

Information Technology Conceptualization: Respective Contributions of Sociology and Information Systems

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Abstract

This article analyzes the different phases the Information Systems--Sociology relationship has gone through and points out some specific features of sociologists and Information Systems scientists in their conceptualization of Information Technology (IT). It shows that both academic fields develop more and more convergent theorizations. The first part is centered on an historical analysis of sociology itself. It shows the great comeback of the Object within the sociological field at the beginning of the 80s. Different models have been developed from the generalized kinds of sociology to those that have been focused on the social construction of the Object. These make up sociological groups, which we call "autonomous". The second part presents the sociological approaches used and worked out in the domain of Information Systems (IS). These are presented by means of three historical moments (causalist, actor-based and processual). For each of these stages the influence of sociologies, notably those that deal with the Object, is obvious and models are more or less "illuminated" by means of broader perspectives. In the third part, there is a discussion of ontological differences between the work of sociologists studying IS objects and the work of IS researchers drawing on sociologists' conceptual contributions. Lastly, it seems that if sociology and Information Systems sometimes diverge in the way they study sociotechnical systems, they converge gradually in their conceptualization of the IT artifact.

Keywords: Sociology, management, sociotechnical approaches, research, epistemology.

Introduction

On one hand, for more than two decades, sociologists have been interested in grasping actor-technology interaction. How do the social ties within an organization evolve when Information Technology (IT) tools are used? How to appraise social processes supported, intermediated, or replaced by technology? These are questions on which sociologists have shed light. On the other hand, Information Systems (IS) researchers and practitioners have developed methodologies concerning technology development and management that more and more draw on and influence social context. IT development, use, evaluation and management are gradually "socialized". Nonetheless, Orlikowski and Iacono (2001) have recently raised the fact that technology was not theorized enough in IT research. Here, we will consider how is conceptualized technology in IS sociological contributions (if so) and in the sociologies focused on sociotechnical dynamics.

As we are going to see in the first part the “Object” has been making a great comeback in sociology for some twenty years. Varied research, mainly European, has put forward new theoretical frameworks to place objects to do with food, religion, the arts or IT in the middle of social interactions. Such is the case for information technology in actor-network sociology of Callon and Latour (1990, 1992), usage theory of Perriault (1989), or innovation sociology of Alter (1985, 1995, 1996). We will see that these approaches, centered either on use, diffusion or knowledge can be classified as “autonomous”. The second part is centered on a historical analysis of sociological approaches carried out in IS management. It underlines that this research draws mainly on social science activities and corresponds to those classified as “integrative”. With the wisdom of our previous chronological analysis, we finish by asking ourselves about the specificity of IS and sociology specificities as regards to IT conceptualization.

Sociologies of the Object: From uses to IT social construction

According to Dosse (1995, p. 131), the social sciences would experience for more than twenty years a sort of paradigmatic rupture epitomized by the "introduction of objects within the scope of study". After decades of absence, it is clear that artifacts have a growing importance in theoretical constructions. In the case of sociology, it seems that the field has oscillated between two interpretations of the Object: the "bad object", i.e. the “fetish” (Latour, 1994) and the “good object”, i.e. the “force”, the more or less visible expression of nature (Latour, 1994). That is why the ordinary object, the everyday object, did almost not appear in humanities (Blandin, 2002). Only the intangible object, the social fact, or the object of the research, this conceptualized target, had legitimacy for sociologists’ work. But as Latour (1994) underscored, actors can "actively localize an interaction by means of a set of participation, settings, wind-protection or fire-break, which make it possible to go from a complex to a merely complicated situation". Nonetheless, anti-fetishist behaviors denounced by Hennion and Latour (1993) have made it difficult to grasp these settings, this network of objects which intermediate action. Up to a certain extent, this resulted in a tautological situation where social phenomena are taken up by means of social notions. This is the point Latour raises when he says: "Do sociologists not try to complicate matters when they grasp social phenomena by means of sociological concepts or when they build cracks with symbolic elements, whereas objects are omnipresent in all the situations they try to make sense of. In their hands, isn't sociology objectless?" (Latour, pp. 596-597).

For more than twenty years, numerous models have tried to correct this error among which generalized sociologies of uses, i.e. diffusion sociologies and knowledge sociologies (Blandin, 2002). We suggest adding two sets of sociologies strangely absent from the panorama worked out by the Blandin: innovation sociology and strategic analysis. All these sociologies have opened the way to new research agenda that were irrelevant previously: IT social aspects.

Before coming to the presentation of the different sub-streams aiming at integrating Object, a brief terminological explanation can be helpful as regards the notion of Object. The concept of Object is broadly defined by Blandin (2002, p 15) as “an entity, built up like a whole, exterior to subject, and distinguished by him like it”. Object is thus something different from a thing that is only a material support or a sign undistinguished by the subject, or the instrument, which is an "object in act", finalized by actors.

Generalised sociologies of uses put together research that gave some social inscription to objects. By means of all the social intermediation they enable objects to be inscribed in different sociological registers, by their finalization, i.e. “usage logics” to stick to Perriault’s expression. (1989) There is thus an “adjustment between what the Object allows and what users make of it” (Blandin, 2002; p 26). The same object may thus be used in a utilitarian perspective or a symbolic perspective. This will depend on its degree of “versatility”, the number of functions it seems to assume naturally. A broad negotiation is initiated between user, object and “what for the Object is a medium” (Blandin, 2002; p 31). Indeed, According to Blandin (2002), actor-network sociology of Callon and Latour (1990, 1992) corresponds rather to a conception of the object as a “mediator”.

The sociology of diffusion is more focused on adoption processes of objects than on their use *per se*. S-curve, structural analysis, various statistical models cry out for thoroughly understanding the way objects penetrate a given society. Rogers’ work (1995) epitomizes this stream of research perfectly.

This is with the knowledge sociology that the Object is integrated into global social dynamics. From the knowledge sociologists’ point of view, the Object is only “a possible mean among many others to achieve a given action whose finality is elsewhere” (Blandin, 2002), and the use of the technical Object, then considered as a tool, is never itself the goal of action. The goal of a person giving a call is not to use the phone in such or such a way, but more or less to initiate a broader communication process.

Eventually, Blandin notices that the relation to the Object may structure itself in three ways: a set of fundamental relationships integrating cognitive and affective aspects, a set of fundamental relationships including “utilitarian and symbolic registers” and last, a set of conventional relationships related to the economic register. Anyway, if he or she wishes to grasp the complexity of objects’ social construction, the sociologist must take three variables into account: Subject, Object and Others. Taking the classic example of dummy mobile phones, Blandin shows that the use of a third party is essential to understand numerous usage schemes.

In line with the three categories suggested by Blandin, we would like to add two visions missing in the author’s state of the art: the strategic analysis of Crozier and Friedberg (1977) and the sociology of innovation of Alter (1985, 1995, 1996).

For strategic analysis promoters, the Object has no status by itself. This is particularly obvious in the fourth chapter of Crozier and Friedberg’s founding book, i.e. the chapter dealing with “technological determinism” and where, eventually, the problem of the Object is settled. Authors strongly criticize Woodward (1965) and Perrow’s work (1967). Especially as regards the model elaborated by the latter, technology dimensions (“variety” and “analyzability”) are not “immutable and intangible data” which actors have to put up with. On the contrary, for strategic analysis promoters, those that “constitute by themselves stakes in negotiations and bargaining among organizational actors, and, by themselves, reflect a part of the “rules of the game” which dominate within the action systems underlying an organization or its various sub-units”. The Object has a social reality only when it plays a role in the life of the concrete action system and more particularly when it becomes an “uncertainty zone” enacted by actors. On this point, we can

ask ourselves if Crozier and Friedberg did not go too far in the “autonomization” of actors. Tools and their consequences are not necessarily negotiable and negotiated by actors. Restrictiveness of the tools, numerous social processes, remote from the concrete action system being studied, can restrain actors (independently of their perception). Moreover, it is noticeable that in more recent writings Crozier comes to more qualified propositions. He underlines the presence of a “logic of computer-based systems”. This one allows a more structuring power to computer tools than the fourth chapter of the founding book. The author thus explains, “the logic of computer-based systems (...) encourages open and equal access to information” (Crozier, 1983, p. 86). He also suggests a bit later “any new technical breakthrough is initially utilized within the confines of earlier technological and organizational logic” (p. 88). Crozier admits that technology can be considered, as regards some dimensions, as an exogenous variable for the concrete action system. He also recognizes that their properties are not always negotiable by actors.

The innovation sociology of Alter (1985, 1995, 1996) gives a central place for the Object in the sociological representation of the Object, more particularly innovating ones. These are presented as a major social stake and a driver for collective action. It is the direct technology surrounding that will crystallize the dialectic between “innovators” and “institutional actors” i.e. people hankering to maintain the *status quo*. Among all the sociologies of the Object, that is to say those aiming at re-integrating the Object in the social construction, innovation sociology is one of the most radical as it makes the (innovating) Object a kind of focal sociological point.

Eventually, whether they consider objects as an innovation, a usage scheme, logic of action, intermediation processes or incertitude zones, we notice that sociologies of the Object are all “autonomous sociologies”. They are built on the basis of a specific vision of social ties and tend to a sort of theoretical autonomy. We could also specify that they deal with the Object in a broad manner, without making any distinction between categories and that they have a comprehensive finality (a point we will qualify in our last part).

Some rare sociological research explicitly treats the case of computer tools. Latour (1996) has done this in an interesting historical and philosophical analysis. In a chapter devoted to the subject, the sociologist put forward three historical phases in the treatment of computer tools by social sciences on whole, and by sociology in particular. According to Latour, three “worlds” (“mondes”) succeeded one another: a first dominated by “non-humans”, a second dominated by “humans” and a last based on the “impossibility to humanity or non-humanity the first place” (Latour, 1996 ; p 299).

As regards the first world, all-powerful in the 50-60s, computer-based systems are synonymous with “absolute clarity”. Information technologies stimulate human thought by purifying it from any socio-political disruptions and amplifying rationality. During this period, sociologists and social phenomena are almost absent.

With the emergence of the second world, “humans” make their great return. Computers have bugs, they are unable to include much tacit knowledge, they are a political object and the target of many evolving commercial demands. Eventually, the image is “reversed and computer-based systems, expert systems, information sciences appear then as small pockets, tiny mini-theories, small and fragile experiments inside human, organizational, social, political disorders that do not

show any sign of progressive weakening” (Latour, 1996; p 300). The expected transparency thus leaves the place to a growing opacity.

From the third “world” perspective, different “fragments” of a broad sociotechnical system are lastly associated with each other: “actants”. An actant is “whatever acts or shifts action, action itself being defined by a list of performances through trials; from these performances are deduced a set of competences with which the actant is endowed” (Akrich et Latour, 1994; p 259). Walsham (1997, p 468) also defines actants as “both human beings and nonhuman actors such as technological artifacts”. “Actants” of an organization are put end to end to in the setting of a vast chain of translation inhabited by many hybrid Objects, both technical and human. It is thus not easy to assert if “a computer-based system is a form of limited organization or if an organization is an extended form of computer.” As Akrich and Latour specify when they define the notion of setting, “a machine can no more be studied than a human, because what the analyst is faced with are assemblies of humans and nonhuman actants where the skills and performances are distributed; the object of analysis is called a setting or a setup (in French a “dispositif”)” (Akrich et Latour, 1994 ; p 259).

Eventually, we have to wait for the third world so that the computer object, integrated in the actant category, makes its real appearance in the sociologist’s work. In the first world, the social gives way to the technical. In the second, the presence of technical elements is both illusive and of secondary importance. In accordance with what we have already noticed beforehand, the Object has no real scientific legitimacy for sociologists. It is really only with the third world that IT tools find their place in the broad translation chain deployed by sociologists.

From causalist to integrative approaches: A chronological presentation of IS frameworks

The IS management field is relatively recent as it is linked to a research object whose origin dates back to the 60 and 70s: information system. IS can be defined as a “set of resources: material, software, human, data, procedures making it possible to obtain, store, communicate information (data, texts, images, sounds, etc) within organizations” (Reix, 1995; p. 67). But in spite of this definition including both material and human aspects, it is clear that technology remains central in the interpretation of IS by researchers of the field. Most IS handbooks deal exclusively with computerized IS. The Object, in all its materiality, is thus a long-lasting, clear piece of information for IS as for sociology. Indeed it was gradually that studies on IT use, adoption processes, planning or design methodologies integrate sociological notions. They took elements of sociologies of the Object or more generalized sociologies. As we will see in the following history, the explicit presence of sociological concepts and models in the field is something not at all new. It seems logical in light of the introduction of the Object in the sociologist’s activities, which dates back twenty years. The first relationships within the sociology-IS management were at first a bit superficial and punctual in the first causalist phase. They were more intense and deeper with the second and the third phases.

The following sections are not properly speaking a history, a sequence of clear scientific periods. They are rather a chronological presentation of theoretical frameworks that have been accumulating till today.

The 70-80s or the causalist domination

The first studies in IS were largely inscribed in a causalist perspective, studying technological, organizational or mutual determinism (Desanctis and Fulk, 1995).

Studies treating technological determinism, i.e. impacts of IT on organization, have common roots with "organizational sociology" of Woodward (1965) or Perrow (1967) and contingency theory. They can be divided into two categories: research about the impact on computer tools on *organizational structures* and that tended toward changes occasioned by IT on *organizational processes*. Studies focused on structural variables notably treated organizational centralization (Leavitt and Whisler, 1958 ; Malone, 1987), decisional unities (Huber, 1991) or more broadly changes in formal structures (Foster and Flynn, 1984). Research dealing with the evolution of organizational processes integrated various dimensions linked to information dissemination (Huber, 1990), decision cycles (Huber, 1990 ; Lebraty, 1994 ; Elam and Leidner, 1995 ; Calhoun and Teng, 1996 ; Uzumeri and Snyder, 1996) or changes in the communication network (Crawford, 1982 ; Zaremba, 1996). Research about organizational determinism considered the reverse relation - the impact of different organizational variables on technology, especially on its use. Here could be mentioned Braverman (1974), Jones (1990) or Fulk (1993). Last, some works, rather rare, focused on a sort of mutual determinism by including mutual impacts between technology and organization. We can find here some conceptual contributions developed in direct line with Emery and Trist's sociotechnical school (1969). What is the relationship between this work and more sociological ones? More than a theoretical alignment, it would be more suitable to invoke some kind of an epistemological fraternity with structuralist sociologies. This first generation of work, somewhat crude in its theoretical stance, is more or less inscribed in a positivist perspective. By the end of the 80s and the beginning of the 90s, there had been a relative decline of this research in favor of more actor-centered sociologies. More and more work tried to stick closely to end-user's interpretations and appropriation processes. Nevertheless, Walsham (1995a and b) noticed that positivist studies remained dominant in major IS journals, even if interpretive studies had been gaining ground. Eventually, the causalist vision remains strong today, far beyond academic communities in IS. Wolton has thus underlined the importance of vision in terms of impact as regards the various public reports considering "new technologies", all of which were giving way to a recurrent "technological fatalism".

The 80s and the comeback of actors within IS

With the 80s, a new theoretical framework arose in the IS field. It consists of different actor-centered sociologies: the strategic analysis mentioned in the first part; hermeneutic approaches along with some forms of action-research. IS management is not an exception in the trend of "humanization" on which Dosse. (1995) put the stress as regards humanities on the whole.

IT social construction (Fulk et al., 1987), interpretations of tools by users (Doolin, 1998) and inter-personal dynamics around computer-based systems (Walther, 1992), penetrate the IS world more and more. The autonomy of actors is gradually put forward. Information technology is more represented as an opportunity than a causal factor (Desanctis & Poole, 1994).

With the wisdom of hindsight, it seems that some research at the end of the period integrated actors and structures (notably technological ones) in an interactional model, but the whole remained dichotomist. Independent and dependant variables were still distinguished. Recursive processes were still put aside. The overcoming of this fundamental dichotomy would only happen with the arrival of the third period.

From the end of the 80s to 2003: from actors to structuration processes

At the end of the 80s and at the beginning of the 90s a third stream was developing. This one can be inscribed in a theoretical move we will qualify as “integrative”, on the ground of their ambition to overcome old socio-organizational dichotomies.

IS researchers began suggesting analyzing the implementation and use of Information Technologies as a structuration process. Three big referentials are present explicitly or implicitly:

- (i) Promoters of Structuration Theory;
- (ii) Users of critical realistic approaches (see Mingers, 2000 or Archer et. al, 1998),
- (iii) Adopters of concepts and models developed and refined by institutionalists

These can be described by means of Table 1.

All these approaches share the same theoretical project: breaking with this artificial separation between Subject and Object, individuals and society, holism and methodological individualism. Some other general sociologies, like Bourdieu's (1990) theory of practice share the same project, but do not have the same audience in IS as structurational approaches (Jones, 1999).

The oldest sub-stream in its applications in IS is certainly Giddens' Structuration Theory (1979, 1984), which has been experiencing a growing interest in general management (Giordano, 1998) and information systems management. Here could be mentioned numerous pieces of research:- Barley (1986), Walsham and Han (1991), Orlikowski and Robey (1991), Orlikowski (1992), Desanctis and Poole (1994), Walsham (1993) and many others. Processes *in* and *around* technology are described as both habilitating and restraining actors. IS researchers try to understand how the design, implementation and use of a computer-based tool can modify the conditions of interaction and favor either the reproduction or production of social structures. Three sorts of applications of Giddens' work can be isolated: those attempting to apply directly Structuration Theory to IS contexts, those trying to use it only as a starting point for the elaboration of intermediate theory more usable in a research situation and those using Structuration Theory as a frame making it possible to illuminate and supplement other sociological approaches (Jones, 1999) that then become intermediate theories. We can find in this last situation studies like those of Bloomfield and al (1992), Fung, Lea and O'Shea (1995) or Monteiro and Hanseth (1996). In line with this, Walsham (1997, p 477) states, “the theory (Actor-Network Theory) can be complemented by other social theories which take better account of broader social structures, such as the work of Giddens.” Nevertheless, one can consider, especially with Latour's writings concerning “interobjectivity” (1994), if translation is not much more consistent with a critical realistic approach.

Table 1. Main Integrative Approaches

| | Institutionalism | Structuration Theory | Critical Realism |
|--------------------------|--|---|---|
| Period of glory | Early 20th century The 90's (with neo-institutionalism) up to now | The 80's and 90's | Mid-90's up to know |
| Status of theory | Sometimes a meta-theory Sometimes an intermediate theory | An epistemological stance Sometimes a meta-theory Sometimes an intermediate theory Sometimes a reference to build or illuminate an intermediate theory | An epistemological stance Sometimes a meta-theory Sometimes an intermediate theory Sometimes a reference to build or illuminate an intermediate theory |
| Central principle | Integrating actions and institutions Institutions are an active principle in actor's mind | Action and structure are parts of the same element Actions produce or reproduce structural properties | Action reproduces or transforms the conditioning context Structures can influence and constrain actors independently of their perceptions Analytism |
| Key concepts | Institutions Isomorphism Transaction Order Security of expectations Working rules | Structuration Reflexivity Ontological security | Morphogenesis Morphostasis Structural elaboration |
| Main authors | Veblen (1899), Commons (1934), DiMaggio and Powell (1988, 1991), Oliver (1991) and Strang (1994) | Giddens (1979, 1984) | Bhaskar (1979) and Archer (1982, 1995, 2003) |
| Status of IT | A possible institution or working rule related to IS use An alternative materiality | A "mnestic trace" No materiality at all | A material and normative constraint An intransitive materiality as regards some aspects |

Academic work with a critical realistic orientation shares a common theoretical matrix with Structuration Theory (Hodgson, 1999; Stones, 2001) and institutional approaches (Lawson, 1994). Nevertheless, they give a more direct place for computer-based tools, especially as regards their materiality, and integrate notably a scope of constraints and opportunities set by previous interactions, and that will condition it (without determining it). Up to a certain extent, critical realistic approaches join the notion of “under-determination” as refined by Duhem (1981). This one expresses both the “plurality of the possibilities and the existence of constraints that makes that some things happen and others do not.” (Dosse, 1995, p. 319). Indeed, Giddens’ rather voluntarist theory, because of the “conflation” action-structure it results in, leads to a framework in which time is obviously absent (Archer, 1995). Critical realists thus propose a more analytical representation in three stages describing analytically the deployment of a structuration process: conditioning context (T1), action (T2), and then structural elaboration (either transformation or reproduction of social structures) resulting (T3). It is also considered that context can condition action “independently” of actors’ perceptions. Several contributions were based explicitly or implicitly on the realistic perspective, more particularly Barley (1986, 1990), Dobson (1999, 2002).

The third and last perspective is linked to institutional approaches which draw for instance on DiMaggio and Powell’s theoretical frameworks (1988, 1991). They have promoters and users both in economy and sociology. Those share some common points with Structuration Theory (Barley et Tolbert, 1997) and critical realism as well (Lawson, 1994). Nevertheless they are less used in IS than Structuration Theory.

In spite of some specific points, because of obvious conceptual proximities and on the grounds of a similar theoretical project (overcoming the actor-structure dichotomy), we will call these three sub-streams “integrative”.

Today, integrative approaches, whatever sub-stream they correspond to in IS, are a kind of theoretical contribution we could label as “illuminated”. Even if some specific managerial models exist, those are almost systematically put in perspective with more general sociologies, among which are the sociologies of the Object mentioned beforehand. How can we account for this trend shared by English and French-speaking communities in IS? We can put forward several explanations for this:

- a) The need of minimal theoretical consistency, the use of a general referential being a way to get more harmony in the development of new concepts;
- b) A problem of competency as regards the mechanism of reproduction and transformation of social ties which make it necessary to include a third party in order not to reinvent the wheel;
- c) Legitimacy preoccupations, i.e. the massive use of sociological references which strengthen managerial work;
- d) Lastly, the search of greater autonomy of researchers in IS (and more generally, in Management), notably as regards Economic Sciences. From a psychoanalytic point of view, one can also wonder if the sociological detour is not an extra way for managerial research to “kill the father” (Economics)...

Finally, it is possible to summarize the three big steps of IS developments by means of the following Table 2.

Table 2. Perspectives on the IT-Organization Relationship (Adapted From de Vaujany, 2003).

| Perspectives | Functionalism | Emergentism | Integrative Approaches |
|---|--|--|---|
| Principle | Structure (whether social or technical) determines action | Action is the starting point of any social construction | Action and structure can not be separated. Structure is both a means and a constraint for action, an habilitating and a conditioning factor |
| Theoretical roots | Normativism, functionalism, marxism, structuralism | Interpretative sociology, some forms of social constructivism, hermeneutic approaches | Structuration theory, institutionalism, critical realistic theories (notably morphogenetic approaches) |
| Intermediate theories in social sciences and IS | Cues-Filtered-Out Theory (Sproull and Kiesler, 1991) The SIDE model (Postmes, Spears and Lea, 1998) Theories about IT organisational impacts (Huber, 1990; Elam and Leidner, 1995) Theories about organisational context impact on IT (Jones, 1990; Fulk, 1993) | Hermeneutic approaches (Doolin, 1998) Some forms of social constructivism and some interpretive approaches (Fulk et. al 1987; Jones and Saunders, 1990) Strategic analysis (Crozier and Friedberg, 1977) | The structurational model (Orlikowski, 1992) and the "practice lens" approach (Orlikowski, 2000) Genre theory (Yates and Orlikowski, 1992; Orlikowski, Okamura and Yates, 1999) Barley model (1986, 1990) ; Actor-network theory applications in IS (Fung, Lea and O'Shea, 1995 ; Monteiro et Hanseth, 1996) |
| User status | A passive and determined agent | An active and autonomous agent | A recursive and interactive agent ¹ |
| Technology status | A determining object | A malleable object | A "technology in practice" (Orlikowski, 2000) |

¹ Also an agent involved in "internal conversation" from Archer's (2003) perspective.

Discussion: Ontological specificities of IS and managerial fields and contemporary trajectories

The two preceding parts were based on the most obvious distinction between sociology of the Object and IS: the institutional frontier between both which made it easy to work out specific historical analysis. IS researchers meet regularly at the International Conference on Information Systems (ICIS), the European Conference on Information Systems (ECIS), or the French Association Information et Management (AIM). They publish their research in *MIS Quarterly*, *Information System Research*, *the European Journal of Information Systems* or even *Système d'Information et Management*, the review of French-speaking researchers. They belong to specific academic departments: business schools (i.e. "Ecoles de Commerce" in France), management faculties (i.e. "Institut d'administration des entreprises" in France) and so on. Sociologists meet in specific workshops or conferences. They publish in the *American Sociological Review*, *the British Journal of Sociology*, *the International Review of Sociology*, *the Revue Française de Sociologie* or *Sociologie du travail*. They belong to specific academic departments as well.

But besides this first boundary, the two preceding parts give the impression that both communities are finally not so different in the way they deal with the Object, particularly as regards computer-based systems. This is mainly to draw extensively on the use of sociological references in the IS field.

In this last part, we will examine the possible ontological differences between managerial and sociological work, more precisely the way they conceptualize IT.

From understanding to evaluation

At first sight, it seems that a clear point can differentiate some sociological studies from more managerial ones. The former have a rather comprehensive project. The latter are more evaluation centered. More precisely, it seems that efficiency and effectiveness criteria, fundamental in managerial research, are rather absent in models worked out by sociologists (or only as an actor's logic).

Evaluation matters are thus frequently raised in Information Systems research. Walsham and Han (1993) evoke "usage efficacy", Orlikowski and al (1995) "effectiveness in use", Desanctis and Poole (1994) "social productions" linked to IT use. It is then clear that IS researchers, even if they employ some sociological concepts or models, do their utmost to inscribe them in managerial problems. The vision of IS managers, whether accepted in a narrow or a broad sense, is always present in researchers' minds.

On this first point, things are all the same not as obvious as they appear. Indeed, several sociological works, notably those of Callon and Latour (1990, 1992), have a real managerial impact. Their work is an invitation to appraise sociotechnical networks' resistance around an innovating object, to detect some leaders and more broadly, to open the way to a deep translation process of IT implementation. Callon and Latour research can thus be used in an evaluative manner. Such is the case of many other sociological studies for instance Alter's. In a nutshell, it is

difficult to assert that sociological approaches are intrinsically “contemplative” and not related to action.

From understanding to action

Another axis could help one to differentiate sociological from managerial research in IS: the search of “actionability” in the knowledge worked out by academics. According to Schön (1983), actionable knowledge consists in knowledge that will be “useful for action”. In line with this, it seems that sociology really wants to develop 'actionated' rather than 'actionable' knowledge and that its overall finality is not to work out management tools. Several studies adopt the point of view of the organization and of dominating stake-holders of this one (such as senior managers or shareholders) in order to drive the system in an opportunistic way, i.e. in a way that favors their interests. Sociological models in IS often include useful variables for action:

- The “spirit of technology” and IT “restrictiveness” for Desanctis and Poole (1992, 1994);
- The action of “facilitators” for Walsham (1993);
- Some improvisations of users that help tools to find their place for Ciborra (1999) and that contribute to the auto-organization of sociotechnical systems.

Nevertheless, this potentially normative level is not always present in IS research. Orlikowski (1992) like Barley (1986, 1990) or Ciborra’s studies (1999) or theoretical frameworks correspond to a “comprehensive” project. They are not properly speaking “managerial” in the sense that they would aim at developing knowledge useful for action.

Besides, action-research or intervention-research (Which, till now, have rarely been applied to IS objects by sociologists) completed by some sociologists can make the second axis even more problematic. Action-research methodologies exposed by Barbier (1994) are sometimes very close to a managerial process, especially when they evoke the theorization-evaluation-publication process.

Conceptualization of IT proposed by both field

Gradually, it seems that sociology and IS meets each other on some common points. Each makes sense today of technology by means of complex modeling and place the technological artifact into an interactionalist perspective. They progressively recognize the indetermination of technology impacts.

Nonetheless, sociology's recognition of IT as an "Object" is a very recent phenomenon. Up to the eighties', most sociologists did not give any special interest in technology. This was perceived as something linked more or less to a theoretical determinism. Sociologists focused on the totality of society and has no interest in IT as a specific social construct. In France for instance, it is only in the "Journée de Sociologie du Travail 2003" (an important French conference in sociology) that the emergence of IT topics. can be noticed

On the other hand, IS sociological contributions try more and more to make sense of IT, in spite of an obvious lack of conceptualization of artifacts (Orlikowski and Iacono, 2001). This can be sometimes related to the conceptual frameworks implemented. Most structurational studies, in coherence with Giddens ideas about structures, did not give any specificity to IT. Artifacts have no materiality at all and are a "mnesic trace" like many others. Thus, some researchers tried recently to make sense of IT treating it as a "technology in practice" (Orlikowski, 2000) or as an "organizing vision" (Swanson and Ramiller, 1997, 2003, 2004). At this stage, we can notice that other theorists drawing on critical realism insist on IT materiality and exteriority (see Mingers, 2004 and Dobson, 1999, 2002). They perceive it as a "conditioning" element, with some intransitive material properties that defines an opportunity scope. Nonetheless, they avoid any deterministic stance, as they believe in unexpected outcomes of interactions.

In view of our analysis, one can easily yield to the temptation to adopt Dosse's point of view (1995) when he says, "disciplinary frontiers have no naturality. They are much more linked to institutional boundaries which have not, in spite of recurrent formal claims, specific objects or notions." Even if managerial models often have an evaluation or collective action management centered-project, it is clear that this distinction has nothing ontological. Several sociologists' frameworks or field-studies display messages useful for collective action (such as actor-network sociology) or are based on absolute evaluation criteria of social dynamics around tools as well.

Finally, the IS-sociology pairing has already a long history. IS objects, their evolution, have largely fed the debates, for instance with sociology the most recent changes, i.e. the re-introduction of objects or materiality in sociological frameworks. Some relatively isolated researchers in IS even contribute to sociological debates and publish in journals and reviews outside their disciplinary field. On the other hand IS researchers have been used to implementing sociological models like strategic analysis and Actor-Network theory for a long time. In the case of structurational frameworks or usage theories, they have inscribed them in managerial problems dealing with evaluation or collective action management. The distinction between sociologists interested in IS and researchers in IS management interested in a partial or global sociological vision is not that easy to make. In view of our chronological analysis, it seems that sociology and IS collaboration consists of an interesting one-way relationship between two similar partners. This isomorphism, especially as regards IT conceptualization, could be illustrated by means of the Table 3.

In view of our first part, it seems that both academic fields view technology not in itself, but either as a socio-cognitive scheme (like Orlikowski when she uses the idea of "technology in practice") or as a part of the social stage on which organizational members play and refine their roles.

Last, in view of this analysis, something seems to be clearly missing in the academic system: a forum between both communities. But would both parties be equally involved in such system?

Table 3. Comparison of the Sociology of the Object and IS Sociological Contributions

| | Sociology of the object | IS sociological contributions |
|--|---|---|
| Draw on general sociological approaches | No | Yes |
| Study IS objects | Yes, more and more | Yes |
| Have some normative goals | Yes, for some | Yes |
| Have comprehensive intentions | Yes | Yes |
| Use other fields references | Rarely | Yes, especially in the fields of sociology, psychology, economy and computer science |
| Status of IT | None up to the eighties. IT was absent in most theoretical frameworks. Computer use was a social phenomenon treated like any other social phenomena, i.e. a possible "uncertainty zone", a part of social structures, a social activity... IT becomes either a socio-cognitive scheme (for Blandin) or a part of the interactional framework (for Latour and Alter) | IT as an artifact is more or less theorized by IS researchers. It is often treated as a "tool", whose appropriation has to be understood in order to be improved. In many works, IT conceptualization remains rather poor and is more or less related to a socio-cognitive scheme (for Orlikowski) or a material artifact actors can interpret and interact with (for Barley) |

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