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Research Diary Visual Mapping : a reflective methodological
tool for process and strategy-as-practice studies.

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Introduction

Balogun, Huff and Johnson (2003) highlight the growing paradox for researchers who must focus on context and details while favouring general lines of research. These authors focus their reflection around the collection of qualitative data, particularly those of discussion groups, collaborative research and of research journal redaction techniques. In parallel with this, collaborative research is faced with the object / subject duality underlined by Plane (1996; 2000): the researcher practicing collaborative research is involved in a process that alters his/her perception as well as the nature of the phenomenon; this is well summarised by Levi Strauss (date?) *"In science, when an observer is of the same kind as the observed phenomenon, he/she is part of the observation"*. The researcher's personal involvement in daily activities of the company is another limitation attributed to collaborative research. These two limitations, inherent in collaborative research, are an obstacle to the researcher's reflexivity about his/her own practices and his/her perception of the phenomenon through his/her practices. It is also a limit to reflectivity, that is to say, the ability to perceive the phenomenon as a whole and to take a step back from it. These limitations are frequently accompanied by the question relating to the basis of the results claimed by the interpretive researcher (Yanow and Schwartz Shea 2006). Ethical implications specific to this mode of research like securing the researcher's consent, ensuring confidentiality and managing any disappointments (Bartunek and Louis 1996) must also be taken into consideration. The specific mode of collaborative research renders the researcher's view on his/her own practices primordial. The researcher in position, immersed in praxis over the medium term, with structurally limited time dedicated to research, can make the link between theory and practice by increasing the degrees of reflectivity and reflectivity. These considerations lead us to propose, in the context of collaborative research, a new utilisation of the personal diary, fuelled by our doctoral experiences in collaborative research. While the personal diary in its usual form increases the level of reflectivity on an intervening process, it is nevertheless difficult to exploit for the work of interpreting and legitimizing research. We therefore propose personal diary mapping. In addition to the advantages of personal diary mapping as a methodological tool for viewing the phenomenon, it allows a process to be described by highlighting specifics that are not obvious in reading a text. Moreover, the process of personal diary mapping provides a contribution to the epistemic work in a constructivist reference because it helps make the relationship between knowledge and empirical information explicit (Martinet 2007). This mapping work is at the boundary between Miles and Huberman's data

reduction (1994/2003) and the visual form of data suggested by Meyer (1991), and is also in line with Langley's work (1999). This proposal for a methodological tool is particularly valid for research in Management Sciences and more particularly for research into processes, since the implementation of longitudinal research helps one to better appreciate these phenomena over the medium term (Van de Ven 1992; 2007). In addition, this tool offers opportunities in terms of researcher responsibility in collaborative research through the epistemic work (Martinet 1990; 2007; Avenier 2010) that it implies, the structuring of the phenomenon that it allows and the reflective character it bears. It is also a way to minimize disappointments as it is the concrete expression of the researcher's perception and can be used to interface with practitioners.

After a summary bringing process studies closer to SaP and a review of the modalities of action research and their implications in terms of ethics and researcher responsibility, we present the origins, principles and benefits of visual mapping as regards the researcher's responsibility. In a second step, we illustrate the normative elements of this approach through a case study on strategic competence development based on personal diary mapping.

1 Action research, ethics and visualization of available information: process and strategy as practice

1.1 STRATEGIC PROCESS AND STRATEGY AS PRACTICE

Studies of Strategy as Practice (SaP) and of strategic processes are often associated. Whittington (2007) denounced abuses concerning the reciprocal use of these two points of view as applied to strategy study. He indicated, however, that these two currents meet when one focuses on micropractices. Using the logbook as a methodological tool for recording empirical elements is a means of recording micropractices and, through them, of understanding the development of strategizing in a processual context. In addition, Strategy as Practice understands strategy as a social practice which is expressed through actions ("what people do") (Johnson, Langley, Melin and Whittington 2007). Hendry and Seidl (2003) propose bringing in the concept of episode from Luhmann's theory of social systems in order to consider strategic change organizational processes in another light. They argue that emphasising episodes in a process is a rigorous means of isolating and exploring the problems and of putting them into perspective. This approach is consistent with the three axes of SaP: practices, praxis and practitioners, axes that are at the crossroads of strategizing (Whittington

2006). Using the logbook and its mapping plays a part in determining coherent episodes relating to the practical issues facing the company and its context.

1.2 COLLABORATIVE RESEARCH: A RELEVANT MODE OF RESEARCH FOR MANAGEMENT SCIENCES.

Action research, broadly defined, is a form of research that promotes a different implementation than that of natural sciences since the researcher, who is also a participant in the action, is not independent of the observed phenomenon.

Action research is a research method that brings together different approaches, the best known of which are Lewin's Action Science, *action research* by Argyris, engineered research ("*recherche ingénierique*") in Management Sciences (Chanal, Lesca and Martinet 1997) or collaborative research (David 2000). The term "action research" implies the intervention of a researcher or of a group of researchers within the framework of an organisation.

The aim of this research is to produce knowledge in collaboration with company stakeholders in the context of the transformation of the organisation. Bartunek and Louis (1996) emphasize the contribution of internal players (insiders) in the process of creating knowledge generated by researchers (outsiders). Although the change is envisaged in many ways (Edmondson 1996), the general aim of action research is to develop practical skills in a democratic and participatory manner (Reason and Bradbury 2001). These authors state that the process associated with this practice combines action and reflection, theory and practice in relation with others to develop practical solutions.[1]

David (2000) indicates that the researcher's position "is both more sophisticated and more risky" (p. 23) than in more 'traditional' research and that epistemic work is one of the keys to looking at the practices induced by the researcher, a view consistent with the proposals made by Martinet (Martinet 1990; 2007). We add that the researcher, working on a real problem facing the company, faces a real paradox. He/she must be immersed in his/her field, working with and for stakeholders in order to propose a solution or solutions to a strategic management problem. Action, therefore, requires a necessary and beneficial immersion in the context and the phenomenon. It is necessary because it allows observations to be obtained in position and in co-construction with the practitioner or as a practitioner. It is fertile because it is at the

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[1] action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities.

source of the creation of usable or potentially usable knowledge (Argyris 1995). Immersion is the paradox because the researcher must manage to remove himself/herself from the company to let the knowledge project evolve and exist at a more conceptual level. These findings raise questions about the factors that may contribute to legitimize this type of research and to strengthen the apparently paradoxical position of the researcher "in position". The legitimacy of this type of research and of the researcher will thus be better acknowledged.

Collaborative research allows determination of a research direction in congruence with the needs of organisations since the guidelines are built on the basis of observations made by the company and of the needs for solving the expressed problems. This corresponds to the notion of researcher - practitioner interaction emphasized by Avenier and Nourry (1999). Regarding the information available, collaborative research is a preferred means of access to the field. The definition phase of the action must therefore be put to good use in negotiating terms of access to the field and highlighting the mutual contributions of the two projects (Avenier and Nourry, 1999, p 58). Indeed, research consistent with the needs of the company is a factor facilitating the delineation of specific points of study or the identification of players to meet. The study of processes, and particularly those implemented in the context of collaborative research, requires epistemic work (Martinet 1990, 2007) useful to understanding the phenomenon and to the associated skills project in the wider context of establishing a core of knowledge common to a discipline. The tool we propose is part of that goal.

1.3 THE IMPLICATIONS IN TERMS OF ETHICS AND OF RESEARCHER RESPONSIBILITY

Most ethical considerations in the field of social sciences research relate to the researcher's relationship with the people involved in the study (Gohier 2004; Bryman 2008). These considerations, as outlined by Gohier (Gohier 2004), comply with the research ethics policies established by the "funding bodies". Avenier (2010), in her proposition of constructivist scientific paradigm elements, highlights the implications in terms of researcher responsibility, particularly through the work of legitimization of skills that must be performed in this epistemology.

Between ethics and responsibility, it is our opinion, that there is an axis that has not been explored: the implementation of a methodology consistent with the epistemological choices. In the epistemic and methodological frameworks under discussion, these ethical issues must be integrated. The mapping of the logbook plays a role in this. This need is particularly important when the research takes place in an SaP framework. It is necessarily with the

practitioners that the research goals are built and they are predestined to be implemented in the shorter or longer term, which further accentuate ethical concerns.

It is from the paradoxes of action research and in light of ethical considerations that we propose personal diary mapping as a methodological component. It allows the information contained in the diary to be included within a relatively small space. This visualisation leads to the phenomenon being grasped in its entirety through a better understanding of the links between periods and events and helps in the overall structuring of the phenomenon. The creation of this mapping corresponds to a piece of epistemic work that gives substance to the research and provides the various players with a common framework for reflection while fostering researcher responsibility.

It is the researcher's responsibility to explain the link between his/her results, the methodology and the materials used to achieve them. This follows reflection relating to the legitimization of generated knowledge as envisaged by Avenier (2010). It reveals the importance of clarifying and demonstrating "flawless rigorousness" *(ostinato rigor)* (p14) to legitimize the generated skills. We shall see later how personal diary mapping is a tool that, in a posture of constructivist collaborative research, can promote the legitimization of generated knowledge and the researcher's responsibility.

Proposal of tools appropriate to research-approach enhancing practices is relevant. The context of action research implies a paradoxical position for the researcher. In addition to guiding the research, these tools must meet ethical concerns related to the conditions of the research. After the presentation of methodological anchors concerning information gathering (Meyer 1991) and reduction of data into visual form (Miles and Huberman 1994/2003; Langley 1999), we will discuss the advantages and limitations of diary mapping followed by the methodological aspects concerning its development.

1.4 VISUAL MAPPING: A METHOD ADAPTABLE TO THE PERSONAL DIARY

1.4.1 Origins of data visualisation in Management Sciences

Meyer (1991) proposed studying the potential of visual presentation of qualitative data for management sciences after finding that visual presentation is very widely used in management sciences within research designs and for reporting results, but little-used for

information gathering. Meyer proposes collecting visual data rather than data written or transcribed from the oral.

Miles and Huberman (1994/2003) support presenting data in graphical form and propose different forms of presentation. The authors value the summary nature of visual information that makes it possible to respond to the cognitive abilities of human beings. This specificity echoes the limitations of the personal diary in its literary form and the fact that the graphical form is better suited to the presentation of more data in less space. Laying out qualitative data in a graphical format corresponds to a phase referred to as "data reduction" (Miles and Huberman 1994 / 2003, p 29) which is an integral part of the analysis.

Langley and Truax applied (1994) the presentation of visual data in graphical form as part of an inter-site study. They propose reducing the data into an organisational flowchart. The purpose of this image presentation is to find regularities by analysing several organisations' flowcharts. Langley (1999) describes strategies for theorising from processual data. In particular he details the case of mapping and says that this format is particularly suitable for the case of processual studies since several dimensions can be shown in the analysis. Langley then recommends its use for inter-site studies, allowing regularities between cases to be discovered, the information to be reduced to a high degree | ...] and a level of "moderate generality" (p. 703) to be achieved.

This method can be extended to intra-site studies because it facilitates overall understanding of the phenomenon. This method is also quite relevant in the context of a longitudinal study of a single case largely rooted in the field and therefore in collaborative research. Beyond the issue of visual data collection proposed by Meyer, it is also interesting to highlight the methods of visual data reduction. The process of creating a mapped personal diary is therefore at the border between the methodologies of Miles and Huberman (1994) and of Meyer (1991) and in line with Langley's work (1999). The first two have shown the benefits of the visual aspects in processing and gathering information for social sciences and Langley provided a new perspective on the use of mapping for research on processes in the context of inter-site studies.

We will therefore expand on the use of the logbook and that of the mapping tool in the context of a single case study. We shall also clarify the intermediate steps needed to reach the object available for analysis, that being the mapped personal diary.

1.4.2 The organizational flowchart: the embodiment of the personal diary

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The personal diary in collaborative research is not only a reflective tool but also provides valuable material for collaborative research. It is sometimes difficult to discern relevant information from that of lesser importance. A particular virtue of the personal diary is the conservation of information. It allows information to be selected and for the researcher to take a step back from a sometimes distracting background, it is also a self-reporting method (Balogun et al. 2003).

This method has a long pedigree related to its utilisation in sociology. It is a tool that was initially entrusted to the observed, that the researcher retrieves and uses in the context of the study of a phenomenon or population (Conway, Ikram Nasr, Roussel and Sassi 2006). The diary is also used by researchers themselves in the interest of reflexivity in research (Nadin and Cassel 2006) or for studying an environment already known to the researcher (Alvesson 2003). It is a tool widely used by researchers in many disciplines such as sociology, ergonomics, organizational research and management. The discipline of the personal diary allows one to see emerging regularities during the process of writing and reading the diary, (Glaser, 1992) or differences (Strauss & Corbin, 1990 and 1998) emerge according to the type of analysis chosen (Miles and Huberman, 1994).

The personal diary is a process for the accumulation of raw data and of systematic and rigorous information, subject to the self-discipline of daily writing. This daily task allows one to take a step back from the research objective and this is especially true in the implementation of the first collaborative researches.

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Example of influence of the researcher on the research

This last point finds its origin in our practices; the collaborative research contract was concluded on the basis of research topic relating to the importance of networks in the context of companies in highly regulated fields. After a few months, the network anchor was apparently not the most relevant with regard to the company's needs. That is what we call "the influence that researchers may be tempted to exercise": the fact that they can select data to match what they 'wish to find'. To counteract this undesirable effect, we undertook two actions: with the first, we shifted our research topic to a subject better suited to the needs of the company: the ability for a business to build know-how with few resources; the second was to keep to our personal diary more systematically and rigorously so as not to repeat the same error. For this reason we emphasize the importance of keeping a personal diary in the context of collaborative research. This may be a research diary or a diary of assignments. Whichever it is, it is a methodological means of increasing the legitimacy of the research.

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Box 1: The risk of data distortion

Collaborative research places the researcher at the centre of what he/she is studying since he/she can take on different roles with players from the organization, but whatever the role - consultant, facilitator or even player – he/she is an integral part of the context. In this context,

the role of researcher-participant may have ethical implications, especially when the players see the researcher as an ally or spokesperson.

This aspect of the research therefore implies the question of the chosen point of view (Adler and Jermier 2005), that being how to proceed and what data to retain from the observed phenomenon? Further still, how should the researcher select information gathered from players within the framework of the semi-structured interview even though it is partially controlled, or the more spontaneous information stemming from everyday interactions?

Keeping a daily personal diary yields partial answers to both questions. Indeed, when asked "how?", the personal diary helps the researcher to put into words the experience of the phenomenon. The constraint is high since it is necessary to devote a certain amount of time to this activity every day. But it is a way to release the tensions implied by the writing of field notes and observing the phenomenon itself, since the researcher can then focus his/her attention on the action.

To the second question, the diary allows an answer based on the chronology of events. We retain information relating to the studied phenomenon or situation as a chronological sequence of events making up a process, in the form of episodes, extracted from this methodological task. The personal diary is not a substitute for other methods of data collection: it constitutes a central core to which the researcher can refer if necessary.

The personal diary is a particularly rich and compact source of information. We propose here a method of personal diary mapping for structuring ideas. This approach is a phase of data reduction and analysis inspired by the proposals of Miles and Huberman (1994) relating to the opportunities that exist in terms of structuring qualitative data and among these, the creation of mappings. According to them, this tool offers the possibility of achieving an average level of generalisation by putting a large quantity of information into perspective and contributes to the development and verification of theoretical points of view through the epistemic work it implies while exposing the responsibility of the researcher.

1.4.3 Contributions of personal diary mapping: a reflective tool

- The emergence of remarkable facts

While the personal diary, through reading, allows salient facts to become visible, it is difficult to exploit given the cognitive abilities of human beings and furthermore, some important relationships between facts do not appear in an obvious manner. This dense and complex material can be processed to bring out a visually understandable process.

Mapping the personal diary in the form of a flowchart allows the diary, a literary object, to be transformed into a more graphical form, giving an overview of the phenomenon and helping to better understand the implications in terms of informational flows and exchanges in particular. It is a reflective tool that emerges. It allows event repetitions to be visualised. Langley (1999) points out that this method reveals precedents in the context of a phenomenon or process similarities specific from one case to another. In our approach, this set of salient facts directs the preparation of the interview guide and the creation of categories for later coding. Thus, visual mapping is a phase of primary analysis (Miles and Huberman, 1994) prior to the final interpretation.

- Personal diary mapping: a support to interpretation

Creating a mapping for the study of a single case reveals trends in work sequences corresponding either to hierarchical levels, or to transversalities, and also to repetitions. This allows an improved visualisation of these sequences and their relationships: it renders concrete the emergence of episodes.

This perspective is possible because the personal diary changes from a linear and literary version in its primary written form, to a spatial version (representation in a plane), in which we can define a space showing some favourite dimensions for the observation of the phenomenon (Fig. 1 and 2: ordinate, the various divisions of the company). The temporal dimension is included in the form of a scale making up the base of the diagram (Fig. 1 and 2: in abscissa, time scale).

The examples below represent the graphical layout of a fictional personal diary. The symbols (squares, circles and triangles ...) are events.

In the two simulations below, the first shows a repetition of events, surrounded by double lines (1) on the diagram; it also shows a period of intense exchanges between two dimensions of the company, in dotted lines in the diagram (2). Lastly, the thin arrows indicate information transfers.
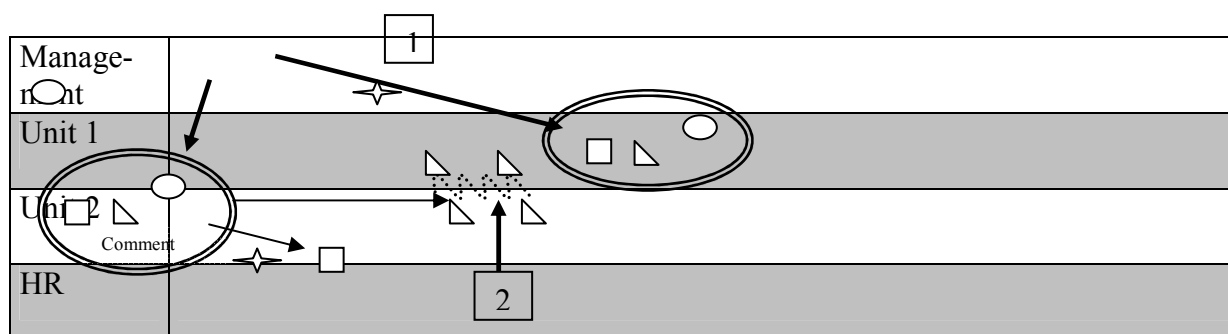
Time	Jan	Feb	March	April	May	June	…..

Figure 1: Processing a personal diary according to the *flowchart* method

The second schematic shows a phase of progression within the company. At this precise moment in the process, we see it evolve through the dimensions of the studied company.

Manage-ment							
Unit 1							
Unit 2							
HR							
Time	Jan	Feb	March	April	May	June	…..

Figure 2: Processing a personal diary according to the *flowchart* method

Creating the mapping leads to an overview of the phenomenon and transposes the linearity of narration into a plane. This step clearly shows global trends and repetitions, specifics which are difficult to identify in reading a research journal in its literary form.

- Support for the epistemic work

The mapped diary can be used as a general support for research and constitutes a methodological reference tool for the research design as much for locating oneself in time and among players as for structuring the phenomenon. Indeed, the mapping is a way to link the concepts used with the events or remarkable phases of the process. In this case, it is a tool to join theory and practice.

Moreover, the mapping implies a reflection on the various elements that will be selected for mapping. This work is an integral part of the reflection on the issues. The choice of the number of pictographs that appear on the mapping implies the emergence of a taxonomy of events that is not obvious at first sight. These choices structure the mapping work and, therefore, the continuation of the research and the resulting proposals. Mapping is central to the research inasmuch as it helps to define the relevant dimensions, categories and study objects during its structuring. Mapping has, so to speak, the role of "developer" in the photographic sense. Therefore, this tool has heuristic potential.

- A tool to uncover the responsibility of the researcher

What are the results of research based on? This question is the basis of questions concerning the quality of the research, it is the researcher's responsibility *vis à vis* his/her proposals that are then questioned.

Mapping induces a systemic and reflective view of the phenomenon. This visual representation can help the researcher to refocus the information on the <mark>issue</mark> because of the preliminary work in selecting events. It then helps the researcher to make links between the knowledge used and the empirical material, then the link between reported and field results. This support allows the researcher to anchor his/her results onto a concrete artefact. It is therefore a way of allowing peers to understand the researcher's perception of the observed phenomenon and the logic underpinning the research. Mapping is also an anchor point for concrete discussion with practitioners; it is a common basis for exchange.

It can also be used to more technical ends, like categorising or developing ideas central to the interviews. Indeed, from the empirical elements, concepts of literature are identifiable. To understand the relationships at work between these concepts, it is useful to construct the interviews based on the empirical and theoretical links emerging from the mapping.

Finally, downstream from the interviews, at the time of coding, mapping offers a reading of the interviews in light of the elements used in the mapping. In this latter case, it helps by favouring coding specific to the selected issue.

- What mapping can't do

It does not replace writing the personal diary nor is it a substitute for it. It is a way of treating it in a more structured manner. While this represents a loss in terms of the initial wealth of the personal diary, it is a contribution to the legitimacy of the whole research. Finally, while this tool is relevant in the context of the research on processes, it is not sufficient by itself. So the research design should be complemented by other methods of collecting and processing information.

<mark>1.4.4</mark> Elements of methodology for creating a personal diary mapping

The development of a mapping requires prior epistemic work for easy implementation: selecting the dimensions of the organisation and events and creating a summarised legend offering the possibility of reintroducing contextual elements.

The first step towards the creation of the mapping is to define the desired organisational levels as the abscissa. In the example, the fictive organisation's units are: Management, Unit 1, Unit 2 and HR. It is possible to represent associated entities (partner, supplier, subcontractor, funding agency, state, local government).

The second step consists of setting the ordinate. Providing a timeline and respecting its units as much as possible in each period allows human cognitive abilities to be satisfied. It is true

that some stages are much more laden with events, so it is important to assess in advance the necessary space to allow the selected events to be shown.

The construction of the mapping is performed from a limited number of events because it can quickly become unreadable without prior selection. This is a full-fledged analysis phase since certain information is selected at the expense of others. This is consistent with the proposals of Miles and Huberman on data reduction since "reduction is a form of analysis that consists of pruning, sorting, differentiating, rejecting and organising data so that we can draw "final" conclusions from them and verify them." (1994, p 29).

Achieving the desired summarised form requires identifying, categorising and selecting the types of events that one wants to have appear on the mapping. Once this list has been created, it is then useful to create groups of similar events. This categorisation reveals regularities. Only events representative of the process allowing the research issue to be answered are retained (a meeting, e-mail, a specific work period, a professional event, a sale, a new contact, etc.). For each of these events, adding information should be envisaged: a comment, a quantified indication, a label or any other type of information. This step determines the type of symbol that will be chosen to indicate an event type. This guarantees a certain diversity in the information despite the reduced form, while ensuring the essential character of this written statement.

The creation of a mapping also involves specifying the linkages between events. This requires choosing symbols to translate these links: lines, arrows, filled arrows etc. This job will reveal the dynamics at work in the studied phenomenon as well as the regularities. This is why the choice and use of these symbols must be the result of prior epistemic reflection. We illustrate the implementation of the mapping of a personal diary and its contributions in the context of collaborative research on the process of developing a strategic competence.

2 The case of developing a strategic organizational competence

I have used the personal diary in a reflective sense, to have a view on my actions in light of my experience. It is at the end of the collaborative research that the creation of the mapping has emerged as a means of revealing the highlights of the process and of providing a reflective perspective on the research.

I developed the mapping on the basis of this personal diary, complemented by certain company documents. The diary, in this form, is an anchor for the research. The methodology and research context will first be detailed, then the studied case. The graphical choices for the

development of the mapped diary are detailed in a second section. The first results from the mapping study are presented in the last part of this work.

2.1) RESEARCH DESIGN AND CONTEXT APPLIED TO A STRATEGIC ORGANISATIONAL COMPETENCE DEVELOPMENT PROCESS

2.1.1 The mapped diary at the heart of the methodology

The research in which mapping is implemented is a collaborative research on the construction of a process, namely that relating to the development and implementation of a specific organisational competence. Figure 1 shows the overall framework of this collaborative research. The ellipse shown on this diagram allows the methodological point addressed in this communication in particular to be viewed.

This methodological framework comprises three sources of information (numbered on the diagram below):

- The personal diary (1): it recounts the day-to-day running of the process, this perception being recounted in written form by the researcher participant.
- Formalised exchanges: this research material was obtained in the context of collaborative efforts with the company (e-mail, meetings) as well as the documents associated with exchanges (meeting notes and minutes, e-mails, joint working papers emerging from meetings).
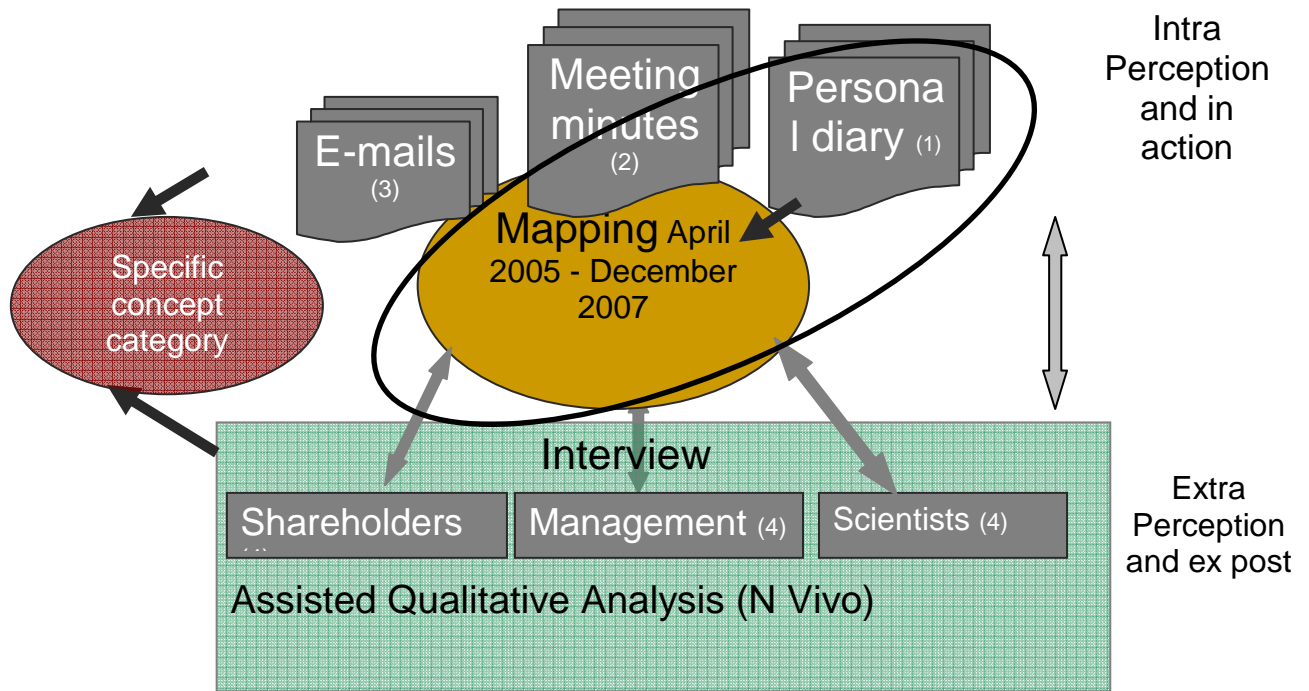- Ex-post interviews: conducted with key players, directors and shareholders.

Figure 1: Research methodology

2.1.2 The context of the organizational competence development process

- Entrepreneurial context

The company hosting the research develops biocontrol products that are environmentally friendly micro-organism-based biopesticides.

- Case study: a new organisational competence with regard to registration

The developing company needed to obtain registrations. The implementation of the registration competence took place between October 2005 and August 2007. This period is broken down, before the realisation of the mapping, into four stages of varying durations and content. These steps were determined intuitively based on the company's pace of development.

- Step 1: February to October 2005: The first phase corresponds to a particular assignment for the company in the context of an internship. A phase of understanding the implications of registration and of the intellectual strategy (patents, trademarks ...). The result of this mission is to have revealed that *the implementation of a registration strategy was equally or more important than an intellectual property strategy.*

This step corresponds to two assignments conducted by a master's degree student.

- Step 2: November 2005 to April 2006. Start of the collaborative research. This period was used to create a database, required to understand the procedures for future implementation: (Web sites, methods, guides ...)

This second stage starts at the beginning of the collaborative research and ends when the company is obliged to focus its HR on seeking funding.

- Step 3: May to August 2006. The third phase is shorter. This is an administrative phase of building a matrix, which is the backbone of the submission, the document that guides the creation of a specific file.

Step three begins with the preparation of the merger agreement and of the new guidelines decided by the acquiring firm.

- Step 4: September 2006 to August 2007. Preparation of the first European registration submission. This is therefore the first organisational experience relating to registration for this company.

This last step covers the entire period of preparation of the submission without further distinction.

These steps represent the development of the regulatory organisational competence. Other submissions since been created and the supporting documents have evolved as a result of constantly evolvinglaws.

- The use of the personal diary

This document is in two parts: one part serves to relate events "objectively" , the second part takes into account the more subjective or "emotional" aspects of the story.

Date	My experience	My feelings

Figure 3: Form of the personal diary used for recording events

This system allows one to disengage from the more emotional issues and therefore have access to a reflective analysis of the situation. This form helps researchers question their practices. At the time of narration, the form incites the researcher to reflect on the status of events and to extract from them the emotional burden implied by a long presence in a corporate environment. The column entitled "my experience" was particularly used for formatting the mapped diary.

The visual mapping phase of the personal diary is more easily achieved if the available data is purged of its links to everyday operations. Figure 4 (p 26) shows an extract from the mapped diary developed through this research.

This research is part of an abductive research model (Avenier and Gavard-Perret 2008); (Barin Cruz, Avila Pedrozo and Chebbi 2008) the aim of which is to contribute to a better understanding of the development of an organisational competence.

This is an embedded longitudinal case study that provides understanding and linking of the components necessary to create know-how adapted to young companies in highly regulated fields.

The next section details personal diary mapping in practice and gives some normative guidance for its construction.

2.2 CREATION OF THE MAPPED DIARY

2.2.1 The time and the creation of the mapped diary

- Personal diary mapping

The mapping was conducted at the end of the collaborative research (Step 4, described p 13). The task of putting the diary into perspective cannot be performed concurrently with the studied process because it is a global and *retrospective* analysis of events that allows those that will appear on the final document to be chosen. Rereading the personal diary helps one, however, obtain a first idea about the relevant events. The retrospective realisation facilitates sorting events and choosing the modes of representation best suited to each.

The need to include a relatively homogeneous timeline also calls for *ex-post* construction of the mapped diary.

Close rereading of the collected information and further in-depth examination of available information on a seminal event is preferable. The researcher aggregates various information sources to this end. The basic ingredient is a personal diary, but when an event appears to be important in understanding the process, it is possible to use other sources of information on this particular event to improve understanding of the event in this context. If a meeting is essential, the researcher can return to read the meeting minutes, listen to recordings, look through the e-mails exchanged or the supporting documentation of the meeting. From this information, he/she may choose whether to write a short text that will appear on the mapping at the location of the event. The following paragraph describes and explains the choices that were made for the labels to place on the mapping

2.3.2 Construction of the mapping and the associated epistemic work

Mapping creation consists of placing identified and selected events to provide an answer to issues. After this phase, the signs indicating the process dynamics are shown in the diagram. The list of events selected for creating the mapping, their representation pictograph and the markings indicate how dynamic the process is.

Most of the dynamics at work in this study have appeared during the construction of the mapping through the links and trends between the events and according to the recurrence of information exchanges. All the graphical signs used for the construction of the mapping are listed in two categories: those representing the events and the others showing the dynamics at work. The first table shows and details the events, the second shows the dynamics.
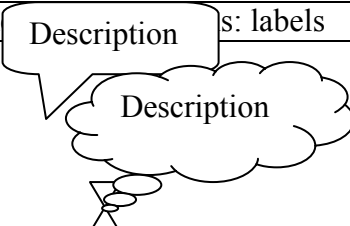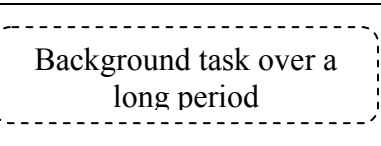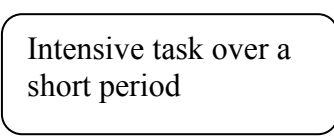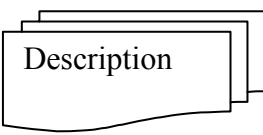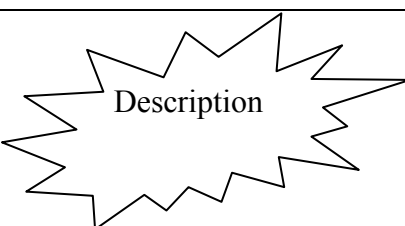
Events	Representation pictographs: labels	Justification / Context
Meeting Concerning the registration and organizational development of the company	Description	The choice of a thought bubble for meetings aims to provide the ability to show the ideas that emerge from the meeting
A defining, yet not necessarily remarkable, **Structuring event** in the process		The comic-book bubble allows a very short event to be shown at the lower tip of the pictograph
Background task A long task, punctuated by other activities not related to the registration	Background task over a long period	The dotted border of the symbol reflects the fact that the task is discontinuous in time
Intensive task Related to registration, short, lasting from a few half days to a few weeks	Intensive task over a short period	The solid border indicates the intensive aspect of the task
Certain decisive event. Occurs in the company and has a structuring effect on the whole in the short-term	Description	The rather sharp shape of this pictograph reflects the critical importance of the event in question
Important likely actions (Implies a strategic choice later) Occurs in the company and may have a structuring effect in the medium-term	Description	The choice of this pictograph with multiple layers allows the various potentialities of the action shown to be expressed
Crisis Occurrence of unanticipated events having an influence over the perception of the phenomenon	Description	The choice of a star to represent chaotic events expresses the unforeseen content that these events may have

Table 1: Pictographs chosen for the representation of events in the mapped diary

Table 1 lists the labels created for the representation of events. All include a text box to identify the events. Some are used to recall more detailed information (structuring events and meetings in particular) that has been selected for its relevance in the analysis of the process of developing regulatory competence.

Table 2 lists the pictographs used to identify the dynamics at work in the process. They are mainly arrows with varying meanings depending on the dynamics illustrated.
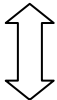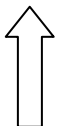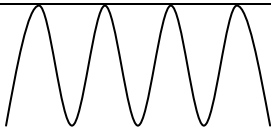
Type of dynamic	Related pictograph: arrows	Justification / Context
	" As a consequence" Used to indicate the direct consequences between two or more events	The single arrow expresses the apparently direct relationships of consequence between one event and another
	Used to indicate a joint action between several dimensions shown	The thickness of the symbol reflects the multitude of exchanges that can occur in the context
	Used to indicate a transfer of information. The base of the arrow indicates the dimension of the company from where the information leaves	Idem
	Used to represent phases of intensive work involving many information round-trips and document amendments (meetings, exchange of e-mails, work files). Occurs at the end of the process	This symbol is made of fine lines to reflect a set of exchanges that are part of micro-practices but that are important to the whole

Table 2: Pictographs chosen to show the dynamics at work between the events of the mapped diary

For the chosen time scale, one square represents roughly one day in the example shown. The chosen pictographs are a reflection of the interpretation of the selected events. This method helps to explain the choice of combinations of events (meetings, crises...) and their relationships to provide a representation adapted to the issue. These choices have implications on the interpretation and their explanation makes explicit the links between material and local results, a part of the epistemic work of the research. Detailing these choices highlights the researcher's responsibility in creation of proposed knowledge while bringing to the fore practices that lead to the construction of the phenomenon and the players concerned.

2.4 MAPPED DIARY ANALYSIS RESULTS

- Contributions of the research: creating structuring episodes

Ex post interpretation has identified five separate episodes from the intuitively-derived job steps presented at the beginning of this section (p 13). The total reference period is not the same and the first division corresponds to activity phases and to the company's pace of development. This phasing covers a shorter period than the initial one and defines the specific work done for the installation of the strategic competence. The breakdown resulting from the mapping focuses on the period from October 2005 to December 2007. The first step described on page 13 was not taken into account since this period had not been transcribed in a research diary. This was implemented at the beginning of the collaborative research.
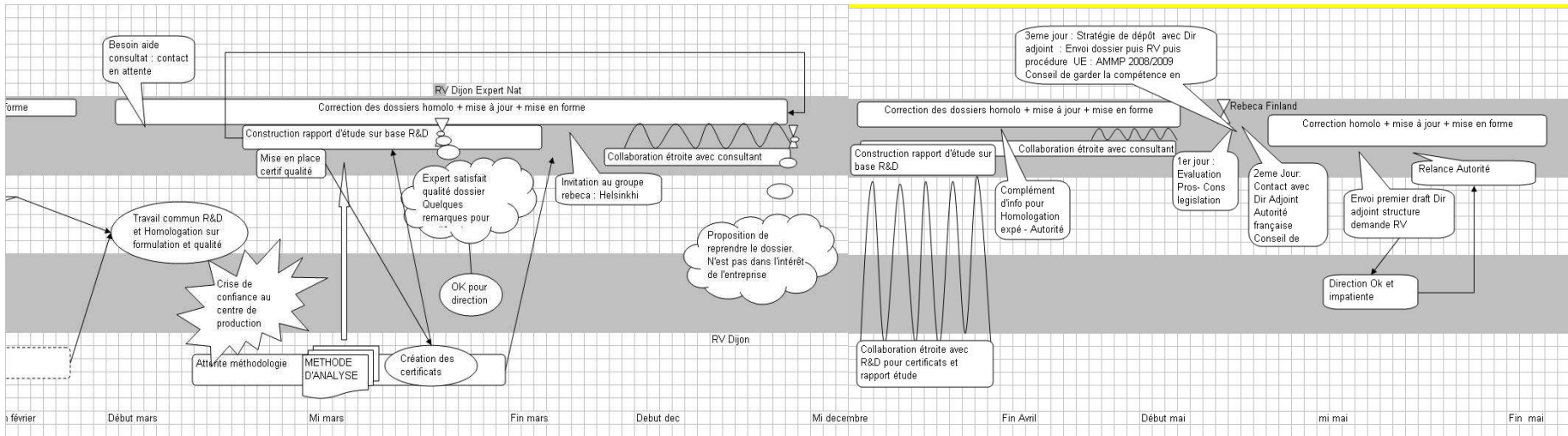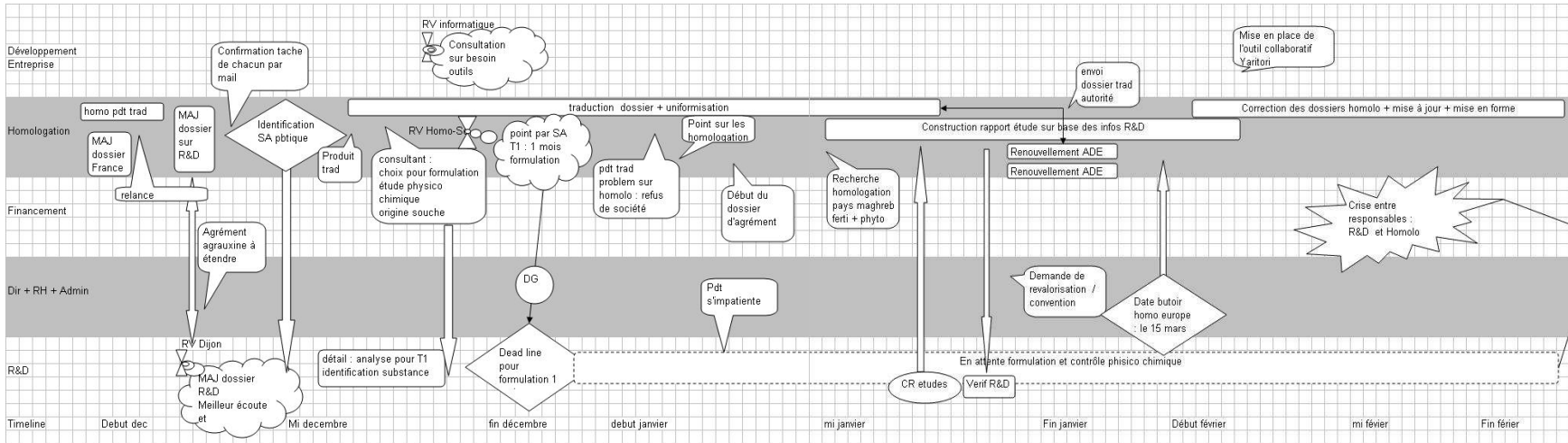
Figure 4: extract (6 months) of the mapped research diary on the creation of competences in highly regulated fields (reads from left to right and from top to bottom)

The five episodes evinced by the mapping are as follows:

a) Discovery episode (October 2005 - April 2006)

b) Strategic implementation episode: implementation of a strategy, *milestones* and tools (April-August 2006)

c) Linking episode (September-November 2006)

d) Intra-group collaboration episode (internal to the company) (December 2006 - April 2007)

e) Confrontation Episode (internal and external to the company) (May-August 2007)

Up to episode d) the work can be questioned and can change direction. Episode e) is more formal, because once the submission has been submitted to outside scrutiny, it is difficult to effect changes in the perception of professionalism that regulatory officials harbour towards the company. In a way, it is a point of no return because it leads to irreversibility in the company's strategy at the R & D, production and registration levels, and participates in creating a regulatory brand-image of the company. Episode e) leads to the official presentation of the submission to the authorities. Table 3 below summarises the progress of these phases as well as their specificities.

Episode	Units involved	Specificities
a) Discovery: Solitary work phase. Researching information on the laws, procedures and structures of the registration institutions (Internet, contacts, law texts). Working in conjunction with a registration expert from the science council giving rise to a transfer of more tacit information. Extensive phase allowing for time dedicated to the creation of a network, to discover entry points to be used later.		
	• Registration one person	• Watch • Integration of knowledge & procedures (Implicit and explicit) • Network development
b) Strategic implementation: minimally collaborative work phase. Definition of: registration priorities by product, a calendar by task and division of the company. Definition of *milestones*. Development of a task definition matrix. Construction of the network (continuing)		
	• Registration and Executive Board	• Establishing strategy • Tool building • Task Definition • Network development
c) Allocation of responsibilities: Coordination work / increased contacts. Presentation of the registration within the company and distribution of the requirements relating to the proposed registrations. Definition of personnel resources and allocation of tasks and responsibilities. This phase allowed the need for external advice to be identified. Steps for setting up links with the authorities and companies with similar difficulties.		
	• Registration, Executive Board, other units	• Definition of personnel resources • Task and responsibility distribution • Transfer of specific information

		• Network development
d) Internal cooperation: Episode based on the intensification of exchanges (e-mails, meetings, documents ...) and on coordination. Intensely collaborative work aimed at achieving a level of structuring of the scientific results in line with administrative requirements. Culmination of important contacts.		
	• Registration, R & D, manufacturing, consultant	• Coordination, monitoring of tasks and responsibilities • Structuring of knowledge developed internally • High level of interaction • Development of contacts
e) Confrontation: an episode in two steps. The participants are less important than in the previous part. This phase requires consolidation of all documents, formalization of the knowledge and information in a specific format for submission of final dossier to the company's internal and external experts. The end-result of this episode is the submission of the dossier to the authorities responsible for the assessment.		
	• Registration, Consultant, CEO, Chief Scientific Officer and Authorities	• Centralisation of tasks • Cycles: experts' evaluations / changes • High level of interaction

Table 3: Summary of the episodes derived from analysing the mapped diary

The mapping not only identified the major structuring episodes inherent in the development of the strategic competence of registration, but also allowed the specifics of each phase to be extracted, as well as the order in which different levels of the company are affected. The contents of these episodes are more structured than in previous stages and they represent an increase in abstraction helping to reveal some concepts of the theory. It is the recurrence of certain events and relationships that appear in the mapping process and show emerging episodes. Thus these emergences are related to the running of the process and not to the development of the company. The nature of these episodes is highly detailed as they emerge from the linking of daily and institutional practices and the players having a role in this construction, rather than from the strategic directions initially determined.

This tool is not, however, an end in itself: it is a means to realize the transition from empirical to theoretical. Creating it is but a step in generating knowledge.

- Legitimizing the knowledge

Mapping provides a way of thinking about a phenomenon in its entirety and structuring it. It also helps in the eventual writing of interview guides, in that it identifies the most relevant players linked to each specificity. The phenomenon is manifested in such a way that human cognitive abilities can perceive it more clearly, thus facilitating analysis. This methodological tool provides a means of reflectivity for the field researcher, in particular because it allows an

overall and *retrospective* reading of the studied phenomenon. With these characteristics, mapping helps clarify the relationship between skills and empirical material, and can be used in the context of epistemic reflection useful to carrying out research.

Mapping is also useful over the course of collaborative research itself. Setting up interviews with all the practitioners who have been directly or indirectly involved in the activities carried out throughout the study implies reconsidering the experience in which the researcher himself took part. Often, during an interview, the researcher is taken to task, especially when he has joined the organization as full-fledged employee. The context and climate of the interview, and more generally of the research, must not lead to frustration on the part of the practitioners (Bartunek and Louis 1996) as they may not want to participate further: ensuring freedom of speech is therefore very important. Ideally, the interview should continually be brought back to the selected topics, but the proximity acquired during the intervention does not always allow for this. In these cases, the interview sometimes leads to obtaining additional data at the limit of, or even outside the research subject. Mapping then allows the researcher to refocus during the work of interpretation and coding, on the central elements of the problem.

From this point of view, the researcher's responsibility is as important as the quality of the knowledge generated. The researcher's responsibility is key because elements that might affect the interviewees can be lost during the process of interpretation and the quality of the knowledge generated is involved because the mapping can refocus the elements on the issues and build theoretical propositions based on carefully selected empirical evidence.

In addition, being able to present a stable artefact of the representation of the phenomenon is an asset to communication. The perception of the phenomenon on which the research is anchored becomes more concrete during the mapping process and enhances the potential for successful interaction stemming from a common vision. From this point of view, the responsibility of the researcher takes on a practical dimension, since mapping crystallizes the choices and is a basis for exchange.

Conclusion

This paper argues in favor of the construction of tools useful to studies of process micro-practices. These tools can be used in the pursuit of epistemic work and allow researchers to address a longitudinal study in a more structured manner while emphasizing their responsibility. We initially recalled the common elements of strategy as practice and the study of processes to bring out the value of using episodes as structuring tools. A reminder about the benefits of collaborative research for this type of work preceded the founding elements

mobilised concerning the methodology. After showing the contributions and limitations of this tool, a normative point allowed the steps leading to the development of a personal diary mapping to be detailed. Finally, this innovative methodology was illustrated using the case of a collaborative research project integrating research diary mapping dealing with competence development as its cornerstone. This tool organized the phenomenon into structuring episodes that reading the diary in its literary form did not necessarily bring to the readers' attention.

This tool fits into a broader methodology triangulating with other methods. The goal of the tool is to understand a complex phenomenon via a multi level analysis. The first level of analysis provides an overview of the phenomenon and promotes researcher-practitioner exchanges on a common, concrete basis. The first results of studying the mapping lead to understanding the phases of construction of a specific competence, in this case, regulatory registration. Additional interpretive work highlighted specifics related to recurrent changes in the resource base during the process, and are indicative of the development of the strategic competence. The changes are as follows:

In episode a) integration of legislative knowledge,

in episode b) establishment of an appropriate strategy,

in episode c) transfer of information and network development,

in episode d) structuring of knowledge and creation of company contacts

and episode e) the evaluation rounds.

Just reading the logbook would not have achieved the same results because it does not render material the overall structure of the phenomenon, and links between different events are limited to the experience of the phenomenon gathered at a given time.

The process of mapping, thanks to the epistemic reflection that it implies, simplifies understanding of the relationships between the selected events. This phase is crucial for understanding the information flows at work and their implications in the various dimensions of the company. From the perspective of the outcome of the company's process, (process) mapping allows reconstruction of network development monitoring as well as examining the outcome of personal contacts. (Object) mapping supports the overall vision and displays the dimensions of the company that are more particularly mobilized at certain times. From the research perspective, the implementation of this methodological tool allows the practitioners' words to be brought together in relation with the conduct of specific actions and therefore offers a way to retain only comments contributing to the events selected in the mapping. Furthermore, it can serve as a defence against use of potentially compromising testimonies. Regarding the knowledge generated during the research, mapping allows disparate events in

the research to be linked. This, then, is a reflective tool offering a global vision, allowing the various materials to be linked to the generated knowledge and to the theoretical frameworks used. Finally, mapping is a tool that increases the effective and perceived responsibility of the researcher since it concretely responds to the question "what are the results of your research based on?"

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