in the sciences to map relations between complex variables, and as such, it offers “a new perspective that seeks a holistic understanding of the inter-relationship of multiple individually complex variables that form information behavior” (p. 156). Information behavior changes with any contextual change, and with any new information-seeking experience. Information-seeking activities are therefore “analogous to an information seeker holding a palette of information behavior opportunities with the whole palette available at any given moment” (Foster, 2004, p. 235).

Two primary contributions of Foster’s model to IB research are his understanding of information practices as non-linear, complex interactions of activities and contextual elements, in which any small action “may lead to a significant information-seeking outcome” (Foster, 2006, p. 160), and his reinterpretation of the processes of problem definition and problem solving. Although problem definition is a stage placed at the beginning of information seeking in linear models, in Foster’s model, the problem definition “occurs continuously through to closure” (Foster, 2006, p. 162). Likewise, in linear models, problem solving is seen as a process of moving through successive stages toward a solution: With each stage the level of certainty is increased, until a stage of problem resolution is reached. On the other hand, in Foster’s model, the certainty level is the product of a complex interaction between core processes and contextual elements, so that some activities can increase the level of certainty, and others can reduce it. The level of certainty is also determined by “previous knowledge, previous information seeking, and other contextual elements” (Foster, 2006, p. 163).

Information seeking is completed when information seekers “have achieved what they consider an appropriate level of certainty for each of the problem elements for which they establish a personal threshold” (Foster, 2006, pp. 163–164).

However, Foster’s model lacks clarity as to how the contextual layers are connected to the information core processes. The graphical representation of Foster’s model (Fig. 1) shows contextual layers as three nested squares that serve as containers for the information-seeking core processes; the movement of information practices is limited to the confines of defined contextual elements. Foster (2006) states that the core processes “are placed within [emphasis added] an interactive framework of contexts, and a cognitive approach” (p. 159), which suggests a one-directional causal relationship from context upon information practices. This relationship is not one-directional: Although information-sharing practices may be shaped by context, they also shape the context. Thus a layered presentation of contextual elements is not an adequate representation of the complex non-linear interrelationship between context and information-sharing practices. This suggests that there is a need for a different graphical representation, as well as theoretical conceptualization of the context in order to capture the complexity of the links between information practices and contextual elements. The proposition is that ANT can provide the means to capture these links by shifting attention from a predetermined existence of the connection to the action of network building, since “the existence of this connection depends on what the actors have done or not done to establish it” (Latour, 1999, p. 86).

ANT emerged during the 1980s within the sociology of science and technology, with the work of Bruno Latour, Michael Callon, and John Law. One of the main assumptions of ANT is that science is the process of heterogeneous engineering in which the social, natural, and discursive are puzzled together in the process of translation. Basic concepts of ANT include actor and network. An actor is any agent, collective or individual, that can associate or disassociate with other actors. An actor is not just a point object or a placeholder (Latour, 2005, p. 153), but an association of heterogeneous elements, so that each actor is also a simplified network (Law, 1992). Since “actor” is frequently used to refer exclusively to humans, the term actant “is sometimes used to include nonhumans in the definition” (Latour, 1999, p. 303). An actor or actant is “something that acts or to which activity is granted by others. . . . [which] can literally be anything provided it is granted to be the source of an action” (Latour, 1997). The word “network” came from the attempt to describe society not as two-dimensional or three-dimensional but “in terms of nodes that have as many dimensions as they have connections” (Latour, 1997). The notion of network enables ANT to replace spatial metaphors such as close/far, up/down, local/global, and inside/outside with associations.
and connections that are not exclusively social, natural, or technological. This is where ANT differs from most approaches to context, including Foster’s, in the IB field.

According to Talja, Keso, and Pietiläinen (1999), there are two main approaches to context in the IB field. One is the objectified approach, in which context is described merely as “a background for the study of individuals’ or a particular group’s information behavior” (Talja et al., 1999, p. 753). The other, interpretative approach, places the context in the foreground, since the context is the place where meaning is socially constructed. Hence this approach could “be called a social constructionist or discursive approach” (Talja et al., 1999, p. 753). Latour (1999) might call these internalist and externalist approaches. In the first, content explains itself, without a need for external assistance. In the second approach, content is explained, or interpreted, by society.

Latour (1999) claimed that an internalist explanation without consideration of the rest of the society is “as meaningless as the idea of a system of arteries disconnected from the system of veins” (p. 80). However, this does not mean that ANT “embraces the opposite position, that of a ‘social construction’ of reality” (Latour, 1999, p. 84). For ANT, “multiplicity is a property of things, not of humans interpreting things” (Latour, 2005, p. 116). Instead of using internalist or externalist approaches, which define a priori distance between content and context, Latour (1999) proposed an alternative model—the circulatory model of scientific facts—in which the aim of researchers is not to find a contextual explanation for a scientific discipline, but to follow “scientists themselves placing the discipline in a context” (p. 104).

4. Latour’s circulatory system of scientific facts

Latour’s (1999) circulatory system model (Fig. 2) outlines five different activities “that all researchers will hold simultaneously if they want to be good scientists” (p. 99). Researchers have to simultaneously get their instruments to work; convince their colleagues; interest possible alliances; give the public a positive image of their work; and deal with the conceptual content of their research. These activities are represented as five interactive loops: mobilization of the world; autonomization; alliances; public representation, and links and knots. If we are to understand the work of researchers, each of these loops should be described, since each “is as important as the others, and each feeds back into itself and into the other four” (Latour, 1999, p. 99). It is important to stress that ANT rejects hierarchical divisions between academic fields, the same way it rejects divisions between human and non-human actors (Latour, 2005, p. 125); therefore, this model include all actors involved in research within the social sciences, humanities, arts, and natural sciences (Latour, 1999, pp. 18–20).

5. A non-linear model of information-sharing practices in academic communities

A non-linear model of information-sharing practices in academic communities (Fig. 3), based largely on Latour’s (1999) circulatory system of scientific facts, can be applied to academic information-sharing practices as illustration. Foster’s core processes are accommodated within the central conceptual loop (links and knots in Latour’s model), providing the proposed model with useful concepts of information practices described as “concurrent, continuous, cumulative, and looped cycles” (Foster, 2004, p. 232). In the Foster model the core processes are contained within heavy layers of context, but in this model, the loop of core processes is presented “more like a central knot tying the four other loops” (Latour, 1999, p. 100).

The proposed model emphasizes the interdependent relationship between contextual elements and information practices: This is the main difference between this model and other IB models, including Foster’s. Context is not presented merely as a background for information practices, but at the same time, information practices are not seen simply as a construction of social or cognitive context. The proposition of this model is to follow the actors in information-sharing practices, as they create context and identity. Such an approach provides a more effective means to understand information-sharing practices from the actors’ point of view. The main elements of the model and the relations of each loop to information-sharing practices in academic communities are described below.

Fig. 2. Latour’s circulatory system of scientific facts (Latour, 1999, p. 100).

Fig. 3. Proposed non-linear model of information-sharing practices in academic communities. Reprinted by permission of the publisher from Pandora’s Hope: Essays on the Reality of Science Studies by Bruno Latour, p. 100, Cambridge, Mass.: Harvard University Press, Copyright © 1999 by the President and Fellows of Harvard College.
5.1. Mobilization of the world

The first loop in the model, mobilization of the world, refers to the “means by which nonhumans are progressively loaded into discourse” (Latour, 1999, p. 99). These means include not only instruments, equipment, expeditions, and surveys, but also the sites in which the mobilized objects are assembled and contained, such as museums, libraries, databases, etc. By mobilizing the world, scientists transform the world into immutable and combinable mobiles, which means that “instead of moving around the objects, scientists make the objects move around them” (Latour, 1999, p. 101). These objects, inscribed “into a sign, an archive, a document, a piece of paper, a trace” (Latour, 1999, p. 306), are mobile, but they are also immutable “because the objects hold their shape as a network” (Law, 2002, p. 93).

Mobilization of the world enables things to “present themselves in a form that renders them immediately useful in the arguments that scientists have with their colleagues” (Latour, 1999, pp. 101–102). This is a major way for actors in information-sharing academic communities to gain authority. Obtaining data is seen as an achievement, because data “contrary to their Latin name, are never given; they are obtained” (Latour & Hermant, 1998, p. 22). For Latour, a word does not simply refer to a thing, but it is progressively loaded with meaning through progressive chains of translations (Latour, 1999, p. 99). The study of mobilization of the world is “the study of the logics that are so indispensable to the logics of science” (Latour, 1999, p. 102). To study the logistics of information-sharing practices in academic communities involves not only the study of instruments for obtaining data, but also the study of information sources, and places used to keep and share these resources, such as libraries, databases, and information and communication technologies.

The degree of information-sharing in academic communities is proportional to the speed of the circulation of all loops in the circulatory system. In an ideal situation, academics will share not only data but also ideas, instruments, equipment, and laboratories, where appropriate. In such a situation, this loop will be a major trigger for the circulation of all other loops. In an opposite situation, there will be nothing to share, the circulation will stop, and the whole system will collapse. In most cases, however, academics do not share all of their data, they select only certain information to be shared. Avoiding information sharing can be a result of negotiation within the alliances loop when “certain data sets funded by private commercial interests may carry usage and confidentiality restrictions that prohibit them from being shared” (Birnholtz & Bietz, 2003, p. 340). The reason may also be the researchers’ attempts to gain a reputation among colleagues by being the only spokesperson for the mobilized objects—that is, the only actor to have the roadmap of the chains of translations that transform these objects to information. Access to resources and instruments may be indicative of the status of researchers in the field, and consequently, circulation within the autonomization loop.

Willingness to share information therefore depends on negotiations with other actors such as colleagues, allies, and the public—the circulations of the other loops—rather than on any cognitive style, or internal and external non-negotiable forces. So in order to understand the circulation of this loop, it is not enough to understand the achievement of obtaining data and building powerful instruments alone. It is also important to understand negotiations that enable the circulations of other loops through this loop. Whenever we ask how data is obtained, we have to follow with questions such as: How is this related to people’s everyday activities? How will allies respond? How is it credible to colleagues?

5.2. Autonomization

The second loop is called autonomization since it refers to “the way in which a discipline, a profession, a clique, or an ‘invisible college’ becomes independent and forms its own criteria of evaluation and relevance” (Latour, 1999, p. 102). This loop deals with the ways that disciplines and institutions provide credibility to the world mobilized in the first loop. Latour argues that an isolated specialist is a contradiction in terms, because agreed criteria of relevance, negotiated within these associations of specialists and regulations of scientific institutions, are “necessary for the resolution of controversies as is the regular flow of data obtained in the first loop” (Latour, 1999, p. 103). This loop directly accelerates the circulations in the first loop by demanding more and more data, but it also accelerates the circulation in other loops by increasing the credibility of data. This is why a conflict within this loop “is not a brake on the development of science, but one of its motors” (Latour, 1999, p. 102).

If for no other reason but to increase the credibility of an argument obtained in the first loop through the mobilization of the world, researchers will participate in some information-sharing activities with their colleagues. An obvious example might be the heavy reliance on peer review employed across the academy. The drive to establish credibility of information is one of the most powerful accelerators of the circulatory system. It is frequently the primary trigger for information-sharing practices in academic communities, and it forms “the seeds of all relationships among researchers” (Latour, 1999, p. 103).

There are differences between academic groups that can increase the need for multidisciplinary collaboration (Katz & Martin, 1997), but these differences can also hinder or even prevent collaboration taking place (Sonnenwald, 2007, p. 653). For instance, different disciplines have different norms regarding intellectual property (Walsh & Hong, 2003), different methods and terminology that can hinder communication, and there are different levels of trust among academics between disciplines (Zucker, Darby, Brewer, & Peng, 1995; Shrum, Chompalov, & Gennush, 2001). All these issues of building relevance criteria in academic groups and institutions are directly related to the autonomization loop. But to fully understand how this loop enables or prevents information sharing in academic communities, we have to understand how it is linked to the other loops. How do these academic communities build their laboratories, obtain their data, and use their instruments? How do they build a positive public image of their research? How do they enroll powerful allies in order to enlarge their network?

5.3. Alliances

The third loop, called alliances, deals with making actors outside scientific laboratories interested in the research. Without this loop, the world could not be mobilized, as the instruments could not be developed, nor could a discipline become autonomous. For any research development, it is crucial to cultivate interested powerful groups and institutions, such as military, government, and industry. The links between these groups and research have to be created since there is no natural and self-evident connection between, for example, the military and physics, industry and chemistry, or kings and cartography (Latour, 1999, p. 103). The aim is not merely to investigate the impact of research funding on research productivity, but also to understand how different alliances create different research objects.

Alliances are never given. They have to be created, which involves “enormous labor of persuasion and liaison . . . to make these alliances appear, in retrospect, inevitable” (Latour, 1999, p. 104). Creating alliances is not a linear process going from basic to applied research. Howells, Nedeva, and Georgiou (1998) point out in their UK survey on industry-academic collaboration that although the significance of linkages between industry and academic communities has become fully recognized since the 1970s, these linkages go back to the late 19th century with the establishment of so called “redbrick” universities in the industrial areas of Britain. The aim of these universities was both to serve the academic communities, and align them to the local industry and economy. Recently, for example, we have seen a number
of alliances built by academic communities interested in developing clean energy. Developing clean energy is becoming a major issue in winning elections in many countries. Unlike actors, such as the automobile or coal industries, are building alliances with academic communities. These alliances appear more and more inevitable as academic communities translate their interests and the interests of industry into a composite goal. By shifting their interests, both industry and academic communities are not only creating a new goal, but also building a new context. So, the context is created by actors themselves through a chain of translations. If we place a priori this collaboration in an external contextual element, for example capitalism, and/or in an internal contextual element, such as “anomalous state of knowledge” (Belkin, 2005), we will not be able to understand this hard work of building alliances. Instead, we should follow the actors themselves in their world-building activities.

This alliance loop is therefore not concerned solely with research funding obtained through the alignment of interests between powerful actors and academic communities. More importantly, it enables us to understand the socialization of technology. Perhaps like no other loop, it illuminates the process of swapping properties between humans and non-humans, in which social relations are transformed “through fresh and unexpected sources of action” (Latour, 1999, p. 197). To fully understand the impact of this socialization of non-humans on information sharing in academic communities, however, it is not enough to understand only the circulation between this loop and the loop of autonomization. It is also necessary to understand how it affects the mobilization of the world. How do these processes change people’s everyday life? What is the public opinion of these processes?

5.4. Public representation

The fourth loop, public representation, describes the effects of scientific works on people’s everyday practice. Since science modifies associations between people and things, this loop is no more outside scientific work than other loops in the circuitary system, but rather “it simply has other properties” (Latour, 1999, p. 105). Public arguments for or against a research practice can have a direct impact on the funding of a particular project. For example, some governments are reluctant to fund human embryo research projects because of public concerns. This reluctance might change the dynamic of other loops, and may even stop the circuitary system as a whole. The relationship between scientists and the public has also the potential to create “a lot of the presuppositions of scientists themselves about their objects of study” (Latour, 1999, p. 106), which may change the way they mobilize the world, enroll themselves in a discipline, or create an alliance.

The loop helps us to understand the ways society creates representations of academic work, and the ways that these representations influence information sharing in academic communities. Since academic communities need support from society, they often try to convince society of the benefits of their work through their representatives with a status of “acknowledgable leaders” (Bever & Rosen, 1978, p. 67). Public representation also has an impact on government allocation of public research funding and the provision of tax benefits, initiatives that encourage business and industry to enroll and invest in academic communities and their research (Autio, Hameri, & Nordberg, 1996). Public concerns about national security can also encourage governments to place restrictions on publishing and otherwise sharing sensitive information (Gast, 2003); this impacts upon academic information-sharing practices.

Public representation is not linked only to building alliances, however. Public concerns can also define the object of academic activities. Finding solutions for public concerns is frequently a major motive for the activities of academic communities. For example, the global threat of Severe Acute Respiratory Syndrome (SARS) motivated collaboration among scientists around the world and resulted in finding causes of the disease in only five weeks (Sonnenwald, 2007). Thus, public representation can be both an enabler of and a barrier to information sharing in academic communities. Public representation also adjusts when a political environment changes. Havemann (2001) showed how information sharing between academics from East and West Germany has changed since the fall of the Berlin Wall, and Williams (1998) described how the peace process in Northern Ireland opened the door for information exchange across borders. Jaeger and Burnett (2005) analyzed the impact of U.S. policies on shaping information behavior in the country since September 11, and found that these policies “have altered the roles of information in many social contexts, with impacts on information access and information exchange between social groups” (p. 464).

All these political, cultural, or social contextual elements described above circulate through the public representation loop. However, they are not enough to fully explain information-sharing practices in academic communities. The public representation loop is only part of the model. It has a great impact on the circulation of the model, but it is also an effect of the circulation. So, it is crucial to understand how this loop is connected to the other three contextual loops, and how they are all linked to and by the central loop of the model: how they are moved by, and how they are moving this loop of core processes.

6. Core processes

Definition of core processes in the model proposed here remains the same as in Foster’s model (Fig. 3). However, these processes are now explicitly connected to the contextual elements. The circulation of this loop is directly moved by the other four loops, but it also moves the circulation of all other loops. The core processes are shaped by the contextual elements, but they simultaneously shape the contextual elements, which also shape each other. No loop can circulate without circulation of all other loops. If circulation stops in only one loop, the circulation of the whole model will stop. As each loop is directly connected to each other four loops, so each contextual element is directly connected to each activity that constitute information core processes.

For example, an information core process, networking, which includes activities that operate through channels such as “conferences, social gatherings, colleagues, and departmental research groups” (Foster, 2004, p. 233), is obviously linked to the autonomization loop. This link is so obvious that it appears to be independent from other loops. But any change in the circulation of other loops can change the circulation between networking activities and autonomization loop. The loss of public support, or a change of instruments and/or allies, can stop this circulation, or move the core processes in a non-linear direction. Suddenly, information sharing could go from networking back to the picture-building process again. From here, picture-building activities of mapping relevant concepts of research can be changed with any change in any loop. New instruments can bring new alliances. New data can change public representation. New public concern can create the need for new data. This is why with each contextual change, “the opportunity and need for information-seeking change too” (Foster, 2004, p. 235).

With each change in information practice, however, the contextual elements change. Any of the information core processes can change any of contextual elements. For example, any breadth exploration, a process of “a conscious expansion of searching to allow exploration of every possibility . . . to bring within range different information types, sources, concepts, and disciplines” (Foster, 2004, p. 233), can change circulation in the autonomization loop, which will in turn change the circulation of other loops. Or after any attempt of sifting, which is “the process of deciding which material and sources were relevant” (Foster, 2004, p. 234), there is a possibility of moving the
circulation of the model out of the loop of the mobilization of the world. The process of serendipity can move the circulation of the contextual elements in even more unpredictable directions. These dynamic non-linear interrelationships between all loops, and between all loops and all core processes, is the main reason for the non-linear nature of information behavior in general, particularly in information-sharing practices.

Although the interpretation of problem definition and problem solving is what most distinguishes Foster’s model from traditional linear IB models, his definition of what or who determine the level of certainty in problem definition and problem-solving activities seems to be a contradiction. The level of certainty is defined as a product of interactions between core processes and contextual elements (Foster, 2006), but ultimately, according to Foster, individual seekers determine what is an appropriate level of certainty according to their personal threshold (Foster, 2006). This contradiction is a result of a rigid presentation of contextual layers in Foster’s model. As the contextual layers are presented as squares, layers, and containers, it is possible to regard them as separate entities, and consequently, to have different answers for different entities. It is possible to say that problem solving is determined by relationships between different actors, but ultimately, it is an individual seeker who has the last word. For ANT, problem definition and problem solving are the result of negotiations between different actors. They are not “generated by the state of knowledge...[but] they result from the definition and interrelation of actors that were not previously linked to one another” (Callon, 1986, p. 228). The result of negotiation of these actors is continuous problem redefinition, which is one of the main reasons for non-linearity in information practices.

The proposed non-linear model of information-sharing practices in academic communities clearly indicates interdependence between the core processes and contextual elements. This interrelation enables us to see non-linearity in information-sharing processes as a result of complex negotiations, since “transfers of information never occur except through subtle and multiple transformations” (Latour, 1999, p. 298). Actors change the role from intermediaries—simply transporting information—to mediators, because they are “endowed with the capacity to translate what they transport, to redefine it, re-deploy it, and also to betray it” (Latour, 1993, p. 81). They change from intermediaries that are shaped by heavy layers of context to mediators that also shape the context, and “information changes from brick to clay, moved and shaped in unique ways by each perceiver” (Dervin, 1983, p. 169).

7. Possible applications

Jarvelin and Wilson (2003) suggest that one of the most important principles for judging the merits of conceptual models is their ability to generate hypotheses for testing and problems for solving. Dynamic relations between the five loops constituting the non-linear model of information sharing in academic communities provide a number of possibilities for formulating hypotheses, as well as research questions for empirical studies on information sharing, such as:

- How does building a positive public image of research impact government funding?

The complexity of links between the different elements of our model enables the generation of an infinite number of research questions such as these. The model provides a possibility to start from any loop to generate research question, but it is important to remember that we have to allow circulation through all loops in order to understand information-sharing practices in academic communities. For example, we might attempt to study how culture impacts information sharing in different academic fields. In this case we would start from the public loop, and aim to reach the autonomization loop through the loop of core processes. As this model does not allow direct access from one loop to another without circulation through all loops, however, we will have to investigate alliances and mobilization of the world in order to gain a comprehensive view of information practices.

8. Conclusion

The main proposition of this model is that information-sharing practices and context simultaneously shape each other. This counters both objectified and interpretative approaches to context that dominate IB research. Context, in this model, is not seen merely as a background for information-sharing practices, nor are these practices understood simply as a construction of internal and/or external contexts. Rather they are seen as complex negotiations between heterogeneous actors in the process of translation. Such an approach enables us to see participants in a research project not merely as intermediaries that simply transfer information, but as mediators that can act on—translate—information. Therefore, this model may contribute to understanding information-sharing practices in academic communities from the actors’ point of view.

The model also provides potential to generate a number of research questions and hypotheses, and as such it will be a useful tool for empirical studies on information sharing in academic communities. The future theoretical improvements of the model could make it more general and expand its use as a theoretical framework for understanding information sharing in communities other than academic, and perhaps for investigating information practices in general.

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