Sciences of the Artificial and Knowledge Production: The Crucial Role of Intervention Research in Management Sciences

M.-J. Avenier and L. Nourry

Translated from the French by Mary Sweeney

Over the past thirty years a number of European researchers have questioned the epistemological status of their respective scientific disciplines. Works like J. Piaget edited essays in the *Encyclopédia de la Pléiade* dated 1967, or A. C. Martinet's *Epistemologies of Management Science* can be considered landmarks, together with the symposium "Constructivism and Management Science" held in Lille, France, October 1997. New references, introduced by the constructivist paradigm in particular, have led to the reconsideration of "field" research methods, and to the study of the role and place of researchers in this type of setting. The idea of researchers as neutral and objective observers is being more and more contested. On the one hand, their values, beliefs, and other goals and plans are likely to influence the representations which they construct from the phenomenon under inquiry. On the other hand, their mere presence in the field can influence the evolution of this phenomenon. "The interaction between observer and observed is an inescapable problem—but rather than viewing this as an obstacle to knowledge, it should be considered the opposite, as a means of knowledge and perhaps the only means," wrote M. Berry in this regard.[1]

Publications appearing in the past ten years, preceded by the pioneering works of K. Lewin[2], the Tavistock Institute of the 1950s, B. Glaser and A. L. Strauss[3], and E. Thorsud[4] demonstrate the interest that has arisen in management science about the problem of knowledge production for and by organizations. Whether called clinical research[5], action research methods,[6] intervention research,[7] or engineering research, these "transformative" fieldwork methods (as opposed to "contemplative" methods) tend to develop, after having demonstrated their potential fertility for the researcher as well as for the practitioner. All seem to have the same intention, an intention Lewin[8] calls "dual," which consists in "succeeding in an intentionally change-inducing project and, in doing so, advancing fundamental knowledge in the human sciences." "In thinking about a theory of researchers' intervention in a company, it is a new understanding of action which may be offered to us," explained Hatchuel.[9] However, it is important to be vigilant regarding the status of knowledge produced by this type of research. Taking the

1 M. Berry, "Logique de la connaissance et logique de l'action: réflexions á partir de l'expérience des recherches en gestion menées á l'Ecole des Mines de Paris et á l'Ecole Polytechnique," in Audet, M. and Malouin, J. L., eds., *La production des connaissances scientifiques de l'administration* (Quebec: Presses Universitaires de Laval, 1986), 200.

2 K. Lewin, *Field Theory in Social Science* (New York: Harper and Row, 1951).

3 B. Glaser and A. L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Chicago: Adline Publishers, 1967).

4 E. Thorsrud, "Complementary Roles in Collaborative Action Research," International Conference on the Quality of Working Life, Sept. 24–29 (New York: Harriman, 1972).

5 E. H. Schein, *The Clinical Perspective in Fieldwork* (Beverly Hills: Sage, 1987).

6 K. Lewin, *Field Theory in Social Science.*

7 C. Argyris, *Knowledge for Action. A Guide to Overcoming Barriers to Organizational Change* (San Francisco: Jossey-Bass Publishers, 1993).

8 K. Lewin, "Frontiers in Group Dynamics I," *Human Relations* 1:5 (1947): 41.

9 A. Hatchuel, "Les savoirs de l'intervention en entreprise," *Entreprises et Histoires* 7 (1994): 74.

position that the subject and object are inseparable, this article proposes to reflect on how to produce knowledge in this type of research, as well as on its conditions of legitimization. Then, after specifying the design of the field work method to which we refer (sec. 1), we will discuss the nature and status of the knowledge likely to be produced (sec. 2). These remarks will be illustrated along the way by a research action conducted in a large French electric company.

1 Modalities for Constructing an Intervention Research Project

We have briefly gone over the principal terms given to transformative field research methods. Before going further in our reflection on the role and place of this type of research in a more global process of production/appropriation of knowledge, it is best to first expand upon the framework within which our conception of this research activity is located.

In his exposition of the concept of action-research, M. Liu[10] essentially proposes to liken this approach to an adaptation of the *in situ* experimental method implemented in a "natural" milieu, the goal being the testing of hypotheses according to a specifically delineated protocol. We suggest adopting a more open vision. For us, the end result of an intervention research project is not so much the testing of hypotheses, which are formed beforehand by researchers in concrete situations. It is, rather, to make new research problems emerge; and to create intervention situations which are likely to enrich the thinking conducted jointly or separately by researchers and practitioners along the way. With this logic, researchers are confronted with concrete situations which they need to understand in order to construct and propose suitable modes of intervention, with reference to a certain theoretical framework and with the intention of producing knowledge which is "actionable"[11] and/or "publishable" in scientific journals. It is precisely this attitude of researchers toward their fieldwork which induces us to prefer the term **intervention research** to that of action research since the research project is planned around and during the intervention.

Before presenting at greater length the main concepts on which this research process is based (sec. 1.2), it is important, at first, to reflect on how it can be constructed. Indeed, it presupposes various interactions prior to the intervention, whose crucial character we will discuss (sec. 1.1).

10 M. Liu, "Présentation de la recherche-action: définition, déroulement et résultats," *Revue Internationale de Systémique* 6:4 (1992): 293–311.

11 C. Argyris, *Knowledge for Action*..

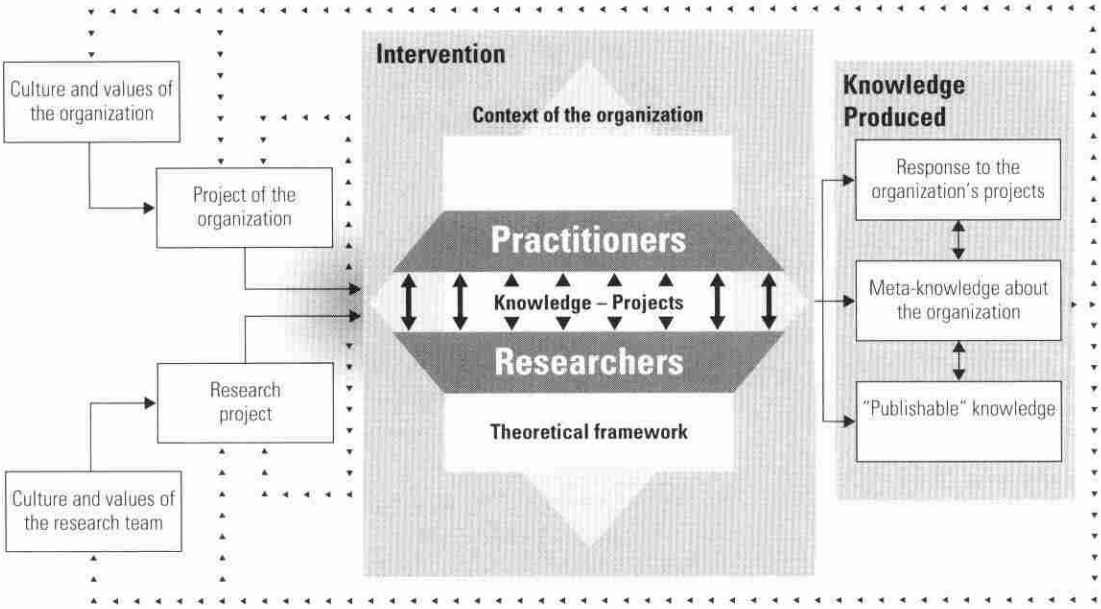


Figure 1
Schematic representation of an intervention research process.

1.1 Negotiating the Intervention Research, a Major Preliminary Phase

Figure 1 underscores the idea that an intervention research project is based upon the conjunction of two projects; that of the organization and that of the research team. Initially, these two projects are different in character. This difference results mainly from the diversity of the underlying goals, and from the cultures and contexts within which they lie. If the researchers' project tends toward a process of ongoing and long-term knowledge production, that of the practitioners often is much more limited and immediate. The latter essentially consists of devising and rapidly implementing changes within the organization (structural changes, changes in the way of working, new management tools, etc.). The conjunction between these two projects cannot be declared *de facto*. It is a prerequisite which, although often considered insignificant, takes on major importance during the process of an intervention research process. This prerequisite is the initial negotiation.

1.1.1 Two Projects Likely to Enrich Each Other

This prerequisite, called "negotiation,"[12] arises from what we could call both an attempt at clarification and the realization of various projects. It consists partly of identifying the possibilities for cross-fertilization between the two projects; in other words, to study "if an investigation is likely to be useful to the organization and to research in management at the same time."[13] Next, it is important to bring up a third project, common to both parties, which is constructed in reference to the latter projects, and which allows them to advance, even to transform. A. Hatchuel[14] explains that these first researcher/practitioner interactions challenge the

12 P. J. Benghozi, "La négociation d'une recherche: une étape clé dans la méthodologie d'intervention," *Economies et Sociétés, série Science de Gestion* 15 (1990): 195–209.

13 J. C. Moisdon, "Recherche en gestion et intervention," *Revue Française de Gestion* (September–October, 1984): 65.

14 A. Hatchuel, "Les savoirs de l'intervention en entreprise," *Entreprises et Histoires* 7 (1994): 70.

researcher to "examine if, from the request set out by the organization, and considering the research possibilities he might have, he can advance his own research inquiry at the same time." G. Arnaud[15] adds that "the researcher must...make a compromise between his own research project (the logic of knowledge), and the onsite problems identified by certain key decisionmakers in the company (the logic of action)." Moreover, this compromise has every chance of exerting an influence on the knowledge produced over the course of the intervention.

The intervention research project used here as a case-study was carried out in a large French electric company. For almost forty years, this company has based its administrative system on a hierarchical and vertical conception of the organization, with different divisions based on specific activities. For example, one division is in charge of managing and overseeing the various electricity production processes (nuclear power stations, hydraulics, etc.), while others deal with electricity distribution (construction/management of electrical lines) or the sale of products and services linked to electricity. Following this logic of division of activities, each division is composed of a number of units spread out over France. Thus, for example, a hundred or so units are involved in commercial activity. Also, there are some twenty-five different production units, twelve or more engineering units, etc. Different units corresponding with various divisions can be found in the same geographical area, all with differentiated missions and issues, and whose intervention space can be fundamentally variable since it can range from a single village to the whole of France. To summarize, this can be considered a multilevel and multisite group.

The strong economic growth that followed the end of the Second World War and the monopolistic position of the group with its vertical and hierarchical organization contributed to the emergence of what can be called a culture of "certainty" (belief in the invulnerability and unchanging context of the company) and "territory" (resulting from compartmentalization and an overall lack of inter-employee cooperation). But the context has changed. The decrease in consumption and the arrival of new actors (economic, political, and social) on both the national and local levels have called for new strategies and new organizational concepts. The scattering of partial representations on group activities in specialized processes, such groups working more often in a parallel rather than an interacting mode, no longer permitted the intelligibility of the overall system. Thus, the Head Office decided to implement a process which would help local directors reconstruct this global vision. This took the form of a strategic inter-unit (thus interdivisional) process, aimed at linking the various strategic processes already in place at the local level. As decentralization policies held by successive French governments give preponderant weight to the "regions," (France is composed of twenty-two administrative

15 G. Arnaud, "Quelle stratégie d'observation pour le chercheur en gestion?" *Economie et Sociétés, série Sciences de Gestion* 22 (1996): 241.

regions) this process was supposed to rely on a committee in each region called *Commission Interne de Coordination Régionale, (CICOR)* which was to be composed of all unit directors located in the region in question. The main project of these committees is to initiate and bring life to a regional strategic activity based on the exchange and sharing of information between units. Each committee was then asked to prepare a sort of strategic plan for company activities in the region, known as the "Schéma Directeur d'Action Régionale" (SDAR), with reference to the strategic thought and actions led by the Head Office and by the local units (see fig. 2).

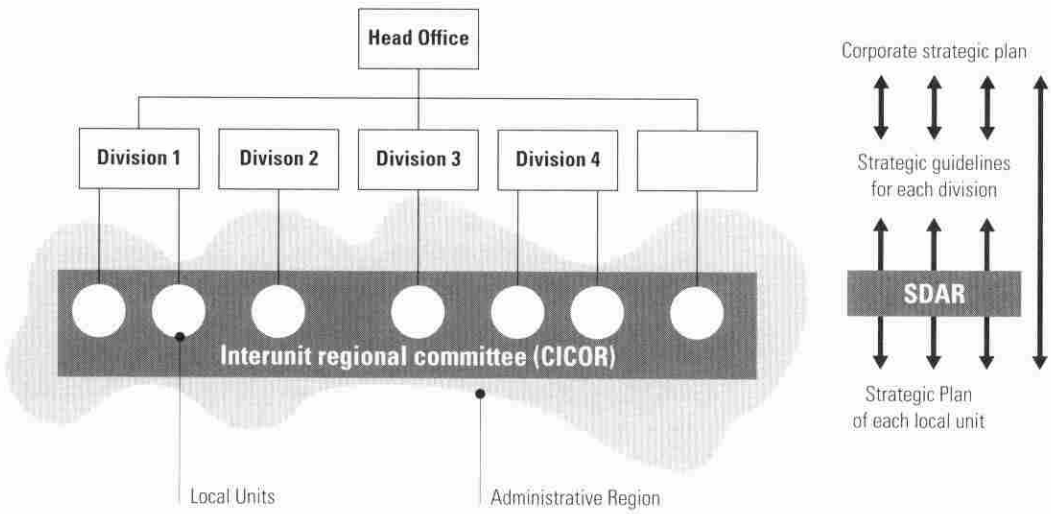


Figure 2
Context of the Intervention Used as Our Case-Study

The example intended to illustrate our remarks focuses on an intervention carried out within one of these CICORs. The initial project of this CICOR was to elaborate a new SDAR, taking into account the opinion of all the actors involved in the process, in order to facilitate its subsequent implementation.

One project of our research team concerned the construction of strategic action in complex settings. Subscribing to the paradigm of "procedural" rationality,[16] this project is concerned with the processes of strategic reflection/action, as well as with their results. In this large research project, one topic focused on a particular modality of project operation—the "co-management of co-designed projects."[17] This consisted mainly in studying the conditions under which organizations are likely to develop strategic actions that are collectively designed and managed (How? Why? In what context?...). This modality seemed capable of providing a frame of reference that would be relevant to the elaboration of the SDAR in this CICOR. These two projects seemed sufficiently congruent to encourage involvement in an intervention research project. The initial negotiation led to an interesting and original problem: how can we initiate and bring to life strategic actions which are co-designed and co-managed by actors having fundamentally different

16 H. A. Simon, "From Substantive to Procedural Rationality" in *Models of Bounded Rationality, Band II* (Cambridge: The MIT Press, 1982).

17 M.-J. Avenier, "Stratégie tâtonnante et démarche projet: une modalité née dans le contexte des opérations de construction publiques" in M.-J. Avenier, ed., *La Stratégie Chemin Faisant* (Paris: Economica, 1997), 269–298.

origins, values, cultures, and goals, and who, until then, had never made the effort to talk together? Our common project was defined.

1.1.2 Constructing the Researcher's Modes of Interaction in the Field

The role and status of the researchers in the intervention research also affect its progress (and thus its output). Moreover, it is in the researcher's interest to negotiate his or her position during the process leading to the project-mounting stage, even if he or she knows full well that this position is likely to evolve and be renegotiated over the course of the intervention. "The researcher must multiply negotiations and take into account the reservations and the expectations held of him." [18] The researcher thus is led to permanently reconstruct his or her relationship with the field.

The idea that a researcher can or should adopt a "contemplative and objective" position is excluded in this case. Even when considered an observer, the researcher is a social being similar to actors in the organization he or she studies. Here he or she is a "non-neutral" actor, interpreting phenomena in his or her own way, and influencing by his or her mere presence the work of the group of actors observed. However, the idea of the "non-neutrality" of the researcher does not appear sufficient in terms of learning and knowledge production. As per the ideas developed by G. Arnaud,[19] whenever a researcher tries to remain neutral and uncommitted to the organization's project, the project cannot lead to significant results. When researchers position themselves officially as participants who are explicitly involved in the project of the organization, much greater opportunities are opened. From a research point of view, this facilitates access to information that probably would not be obtainable otherwise (especially when the organization's project has to do with company strategy issues). In this way, we were able to consult a number of the units' strategic documents, as well as participate in confidential meetings, which gave us a better understanding of the firm's problems. This position also permits the actualization of theoretical references on which the researcher's thinking is based, and allows new problems to arise. Lastly, the researcher's involvement encourages the practitioners' appropriation of the theoretical concepts on which their reflection and action are based. One example might be a co-design of new organizational management systems which is based on their specific concerns and the particular context of their organization. At the same time, however, the researchers cannot replace the practitioners; their role is not to do the practitioners' job on their behalf, but to facilitate it. The researcher's activity then becomes a continual balancing act between two types of behavior, an oscillation between two live poles—observing and acting; observing in order to understand and act (being "visible" and not trying to melt into the organization),

18 P. J. Benghozi, "La négociation d'une recherche: une étape clé dans la méthodologie d'intervention," 202.

19 G. Arnaud, "Quelle stratégie d'observation pour le chercheur en gestion?" 252.

and acting in order to observe and understand, with the goal of learning and knowledge production.

We cannot conclude this first section without bringing up the potentially disruptive effects of the intervention in the organization. For example, the theoretical abilities and references of the research team generate modes of reasoning or thought that could go against those developed by the organization. "Ideological or methodological transparency is not always possible or 'paying' in an organization," wrote G. Arnaud[20] in this respect. In other words, is it necessary to act in total transparency at the risk of scaring the organization? Or is it preferable to have several dark zones, putting certain concepts into practice without overly explaining them, and trying to arouse an interest and reflection around these concepts before unveiling them? For example, although the concepts of procedural rationality or interactive construction were brought up numerous times at select committee meetings (cf. sec. 1.1.3, following), they were not introduced on site in these words, at least not in the beginning. The practitioners would have risked interpreting this as the inability of researchers to "speak simply of simple things," and this interpretation could have led to our rejection, indeed to straightforward exclusion.

1.1.3 The Structure of the Research Project

To establish the construction and negotiation of the researchers' modes of fieldwork interaction, it is important to put a certain structure in place, long the lines of the notion of "management authority" and "research project protocol" outlined by J. Girin.[21] This authority, known here as the "select committee," periodically reunites the researchers and practitioners, who, by their various functions in the organizations, play a key role in the progress of the intervention research project. These various actors then can make joint decisions on the evolution of the intervention research project. In our example, this involved the two persons responsible for leading the construction process of the SDAR in the region. The implementation of this authority had many advantages, for it allowed us to follow the process closely when one of the principal executives was transferred to another position (transition management).

The essential symmetrical role played by the research laboratory must be underlined. It provided a means of "scientific control" beyond the researchers' own "asceticism" (the researchers are supposed to question themselves systematically on the legitimacy of the knowledge they produce), and its members interrogated the researchers insistently on the work they were carrying out in the field, provoking new discussions and reflection.

20 Ibid.

21 J. Girin, "L'analyse empirique des situations de gestion," in Martinet, A.C., ed., *Epistémologies et Sciences de Gestion* (Paris: Economica, 1990), 141–182.

1.2 An intervention Based on a Principle of Ongoing Construction

Once the "researcher/practitioner" system has produced agreement on a certain number of modalities related to the intervention, it can begin. Interactions between the researchers and the practitioners are the main driving force. The two parties "constantly exchange points of view and modes of representation on the constraints and issues coming from their respective fields, fields which are never superimposable.... It is the continual adjustment of this difference which makes the interaction likely to produce new knowledge" [22]—and, we should add, new projects. Our work is based mainly on a logic of "interactive rationality," [23] a "principle of incompletion," [24] and an "interactionist conception of communication." [25] This intentionally transforming and multirationalist process allows one to go beyond the framework negotiated previously by the two parties, as often is the case once researchers adopt a logic of deconstruction/construction of ideas. The permanent confrontation/reconstruction of the actors' representations are likely to enrich, to cause to evolve, indeed, to put back into question, projects which are pre-identified. It also can allow the participating parties to reconsider/adapt some of the tools developed in the goal of realizing these projects. These processes can then be described as a permanent "equilibration" between "assimilation" and "accommodation," [26] or as an "ends/means dialectic." [27] We call them "ongoing" constructions, based on a continuous to-ing and fro-ing between reflection and action.

Thus, the various interactions between researchers and practitioners in the CICOR intervention put into question the relevance of a purely regional strategic action as conceived at the company's Head Office. Indeed, the various units established in this region intervene in a geographic space which is extremely varied (going from a single city to the whole of France). These spaces of intervention can intersect (due to the diversity of the units' activities), be bordering (between two units of the same division, for example), or be totally unconnected. A process of cooperation located exclusively at the regional scale becomes barely conceivable at this point. The relationship set up by interactions between the various participating parties, along with the improvement of mutual understanding and the institution of work and exchange modalities it generated, encouraged evolution towards a more open conception of the activities to be carried on in the CICOR. From a search for purely regional issues which would concern all of the units, we initially moved on to research into regional issues likely to involve only some of these units. Then, with time and over the course of interactions, the idea of constructing an inter-entity strategic action at a subregional level emerged, since the vision of the world prescribed by the Head Office was considered ossifying. The organization's project thus underwent an ongoing transformation. The "tradi-

22 J. C. Moisdon, "Recherche en gestion et intervention," 64.

23 J.-P. Ponssard, "Interactive Plans for Extensive Games," *Theory and Decision*, 1989.

24 A. Hatchuel, "Les savoirs de l'intervention en entreprise," 68.

25 Y. Giordano, "L'action stratégique en milieu complexe: quelle communication?," in M.-J. Avenier, ed., *La Stratègie Chemin Faisant* (Paris: Economica, 1997), 141–182.

26 J. Piaget, ed., *Logique et connaissance scientifique* (Paris: Gallimard-Encyclopédié de la Pléiade, 1967).

27 F. Lacroux, "Contribution á une théorie de la planification adaptative: la stratégie procédurale" (Ph.D. dissertation, 1996, Université d'Aix-Marseille III).

tional" CICOR logic was stepped over in favor of the broader perspective of inter-unit strategic action (reformulation of ends). Moreover, the participation of the units involved in this strategic process was able to evolve over time (reformulation of means).

This concept of intervention research, which suggests taking advantage of situations which arise in midstream, places the issue of evaluating this activity at the heart of the discussion. In fact, the incessant oscillations between ends and means, and the continual comings and goings between reflection and action, presuppose the existence of processes aimed at assessing the relevance of evolutions provoked by this activity as one goes along. One of the basic principles of this "ongoing" evaluation[28] consists of a "continual diagnosis of the situation in which the organization wishes to intervene, as well as of its own operation." This form of evaluation permits "a reinterpretation of processes in progress and, in doing so, an interrogation on the relevance of identified objectives and of the realization of ends/means." It involves the construction of a reference for evaluation common to the participating actors, and their the transcription of preferences in quantitative as well as in qualitative criteria. This system of reference allows them to build a shared meaning of the situations which arise, and sometimes leads them to redirect their reflections and/or actions. Rather than being fixed and static, it is evolving and dynamic. Constructed in relation to actions that are carried out progressively by the "researcher/practitioner" system, it is itself constantly updated. In the CICOR, for example, this common reference system was transformed in order to account for the new logic of inter-unit strategic action, allowing for evolutionary involvement over time. A strategic action conceived in this manner is based on a multitude of organizational and operational systems which are assembled, reassembled, or disassembled according to the issues, contexts, and problems of the units. Thus, the CICOR's system of evaluation is now based on a dual principle: (1.) to permanently construct new knowledge on emerging operational systems, and (2.) to understand them in a manner which is comprehensive enough to facilitate and manage the interactions.

2 Knowledge Produced in Intervention Research

In the first part, we presented the modalities of construction of an intervention research procedure. In short, it is a matter of drawing from the continuous interactions between researchers and practitioners. These interactions allow the researchers to intervene explicitly in the project of the organization, in order to encourage, via the "ongoing" construction of the common project, the development of practitioners' actions and the production of knowledge. At present, the contribution of this interactionist conception of intervention research for the production of publishable knowledge, and knowl-

28 N. Couix, "Evaluation chemin faisant et mise en acte d'une stratégie tâtonnante", in M.-J. Avenier, ed., *La Stratégie Chemin Faisant* (Paris: Economica, 1997), 137–188.

edge that can be appropriated by practitioners, should be studied in greater detail. We thus first will examine the different forms of knowledge likely to be produced over the course of this process (sec. 2.1), and then will debate their status and legitimization (sec. 2.2). In particular, we will show why and how this principle of "ongoing" construction proves to be consistent with a constructivist conception of knowledge.

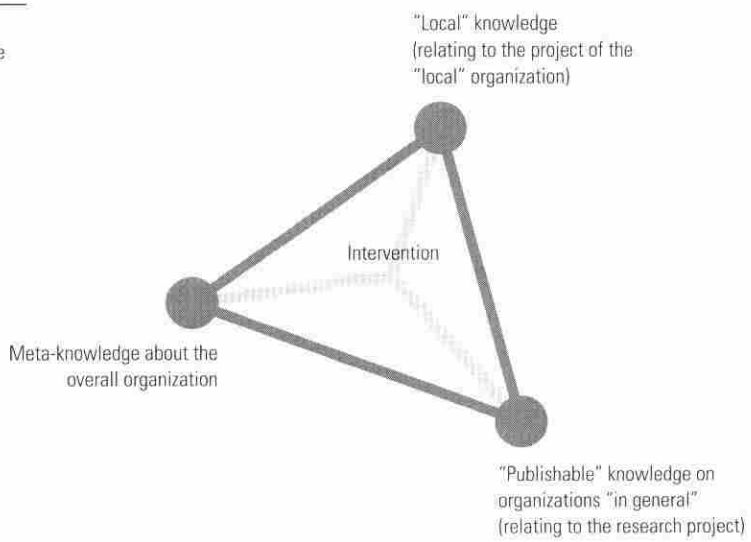
2.1 Knowledge Produced by and for the Researcher/Practitioner System

Although these are highly entwined, we can identify three broad categories of knowledge likely to be produced over the course of intervention research.

The first category (cf. fig. 3) consists of knowledge related to the answers (processes and results) required by the "local" organization's projects (the CICOR, in our example), that is, by the unit mainly affected by the intervention, knowing that this unit can never be totally isolated from the overall organization. This knowledge, which is collectively constructed, focuses on actors as individuals and as groups, on the context of the unit under consideration, on the changes which were finally introduced (processes or new organizational methods put in place, etc.), and on the difficulties that have been encountered and the way in which they were managed. In a way, these constitute the project as it was designed and then transformed over time and over the course of interactions.

In the CICOR, for example, one of the projects was the co-construction of the SDAR by the directors of all the units present in the region. At the beginning of the intervention, we realized that the directors of these various units, although they were geographically close and came from the same company and sometimes even from

Figure 3
Categories of knowledge produced over the course of an intervention research.



the same division, knew little of the goals, issues, or even the activities of some of the other units. They were not even aware of this mutual ignorance. The researchers' intervention helped make this fact more explicit, and encouraged awareness. From then on, mutual knowledge of issues, context, and problems became indispensable in the eyes of the practitioners—they had to get to know each other in order to act together. The collective process of production of knowledge was set in motion.

The second category of knowledge likely to be produced in intervention research is somewhat symmetrical with the first (cf. fig. 3), since it concerns knowledge produced by researchers in reference to their scientific research project. To be brief, we call it "publishable" knowledge. For example, the intervention research project carried out in the CICOR allowed us to have greater insight into the problems related to the co-design and co-management of collective projects, problems which we had already studied before in other contexts, and which formed one of the motives behind our involvement in this intervention research. Namely, we realized that, in organizations where there is no tradition of cooperative behavior as was the case in the CICOR, "co-management of co-designed projects" constitutes more an ideal type toward which it may seem judicious to go than an effective work situation. The actors' difficulty in involving themselves in this type of logic, their reluctance to share (and so to disclose information about themselves and their strategies), the influence of the "old guard" and power games were all phenomena which make the implementation of project co-management very difficult. This experience then lead us to propose, for organizations where a culture of cooperation does not exist *a priori*, a sort of transition phase in which project design would be realized in a collective manner by the actors directly concerned by the project, and where implementation would be carried out, not through co-management, but under the responsibility of a project manager who could ensure that the major project decisions are made in conjunction with the actors directly affected by the project. This intervention also prompted us to think about the multiple roles that animation might play as well as the position of the animator in this type of setting, and also about the close ties that this animation requires with the various evaluation processes in existence.[29] Another research theme highlighted by this intervention revolves around the role of "objects that mediate" in a collective conception process, a concept already well known in the design sciences. Animating a co-design process rests on the construction of tools (schemas, models, charts, etc.) that help initiate and bring to life the interaction between the various parties involved, and help carry out the project which brings them together.[30] In our example, rather than raising the problem of the units' mutual ignorance verbally during a general meeting, we asked all the unit directors to personally fill in a table showing how, in their opinion, each unit in the region

29 L. Nourry and C. Nahon, "De la complexité d'initier et de faire vivre des actions stratégiques co-construites et co-pilotées," in M. J. Avenier, ed., *La Stratégie Chemin Faisant* (Paris: Economica, 1997), 325–352.

30 J. Rasmussen, B. Brehmer, and J. Leplat, *Distributed Decision Making: Cognitive Models for Cooperative Work* (New York: Wiley and Sons, 1991).

stood relative to the company's strategic issues in the region. The immediate graphic display of inconsistencies in perception was obvious from the way the table was filled out, and this instantly activated the directors' awareness of their mutual ignorance. This table thus played the role of an "object that mediates," as it helped to construct this awareness.

The SDAR constitutes, in itself, another example of an "object that mediates." Its co-design "can be seen as a 'facilitating process...devised with the goal of permanently establishing inter-unit strategic action." [31] In other words, the synergy created at the time of the co-design of the SDAR (such as the "development of actors' mutual knowledge," "identification of their common interests," "learning to work collectively") is likely to favor a certain continuity of inter-unit strategic action beyond the SDAR itself.

This intervention research also brought out, in an unexpected manner, a reflection on the role and place of time in strategic action. Notably, this reflection led to the introduction of the concept of "rhythm" in strategy, and to the study of its possible contributions to the conception of strategic processes.[32]

Lastly, the researchers' involvement in an intervention research project is also an opportunity for the latter to expand their knowledge of this type of method, and to develop know-how in negotiation and animation. This knowledge may not be "publishable" right away. It may not be directly linked to the initial research project right away. But it constitutes a skill which the researchers can then put to good use during new intervention research projects, for example.

The third and last category concerns knowledge constructed over the course of the research process about the overall organization, in which the unit directly involved in the intervention research project evolves. We call this meta-knowledge about the organization. This knowledge is likely to be useful to other members of the overall organization besides those parties involved in the research intervention project. For example, the CICOR project raised a certain number of questions on the company's modes of operation. How can the units be coaxed to involve themselves in a strategic activity transverse to the local level, when most of the management tools are still devised in a vertical perspective?

These three categories of knowledge are deeply interwoven. This linkage occurs because the local organization cannot be totally isolated from the overall organization, and because knowledge is not produced uniquely by the researchers for the practitioners, but by and for the practitioner/researcher system. Thus, for example, knowledge related to the local organization's project is built with reference to available meta-knowledge on the overall organization, while also being influenced by the project of the research team which, in turn, affects the way the studied phenomena are regarded.

31 L. Nourry and C. Nahon" De la complexité d'initier et de faire vivre des actions stratégiques co-construites et co-pilotées."

32 F. Lacroux and L. Nourry, "Temps et rythmes de la stratégie", *Actes due la 6éme Conférence Internationale de Gestion Stratégique* (Montreal: June, 1997).

The fertility of this method follows from the entanglement of the processes of knowledge production, which offer multiple learning opportunities. This entanglement favors the emergence of new knowledge, some which is expected (produced, for example, when preexisting tools are put to the test), and some of which is unexpected (refer to the example on the "rhythms of strategy" brought up before), because "meaning is constructed partly during the interaction."[33] It facilitates the appropriation of emerging knowledge (and of preexisting knowledge, of course) by researchers and practitioners. It creates favorable conditions for the appropriation of theoretical knowledge by the practitioners, knowledge which is produced by the researchers. This knowledge is not presented *in abstracto*, but produced in relation to the concerns of the practitioners. And reciprocally, it creates conditions which are favorable to the appropriation by researchers of knowledge relating to the organization (its aims, its modes of operation, its modes of reflection and action, etc.), this knowledge being likely to stimulate their reflection.

2.2 How Can the Produced Knowledge Be Legitimized?

It has already been argued[34] that knowledge produced in an intervention research project cannot be legitimized in positivist epistemologies due to the perturbations that researchers' intervention introduce into the phenomenon they study. On the other hand, it appears legitimate in constructivist epistemologies. This knowledge cannot then have the status of truth (in the sense of positivism, i.e. of absolute truth). It has the status of plausible hypothesis.[35] However, the status of plausible hypothesis does not seem to us to result only from the research method used, but rather to be fundamentally tied to the scientific domain under consideration, that of management science. Like the design sciences, the study of organizational phenomena belongs to the "Sciences of the Artificial," as defined by Herbert Simon in 1969, in which intentionality plays an important role, and not to the "natural sciences." That is why positivist postulates prove to be generally unfit for the study of these phenomena.[36] The proposals put forward by research in management science cannot then pretend to objectively point out what the organizations they are directed at should necessarily be doing. Their aim is, rather, to enlighten and stimulate the creative thinking of practitioners, which should be anchored in the contingency of the particular circumstances of their organization.

Furthermore, the principle of the "ongoing" construction of an intervention research project (sec. 1.2) is consistent with a constructivist conception of knowledge.[37] Rather than aiming at the discovery of a supposedly hidden preexisting reality, it is a matter of constructing adequate representations of phenomena, validated by experience; of constructing intelligibility with the goal of intentional intervention in the phenomena.

33 Y. Giordano, "L'action stratégique en milieu complexe: quelle communication?."

34 M.-J. Avenier, "Recherche-action et épistmologies constructivistes, modélisation systémique et organisations socio-économiques complexes: quelques boucles étranges fécondes," *Revue Internationale de Systémique* 6:4 (1992): 403–420.

35 J.-L. LeMoigne, *Les épistémologies constructivistes* (Paris: PUF, Que-sais-je?, 1995), 93.

36 M.-J. Avenier, "L'action stratégique en milieu complexe: le cadre de rèfèrence," in M.-J. Avenier, ed., *La Stratègie Chemin Faisant* (Paris: Economica, 1997), 37–62.

37 E. Von Glasersfeld, *The Construction of Knowledge: Contribution to Conceptual Semantics* (Salinas, CA: Intersystems Publications, 1988).

As such, the idea that the units involved in inter-unit strategic action could change over time did not exist in the CICOR prior to the intervention (neither in the region under concern nor in other French regions). It emerged progressively over the course of the intervention and cannot constitute an "absolute truth." It proposes an intelligible and plausible mode of operation, which seems relevant in the region considered but would not necessarily be so in other contexts. We noticed this phenomenon very clearly since we carried out a similar intervention research project in another CICOR at the same time. The initial research, the local units' projects, and the way the intervention research projects were negotiated were the same, but they progressed in fundamentally different contexts (the culture and personality of practitioners, and the different geographic, social, economic, and political environments of the two regions concerned). The idea that inter-unit strategic action have the possibility of changing over time, which emerged in one, did not seem relevant in the other.

Knowledge on the local unit's project (category 1 of sec. 2.1) essentially consists in recording a necessarily selective and interpretive reading of the progression of the intervention research project. This record consists only of what, at a certain moment, seemed of interest to the researcher/practitioner system. We also are aware of not having kept track of all the discussions and all the exchanges between and with the various practitioners concerned. For even if one had wanted to, one would not have been able to.

As to meta-knowledge on the overall organization, it is expressed as plausible hypotheses on what guides or influences the behavior, modes of action, etc., within the organization. It can be used to elaborate propositions of action in concrete terms. Thus, we interpreted the weak *a priori* involvement of the unit directors in the collective conception of an SDAR as being linked to the culture of compartmentalization which still reigns within the group, and to the fact that inter-unit cooperative behavior is not taken into account in the personal evaluation of these persons. On the basis of this interpretation, various modifications of the evaluation process of unit directors can be suggested.

Lastly, management science traditionally is considered an action science. We have just discussed the issue of the scientific legitimization of knowledge produced during an intervention research project. But can there be scientific legitimization without practical or pragmatic legitimization? In the action sciences the research method and the knowledge it produces only become legitimate when they are of interest for practitioners. Knowledge relating to the local unit's project and to the overall organization put forward by researchers only becomes legitimate if practitioners agree with the researchers' interpretations. The intervention process itself only becomes legitimate from the moment it permits response to the concerns of the organization. Its legitimacy thus, is funda-

mentally linked to the research project as well as to the context and conditions in which the organization's project unfolds. In the framework of the CICOR, for example, the animators of the SDAR elaboration process were mainly trying to devise processes that would facilitate the progressive and collective construction of a common project, with reference to an appropriate theoretical framework. The animators of the SDAR elaboration process felt that the framework and the intervention process that we proposed were adapted to their concerns.

Conclusion

Intervention research is a method which can be extremely fertile in developing "publishable" knowledge in management science, when this is viewed as a science which engineers (rather than analyzes) socio-economic organizations. Its fertility also results from the fact that it facilitates the appropriation and use of some of this knowledge by practitioners. This clearly supposes that researchers have the project of producing both "actionable" and "publishable" knowledge. However, recourse to this type of method cannot automatically guarantee that knowledge will be produced (in particular, "publishable" knowledge). Moreover, this experience showed that the same general method, implemented with reference to the same initial projects but in different contexts, can lead to very different results and intervention processes.

These properties are directly linked to the conception of intervention research discussed in this article. Knowledge, like intervention, is constructed in an "ongoing" way, requiring constant vigilance on the various processes at work and continual interrogation on the meaning of the actions carried out. In this framework, an intervention research project cannot consist in the implementation of a solution predefined by the researchers or the practitioners. Nor can it conform to a specifically coded method, for fear of obstructing the ingenuity of the actors concerned,[38] and discouraging researchers to pursue the essential activity of intervention research: to question the meaning of their action.

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