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COMPETENCE-BASED COMPETENCE MANAGEMENT:  
A PRAGMATIC AND INTERPRETIVE APPROACH.  
THE CASE OF A TELECOMMUNICATIONS COMPANY

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# Competence-based Competence Management: a Pragmatic and Interpretive Approach. The Case of a Telecommunications Company

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## **Abstract:**

In this research we explore the issue of “competence management”, as usually defined in the corporate vocabulary, mostly in the human resource (HR) function, and more particularly of “strategic competence management” (long run management of competences which are critical to achieve strategic goals). We try to show that competence management is a dynamic organizational competence. We analyze it in the case of a large European telecommunications company, France Télécom, in the years 2001-2003. The telecommunications sector is characterized by quick changes in technology, markets and industrial structures, and therefore a high level of uncertainty. It is also a high tech activity, based upon continuously evolving personal skills which require long education and training times. There is an apparent contradiction between uncertainty, which makes planning difficult, and the necessity to plan new competence development with long response times. This contradiction cannot be solved if competences are defined in a static way, as structural attributes of actual or potential employees or groups of employees. The strategic competence management issue must be considered rather in the frame of a dynamic, process-based view, which involves an on-going collective and reflexive activity of actors themselves to define and manage their competences. We tested process-based competence management in the case of two telecommunication domains: high bit-rate ADSL telecommunications and Internet services to small and medium businesses. The reflexive and collective competence management process had to be instrumented with instruments which did not aim at an accurate representation of competences as objects, but rather tried to offer a meaningful support for actors’ continuous (re)interpretation of present and future work situations in terms of critical competences. As a conclusion we extend the example of competence management instruments to the general issue of management instruments, in the context of uncertain and dynamic environments. Information-based theories of instruments view instruments as specular representations of situations, which allow optimal or satisficing problem-solving procedures. But when business environments continuously evolve and resist prediction, we must move towards an interpretive view of management instruments as meaningful signs, which help actors to make sense of the situations in which they are involved. Their relevance is not an absolute ontological truth but the practical effectiveness of their context-situated utilization and interpretation. A semiotic and pragmatist theory of activity and instruments can then be proposed.

**Keywords:** Business Process, Competence, Competence Management, Interpretation, Management Instruments, Pragmatism, Semiotics, Telecommunications

## **Résumé :**

Cette recherche explore la question de la « gestion stratégique des compétences » (gestion long terme des compétences qui sont critiques pour l’accomplissement des objectifs stratégiques). Elle tente de montrer que la gestion des compétences est elle-même une compétence organisationnelle dynamique. L’analyse est conduite dans le cadre d’une grande entreprise de télécommunications, France Télécom, dans les années 2001-2003. Le secteur des télécommunications se caractérise par des changements rapides dans la technologie, les marchés et les structures industrielles, et donc par un niveau élevé d’incertitude. C’est aussi une activité de haute technologie, fondée sur des aptitudes pointues et en constante évolution, exigeant des délais importants de formation et de professionnalisation. Il y a donc une contradiction apparente entre l’incertitude, qui rend la planification difficile, et la nécessité de planifier le développement de nouvelles compétences, qui implique des temps de réponse longs. Cette contradiction ne peut être résolue si les compétences sont définies de manière statique, comme des attributs structurels de salariés ou de groupes de salariés en place ou potentiels. La question de la gestion stratégique des compétences doit plutôt être examinée dans un cadre dynamique, fondé sur les processus, mettant en jeu une activité collective et réflexive continue des acteurs du processus eux-mêmes pour (re)définir et gérer leurs compétences. La gestion stratégique des compétences fondée sur les processus a été testée pour deux domaines des télécommunications: le haut débit ADSL et les services Internet aux PME. Le processus réflexif et collectif de gestion des compétences a dû être instrumenté avec des instruments qui ne visent pas une représentation exacte des compétences comme objets, mais qui essaient plutôt d’offrir un support de sens et d’interprétation aux acteurs dans leur (ré)interprétation continue des situations de travail présentes et surtout futures en termes de compétences critiques. En conclusion l’exemple des instruments de gestion des compétences est étendu à la question plus générale des instruments de gestion, dans les environnements incertains et dynamiques. Les théories informationnelles des instruments conceptualisent les instruments comme représentations spéculaires des situations, donnant accès à des procédures de résolution de problèmes optimisantes ou « satisficing ». Mais lorsque les environnements évoluent en permanence et résistent à la prévision, il faut avoir plutôt recours à une conception interprétative des instruments de gestion comme signes porteurs de significations, qui aident les acteurs à faire sens des situations dans lesquelles ils se trouvent engagés. La pertinence des instruments ne relève alors pas d’une vérité ontologique mais plutôt de l’efficacité pratique qu’offre leur utilisation située. Une théorie de l’activité et des instruments sémiotique et pragmatique peut alors être proposée.

**Mots-clés :** Compétence, Gestion des compétences, Instruments de gestion, Interprétation, Pragmatisme, Processus, Sémiotique, Télécommunications

*JEL Classification: Z00*

# **.Competence-based competence management : a pragmatic and interpretive approach. The case of a telecommunications company**

Philippe LORINO

In this research we explore and discuss the issue of “competence management”, as usually defined in the corporate and the human resource management vocabulary, or more precisely, the issue of “strategic competence management” (long run management of competences which are critical to achieve strategic goals). We shall analyze it on the basis of case studies made in a large European telecommunications company, France Télécom (FT), in the years 2001-2003. The telecommunication sector is characterized by quick changes in technology, markets and industrial structures, and therefore a high level of uncertainty. It is also a research- and knowledge-intensive activity, based upon continuously evolving high level personal skills, which require long education and training times. Here we meet a practical contradiction which is usual in this type of activity: on one side, it is very *difficult* to plan, particularly on the long run, because of uncertainty; on the other side, it is *necessary* to plan the development and acquisition of new competences, due to the long lead times related with education programs and professional training. This contradiction cannot be solved if competences are defined in a static way, as structural attributes of employees or groups of employees. We shall argue that the issue of strategic competence management must rather be considered in the frame of a dynamic, process-based view of competences. In our view it involves an on-going collective reflection of actors themselves to define and manage strategic competences, at different levels of the organization. The operational activities (business processes) of the firm are complex and evolving objects, which can be scrutinized by actors to be interpreted in terms of strategic competences. This collective reflection is a collective *activity*, a “*collective activity about collective activity*”, and tries to answer the question: “what are the strategic competences involved in this – our – operational collective activity?”

As any collective activity, reflexive competence management must be mediated by systems of signs [Vygotsky, 1934-1986]: languages, tools, which allow the actors to interpret, communicate, make sense, abstract from the singular situation, and build the meaning of situations. We shall argue that the corresponding instruments and managerial practices are quite distinct from those frequently implemented in the field of competence management by human resource (HR) functions. Usually competence management systems *aim at an accurate representation of competences as objects. In the case of uncertain, unstable and complex business environments, instruments should offer a meaningful support for the process by which actors continuously (re)interpret work situations in terms of competences.*

This issue will be related with the more general issue of management instruments and techniques, in the context of uncertain and dynamic environments. We think it is necessary to reappraise the information-based theories of management instruments, which view instruments as specular representations, either of real situations, or of reasoning processes about real situations, allowing optimal or satisficing problem-solving procedures. When business environments continuously evolve and resist prediction, even in a probabilistic way, we should adopt an interpretive view of management instruments as meaningful signs, which help actors to make sense of the situations in which they are involved, without any claim to *truth or accuracy* in copying real environments or reasoning mechanisms. The relevance of instruments does not lie in some ontological truth, but in the *practical effectiveness of their context-situated utilization.*

## **The conceptual background of the case study: strategic competence management**

### Our proposed pragmatic definition of competence

In the first instance, for the purpose of the empirical study, by “competence” we shall designate what managers, and particularly HR managers, usually understand by this word, i. e. some generic concept of the demonstrated and repeatable ability of individuals or groups to accomplish some action with some level of guaranteed result. In the corporate language, this general definition is often applied at multiple organizational levels, from the individual competence (assimilable to what might be more

rigorously named “skill” [Sanchez, Heene, 1997a, p.6]) to the holistic capacity of the whole organization to accomplish some sort of results (what could be called “strategic competence”), through - more or less extensive - collective abilities, roughly corresponding to what might be called “capabilities”. To some extent, these distinct meanings at more or less analytical levels share a common characteristic: whatever the level of definition, we shall admit that “competence” points to an ability to *practically* accomplish some result, which means that this concept is strictly related with the definition of some activity to achieve with some expected result. Whereas “competence” is a *pragmatic* (strictly action-related) concept, “knowledge” often appears as a psychological concept pointing to some attribute of individual mind. Very roughly, in the model of resource-using activity (organizational outputs consume activities which in turn consume resources) that is often used in management control, “knowledge” should rather be located on the resource side, as a cognitive resource, whereas “competence” would rather be on the action side, as an aptitude to *do* something (figure 1).

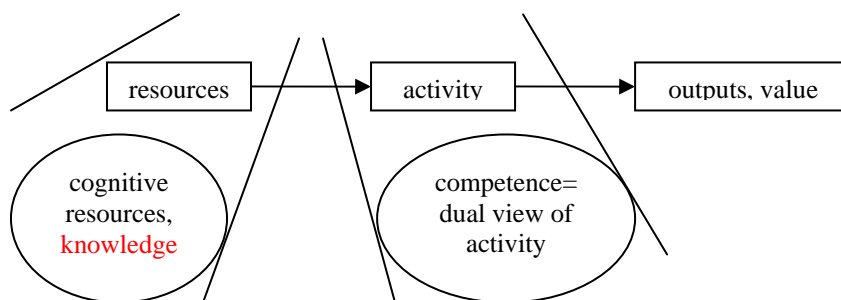


Figure 1: resource versus activity

*Resources are engaged in activities; activities produce valuable outputs; knowledge is one resource; competence is a dual view of activity.*

### The reified approach of competence management

In France Télécom, when we started our study, as well as in most French companies at the same time, the dominant approach of competences responded to what we call “a reified approach”. Thereby we mean that competences were considered as positive objects, which could be abstracted from their context and modelled in a rational way, the model being a true (substantial rationality) image, or an “as-true-as-possible” (bounded rationality) image, of actual competences. Corporate managers tried to apply the standard cybernetic planning paradigm to competences:

1. what are the competences required by our strategy?
2. what are the existing or easily available (firm-addressable) competences?
3. what is the “planning gap” between required and available competences? What are therefore the actions required to fill this gap?

This approach has important consequences. As objects which are abstracted from concrete contexts, competences can, and must, be modelled in descriptive software systems (repertoires of competences) which allow classifications (families of competences), memory (the structure of competences is archived and can be re-used in different periods), standardization (the different sectors of the firm follow the same model and use the same language), diagnosis (the software offers a language which can be applied to describe the whole firm), the evaluation of persons. Competences are supposed to raise ownership issues (“do we own it?”), rather than process issues (“what are we experiencing, what shall we experience?”). In order to develop and make a rational use of fairly heavy descriptive / classificatory instruments, a reasonable level of stability is required and the information structure must not evolve in too rapid and continuous ways. Furthermore, even if decision-makers speak of “individual and collective competences”, in practice they generally focus their attention upon individual competences, which was the case in France Télécom. This is coherent with the “reified” view: it would be difficult to abstract collective competences from specific organizational contexts, since it seems obvious that collective abilities to achieve some result are closely linked with the organizational characteristics within and around the considered group of people (division of labor and knowledge, power delegation, technologies and equipments available...). The collective dimension automatically raises issues of organizing. It seems easier to isolate the abilities of one specific

individual. Therefore the language of competences often tends to describe the organization as a set of individual work stations, and it is focused upon the adaptation “person (actual competence) versus work position (required competence)”. To fulfil this function of person/position adaptation, the system needs to exhaustively cover the whole organization (all work positions, all persons).

In that view, with time and experience, competence management can accumulate knowledge by developing the coverage and the accuracy of descriptive repertoires. This managerial process involves specific extrinsic expertise (competence modelling and evaluation), implemented outside the operational processes (producing, maintaining, selling), by specialists, competence managers, who often belong to the HR function or to external consulting firms. Competences appear as constraining resources (“do we have the competences required by our goals?”). Competence availability must be checked to *validate* strategies and action plans, as a feedback control loop, which means that strategies and action plans are designed first, in view of financial and technological accessible resources, and competences are examined after, as an *ex post* verification, in a sequential process [Prahalad, Hamel, 1990] (figure 2).

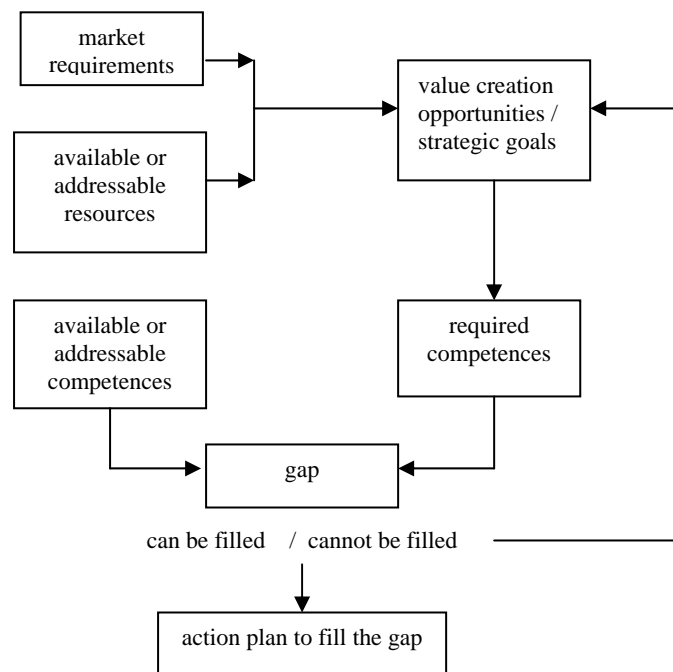


Figure 2: the reified approach of competence management.

#### Limits of the reified approach of competence management

The reified approach of competence management meets severe limits, especially in an uncertain, dynamic and complex environment. First, technological and market transformations are rapid and entail quick changes in the very definition of competences. It is necessary to update descriptive languages and repertoires frequently, which entails high costs and implies a permanent heavy workload. Actually the inevitable inertia of information systems implies that competence models are more or less always obsolete, because they follow environmental transformations with a significant time lag. Second, the pragmatic approach of competence as ability to produce an effective result has little operational interest if mainly applied at the individual level. What an individual can accomplish independently from the organizational context sounds somehow theoretical and remains very far from the major performance issues and strategic objectives of the organization. But, and this is the third shortcoming of reified approaches, if the firm tries to focus its efforts upon collective competences, it faces the problem of context-dependence. The collective ability to reach given targets is closely linked with contextual parameters: what technologies, including information systems, are available; what is the organizational architecture of power and knowledge; what division of labour (specialization, role casting) prevails, what are the external local and global partnership possibilities? Those shortcomings explain why many firms were deeply disappointed about competence management systems and practices, which proved to be too complex, extremely detailed, too heavy and costly, for limited

results, because of the permanent obsolescence of data and the ignorance of organizational contexts which jeopardize their operational relevance.

#### From the information-based view to the interpretive view of competence management

To study the practical issues raised by France Télécom and to overcome the limits of the information-based view of competence management, we had to adopt a different conceptual basis. First of all, rather than the static reified concept of competence, we adopted a pragmatic approach of competence: *competence is an ability to do things and it is therefore indissolubly linked with action*. Hence the study of competences in the firm requires to view firms as *activity systems* [Sanchez R., Heene A., 1997a, page 10].

#### Collective competence

We must also take the social dimension of concrete activity into account. Activity is not first individual and then coordinated with others' activity to become collective: any intelligent human activity and thought are intrinsically and from the very start social, because they involve all sorts of mental and practical interactions with others, from the first learning steps of small children; and because they are socially instrumented, at least by language, which appears as a social tool [Vygotsky, 1934-1986]. In most cases, social interactions are necessary to reach practical results. Even the lonely artist in his workshop interacts with past artists, future audiences, tool-designers and makers... Actors act by permanently trying to make sense of their action, and sensemaking always involves some social dimension. It is even more obvious in the case of organizations, which are basically activity systems based upon the division of labour and knowledge. Results targeted by the firm are only attainable through a collective coordinated action, and collective coordinated action appears as the first logical level for competence study. So the design of our research was based upon the concept of *collective competence*, defined as *the demonstrated or demonstrable ability of an organized group of actors to reach some result, i.e. to implement some given activity with a given level of performance*. In this view there is a close reciprocal relation between collective competence and activity.

What does a collective competence (i. e. an activity) involve? We identify two types of components. First, the collective competence requires individual competences (or more precisely, *individual skills*, based upon individual cognitive resources). Second, the collective competence involves organizational instruments<sup>1</sup> of different types: equipments and technologies, including information systems; the role casting given by the division of labour; norms, rules and languages, all kinds of specific artifacts oriented towards coordination and communication; formal and informal instruments of management, to enable actors to judge their activity from the point of view of value creation (productivity, quality, environment preservation...). Therefore collective competence is not the simple sum of individual competences; a complex combination of organizational instruments, that we call "organizational profile" (division of labour, instruments and technologies) mediates between the individual competence portfolio and the collective competence (figure 3). This mediation between individual and collective competence by an organizational profile opens up managerial options. Different portfolios of individual competences can lead to the same collective competence if combined with different organizational instruments, and conversely the same portfolio of individual competences can lead to different collective competences if combined with different organizational instruments.

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<sup>1</sup> We define organizational instruments as material (tools) or informational (documents, software) objects designed by human agents and engaged by the actors of the organization in the activities of the organization.



Figure 3: from individual to collective competences: organizational profiles  
*The correspondence between the portfolio of individual competences and the collective competence is mediated by organizational profiles (combination of organizational instruments including technologies and division of labour)*

Due to the ongoing flow of experience, individual competences as well as organizational instruments evolve in a continuous way: individuals learn from experience, role-casting can be modified to better address new situations, rules and norms are re-interpreted. Competences interact with the concrete situations of action, in a continuous flow of hypotheses, trials, adjustments, perceptions, circumstance changes.

The definition of competence as “demonstrated” or “demonstrable” stresses a fundamental characteristic of competence: it results from a social judgement; to some extent “to be competent” means “to be considered as competent”; competence is always related with some notion of “reaching objectives”, which requires a conventional judgment about the attainment of objectives, and some notion of evaluation. But the words “demonstrated” or “demonstrable” should not be understood in a narrow way: strictly speaking, nothing can really be demonstrated. The fact that we could do it repeatedly in the past does not prove that we can do it today, because, amongst other reasons, the context may be different. Competence is a relative *interpretation* of 1/ what was done, compared with 2/ what could be done. Since the judgment about what is *done* and what *could be done* concerns some collective organized process of action, it can only be built *collectively*, through a conversation involving the different actors of the process under scrutiny. For instance, to evaluate the level of competence reached by the organization to develop new products, it is necessary to involve the actors who significantly contribute to the product development process.

In the permanent learning and adaptation process, competence must be re-interpreted, especially in a high-tech and uncertain industry as telecommunications, in which technologies and market profiles change quickly. Competence is an on-going collective *interpretation process* rather than a given *state* of the organization, trying to answer the questions: what can we do together? what should we be able to do together to-morrow? For instance: what can we do in the design of networking applications for firms? What should we be able to do to-morrow in the design of networking applications for firms? Such interpretations require that the distinct actors of a given process try to build a coherent view of what the organization can and should be able to achieve, by interacting and combining their specific interpretive schemes and experiences. Competence management appears as an intrinsic *inquiry* which must be reflexively and collectively achieved by insiders themselves, joining their different views and forms of knowledge. Actually, *competence management appears itself as a living competence of the organization*, as a reflexive “competence about competence”, whereas in the reified approach it appeared more as an external knowledge stored in information systems to be used by experts.

The competence management process must be instrumented, as any human process of action [Vygotsky, 1934-1986], with specific languages, models, analysis methods. But instruments do not primarily aim at a descriptive representation of competences “as is” or “as should be”, since such a mimetic representation is a rather sterile and costly attempt, as we saw before. They rather aim at helping actors to build meaningful signs (speeches, alarms about critical vulnerabilities, alternate scenarios) in situations and to make sense of situations in terms of competences. In this semiotic perspective, competence modelling does not need to be exhaustive. Moreover it should rather avoid being exhaustive; it had rather look for the selection of competence issues which are critical for the attainment of strategic objectives and which are particularly meaningful. The actors need instruments to translate their collective activity (present and future processes) into collective competence

requirements, and to translate collective competence requirements into feasible actions. The main differences between both approaches of competence management are summarized in Table 2.

<i>Reified information-based approach</i>	<i>Interpretive competence-based approach</i>
Representation, information-based	Pragmatic, action-related
Abstracted from context	Situated
Substantial state of the organization	On-going interpretation process
Focused upon individual competences	Focused upon collective competences
Exhaustive coverage of the organization	Selection of critical and meaningful issues
Expertise external to operations and actors	Interpretation by actors themselves
Descriptive instruments and true representations	Meaningful supports to make sense of situations in terms of competences

Table 1: reified and interpretive approaches

## The research design

In this research, the firm is viewed as a strategically oriented activity system, modelled as a system of business processes. Each business process provides specific elements of value: deliverable services and products, deliveries conform to orders, new product concepts, technical and financial proposals, pre-sale studies, post-sale services, contracts, guarantees, bills... Some of the business processes are identified as strategic, which means that they have or they will have a prominent impact upon strategic achievements. The firm strategic vision is expressed through levels of performance (cost, quality, time, innovation, post-sale updating and maintenance) required from the strategic business processes (figure 4).

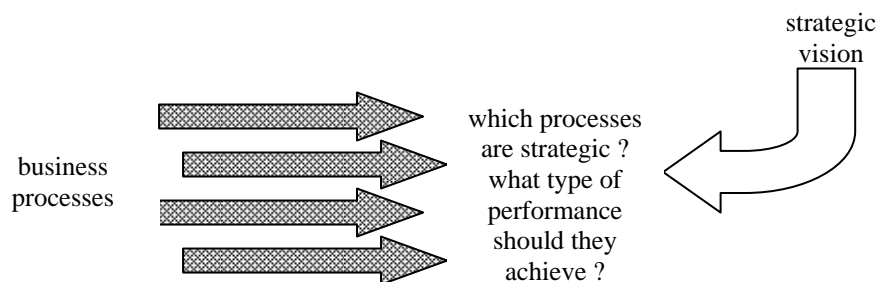


Figure 4: strategic vision and strategic processes

*Some business processes impact the success or failure of the strategic vision of the firm, through some of their performances*

For each of the strategic business processes, an inquiry is achieved to describe the activity structure of the process and to identify which activities within the process are likely to be *critical* to reach the performance levels required by the strategic goals, i.e. which activities are likely to cause strategic failure or success. To do this inquiry, for each selected process (for instance: “selling Internet to professional customers”), eight to ten actors representing the main categories of actors involved in the process are enrolled in a cross-functional working group. This working group is the pivotal component of the approach. Rather than a “community of practice” [Lave & Wenger, 1991], it could be described as a “*community of inquiry*” [Dewey, 1916]: group members have highly heterogeneous individual competences and professional practices, but they cooperate in a inquiry about their complete business process which provides the sensemaking frame of their search (due to division of labour, their individual activities make sense in the global frame of the business process; therefore their inquiry about competences makes sense in the frame of the process): they have no “common practice”, but they have a common sensemaking frame.

As a basic equation for our research, we assume that *a collective competence can be identified with an activity*, subject to specific performance requirements. So collective competences are defined by sentences such as: “to be able to accomplish activity A within X days..., for less than Y euros....,



etc.” For instance, in FT, “analyse the customer’s needs with a certain rate of customer satisfaction and sale completion” will be considered as a collective competence, which involves sellers, technical support, sale managers... If the firm has growth goals on a new innovating market and if the analysis of customer needs is a key success factor on this market, the competence “analyse the customer’s needs” will appear as strategic (figure 5). This definition of collective competences is coherent with the pragmatic view of competences exposed before.

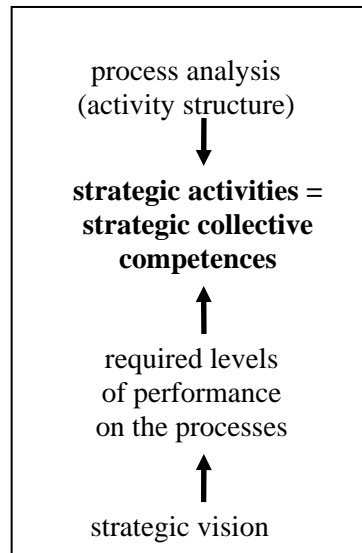


Figure 5: strategic collective competences

At this phase, we can verify that 1/ our approach of competences first targets collective competences, defined in a pragmatic frame (competence identified with an activity), 2/ competence management does not look for an exhaustive coverage of the organization but from the very beginning focuses upon strategically critical elements of the competence system (*sensemaking is selective by nature: to make sense means to choose in the chaos of events...*).

Then the studied collective competence is related with different portfolios of individual competences through different hypotheses of “organizational profiles”. For each organizational profile, for instance:

- some level of decentralization,
- some level of computerization,
- some trade off between specialization and polyvalence,
- some trade off between in-house and subcontracted activity,

the same collective competence can be achieved with different individual competence portfolios. Alternate strategies in the way of combining organizational profiles and individual competence portfolios can be identified, studied and compared (figure 6).

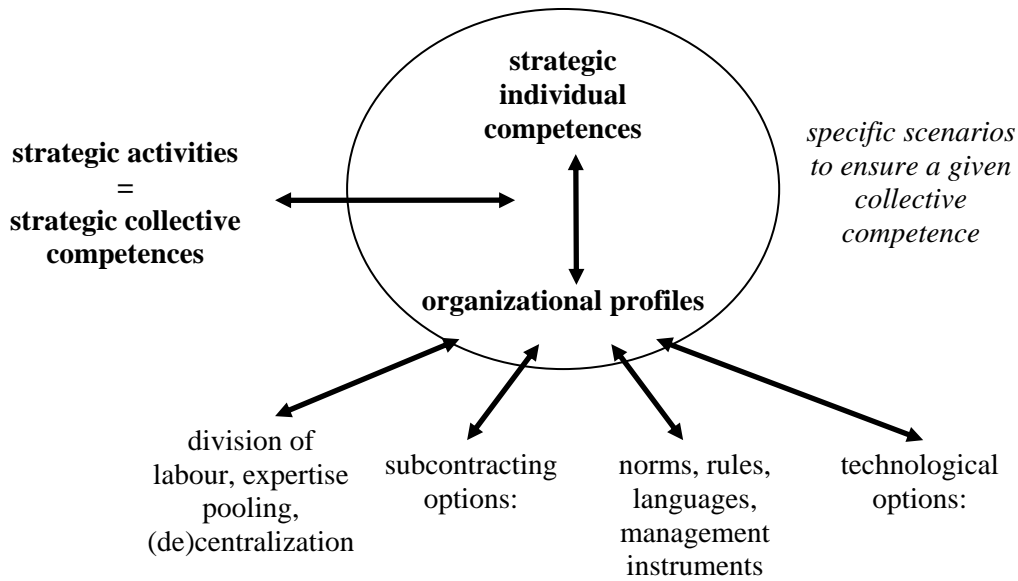


Figure 6: individual competences and organization profiles

Then the actors of the process who participate in the working group build a collective judgement about the existing or reasonably addressable individual competences on the considered time horizon. For this evaluation they are supported by HR data bases and external studies (evolution of professional qualifications, employment market, education programs, etc.). They identify individual competences which can raise critical problems. In view of those vulnerability points, they examine *how variations in the organizational profiles can modify the problem and reduce tensions on individual competence requirements* (figures 7 and 8).

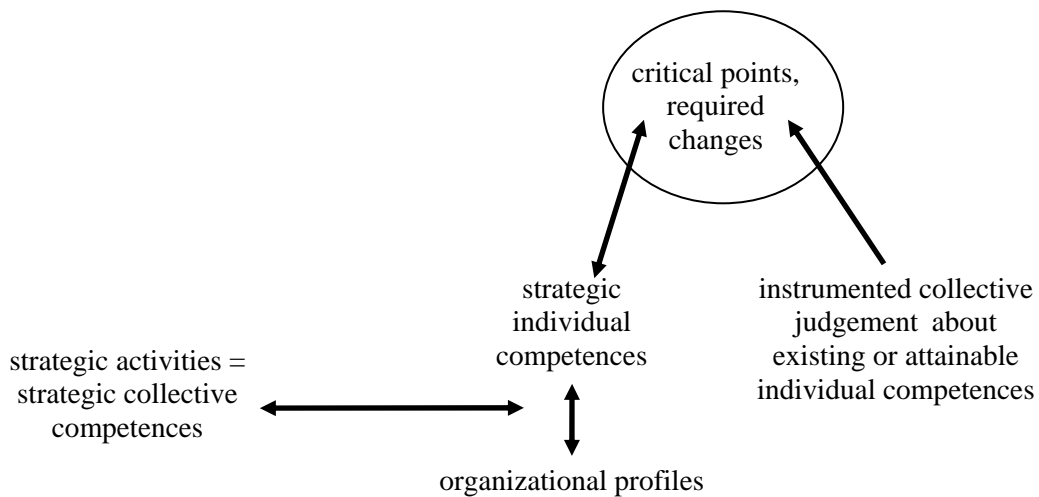


Figure 7: critical gaps between attainable and required competences is an on-going judgement

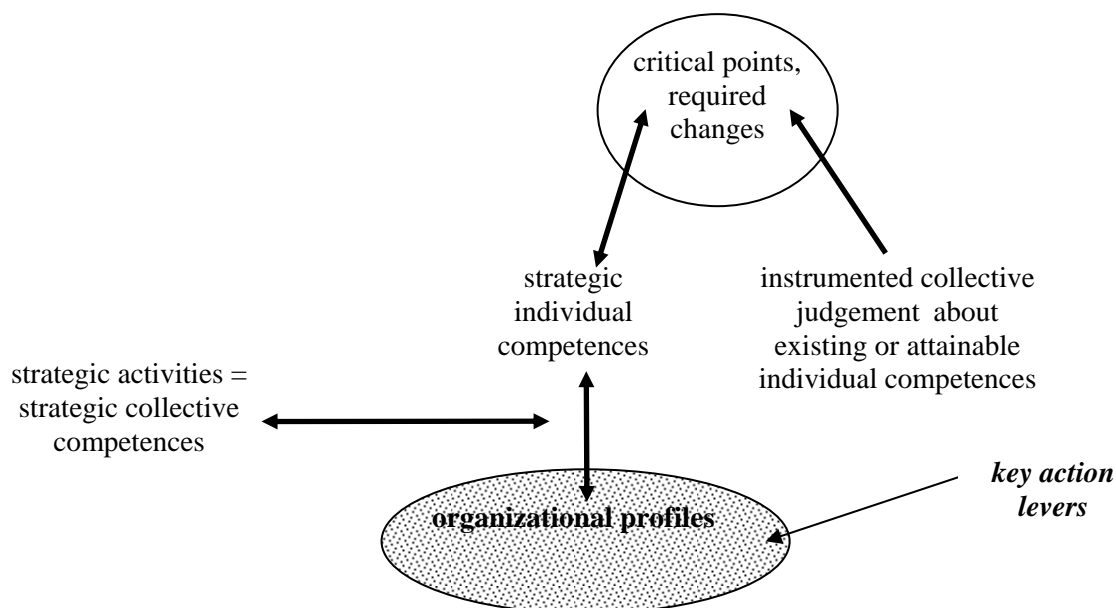


Figure 8: organization profiles are the key action lever.

If critical issues seem to be difficult to overcome, changes can be envisaged in the organizational profiles, particularly in instruments. If such profile variations prove to be insufficient to solve the problem, modifications in strategic objectives should then be considered.

The time horizon of such an inquiry can vary. To reach short run objectives, competence management will adopt an adaptive perspective: organizational profiles are partly inflexible. Then the firm looks for the best fit possible between the work positions imposed by the strategy and the existing organization profiles, on one side, and the available individual competences, on the other side. This version of competence management fairly well responds to the reified approach. But if the inquiry is concerned with long run objectives (strategic competence management), then margins for open choices are much wider. Variations in the organizational profiles offer a key command lever to improve the fit between strategy and individual competences, in both directions: strategy can better be imagined and optimized with a given portfolio of individual competences, a given strategy can be pursued with as low individual adjustment as possible thanks to organization profiles. The social and economic cost of strategic moves can then be minimized, thanks to the organizational dimension. The main step in competence management lies then in *creating options for organizational profiles*.

To really exploit this potential and to avoid to be locked up in the reified approach, competence management should not be considered as the final feedback loop of a project, an adjustment variable, but it should be proactive by managing long run competences from the very first phases of strategic moves. This is particularly true for major projects: in many technological companies, the competence issue is examined in late phases of project planning, when the major technological, market, organization (subcontracting, structures, etc.) and financial options have already been decided. As a result, competence adjustments are difficult and generate social and human pressures with high economic costs.

### The case of France Télécom telecommunications company<sup>2</sup>

France Télécom (FT) is one of the major European players on the telecommunications market. It is present on all the important telecommunications markets: fixed telephone, mobile (Orange), Internet (Wanadoo), services to large corporate clients (Equant). In 2001 FT sales were 43 billion euros and it had 211 000 employees. Sales growth was very quick on Internet and networks market, due mainly to the fast development of high bit-rate technologies (ADSL). Operating profit was 5,2 billion euros, but, due to debt and very heavy financial costs, there was a consolidated loss of more than 8 billion euros imposing a financial consolidation.

From 2000, FT faced difficult competence problems: the quick growth of some market segments (for instance ADSL – Assymetric Digital Subscriber Line – high bit-rate Internet communications) entailed shortages in some specific competences and, in view of sales forecasts, FT senior executives feared that those problems might worsen

<sup>2</sup> This intervention was achieved by a three member team including René Demeestère, professor at ESSEC, Vincent Genestet, independent consultant, and the author of this article.

soon. Some big projects planned ambitious technological and market targets, but they ran into severe limits in the technical and commercial competence profiles required by new products and new markets.

Some HR local services had tried to implement state of art systems for competence management, based upon individual competence repertoires, data bases to classify existing and required competences, and competence gap evaluation. But those attempts had failed. Such systems proved to be too analytical, too focused upon individual work positions, too heavy to operate and tremendously difficult to maintain. In the telecommunication sector, in front of the fast and often unforeseen transformations (cultural evolutions of the market, new types of consumer habits, technological evolutions, mergers and acquisitions), the updating of competence models was always too slow and too late. As a result, the reference frames of the system were always obsolete. There was a general feeling that this was a wrong way to manage the competence issue and that it would be better to adopt a more targeted and more synthetic approach. The team in charge of the problem at the H.R. department also felt that the competence issue was too strongly disconnected from the economic performance issue. FT happened to be a pioneer in business process re-engineering and had implemented performance management methods which were based upon business and local process analysis. The H.R. team thought that those process and activity models could be a relevant basis for competence management: it would be easier to involve operations managers with the language of activities and processes, which was familiar to them, and it would enhance coherence with performance control systems. They decided to start an experiment project and contacted us as researchers who analyze firms as activity systems [Lorino, 2003, 1995] and study activity and process-based performance management methods. In agreement with FT managers, two pilot domains were selected as representative of their main development areas and competence issues:

- the first domain was the ADSL project; this was a big project to develop new transmission technologies and a new virtual network (new communication software), for the high bit-rate transport of voice and data over the ordinary copper cable phone-lines; actually this project was already in a very advanced phase of implementation: most of the design and investment stages were over, sales development started very fast; the main issue then was the quick development of sales, installation and maintenance services;
- the second domain was the sale of Internet and Intranet-based re-engineering of small and medium firms (“e-services”); this was an emergent market: at that time in France, small and medium businesses (SMB) still used Internet and Intranet in a limited way, as a new communication technique (mails) or a fairly simple presentation of the firm and its products; the more advanced example of large firms showed that network integration and Internet-based process re-engineering offered huge possibilities to transform organizations and to enhance strategic performances.

These two domains were seen as distinct and complementary situations: one (ADSL) with short to medium run (2 years) problems to solve, structural options partly frozen, moderate uncertainty; the other (SMB e-services) with longer run issues (4 years), structural options still quite open, high levels of uncertainty.

### The research methodology

We used a research-action methodology coherent with a grounded theory view [Glaser & Strauss, 1967-1985]. The two projects (ADSL and e-services) were considered by FT as pilot experiments to test a new managerial approach of competence management, more integrated with their operations and performance control. We cooperated with the H.R. department to test our theoretical model. The experiments were at the same time prototypes for a new managerial approach and fields to test the validity of our theoretical understanding of collective competence as a dual view of activity and as the combination of individual competences and organizational profiles.

Practically, the research method consisted of five components:

1. A first round of interviews: we interviewed some 20 high level executives (the ADSL project director, the R&D manager, the corporate H.R. manager, the corporate strategy manager...) to explore the strategic issues linked with the two investigation areas, to describe the corresponding value chains and their possible evolutions (market structure, present and future technology, partners and competitors).
2. A second round of interviews: we interviewed around 20 senior managers in each research area (ADSL, e-services to SMB) to model the business processes, their activity content, the main problems met and the critical activities in those processes.
3. Two process working groups were established, one for each domain (“ADSL project” and “e-services to SMB”). Each working group had more or less ten participants, coming from the functions mainly concerned by the research domain. For instance, the ADSL group included a network designer, a software engineer, two sellers, a maintenance engineer, a service-to-customer manager, a planner, the H.R. manager

of the project... The group members were jointly selected by the ADSL project director and the H.R. department, on the basis of their field experience, their ability to build a strategic viewpoint and their opening to innovation. The “e-services” group included the H.R. manager of the SMB division, two marketing experts, a product developer, a solution engineer, two sale managers, a customer project manager. The working groups had to validate the business process analysis, to define probable evolution scenarios of the processes on the time horizon of the research, the consequences of those evolutions at the level of activities (= collective competences) and the resulting critical points. The group also monitored field inquiries.

4. Field visits and interviews: several visits with interviews were organized on the operations fields (commercial agencies, network maintenance local services, regional competence centers).
5. Finally, a one day seminar was organized to present the results to a mixed population of executives, HR managers, operations managers and project managers (about 100 persons), to get their reactions and suggestions and to identify new application fields.

#### The case of ADSL project

ADSL, thanks to a signal modulation method called Discrete Multitone (DMT), allows to use existing phone networks to transport high volumes of Internet data on different frequencies. This technology spares heavy investments in new physical networks and is very effective both from a technical and an economic point of view. In 2001 this project was already in an advanced phase of implementation: technological development and investments were mostly achieved. Sales and market share objectives for the main ADSL products of France Télécom (eXtense consumer package and Turbo ADSL professional package) were ambitious, growth rates impressively high.

ADSL raised three key competence issues:

1. deployment: the quantitative scale of ADSL development was such that it raised qualitative competence issues (how to move from an expert approach of ADSL to a broadly distributed competence, which required a quick collective competence diffusion to most sellers and new forms of organizing).
2. substantial changes in the very definition of core competences: this new technology combines telecommunications and computer software technologies; the telecommunication competence of engineers, technicians and sellers had to be merged with computer know-how that most of them did not have at that time.
3. collective capacity to ensure technological integration: ADSL combines different types of physical networks, different protocols and software, and the objective of end-to-end quality of the chain, vital for customer satisfaction, is not easy to achieve, since the technical system is heterogeneous and complex.

Three business processes were studied: eXtense and Turbo ADSL direct sales, eXtense and Turbo ADSL order-to-delivery (logistic process), eXtense and Turbo ADSL after-sale servicing. Each process was analyzed to describe its activity content and to identify strategic objectives and critical activities/collective competences, as described in table 3.

Processes:	strategic objectives at the process level	critical activities/collective competences
eXtense direct sale	level of sales, customer satisfaction and attachment, cost of sales	“concluding the sale transaction”, “supporting sale methods”
eXtense order-to-delivery	short lead-time, due date respect, cost of processing the order	“managing the order-to-delivery flow”, “managing the incidents in starting the equipment”
eXtense after-sale servicing	time required to restart the connection, customer satisfaction, experience feedback and learning	“managing the customer relation”, “processing network incidents and complex technical problems”, “capitalizing technical experience”, “supervising the dedicated IP/ATM/ADSL network”
Turbo ADSL direct sale	level of sales, customer satisfaction and attachment, cost of sales	“identifying sale opportunities”, “customer needs understanding”
Turbo ADSL order-to-delivery	short lead-time (80% in less than 14 days), due date respect, cost of processing the order	“managing the order-to-delivery flow”, “managing the incidents in starting the equipment”
Turbo ADSL after-sale servicing	same as eXtense	

Table 2: ADSL business process analysis

For each process and for critical activities, the main actors involved were listed. Different alternate organizational profiles for the process or the critical activity were identified. For each profile, the specific contributions of actors were described and the resulting requirements for individual competences were determined.

For instance, for the eXtense direct sale process, key issues differentiate potential organizational profiles:

- on *sales*: would sellers be general ADSL eXtense package sellers, supported by sectorial experts specialized in professional segments (physicians, lawyers, accountants...), or would sellers be themselves specialized and expected to sell to specific professionals without any sectorial support? This is of course a division of labour issue, but it also involves different resource portfolios (the tools to support selling must not be the same if they are aimed at non-selling experts or specialized sellers; the performance management system cannot be either the same: support experts cannot be evaluated in the same way as sellers.
- on *sales promotion*: to promote eXtense sales, each agency provides free self-service computers, on-site demonstrations, users' clubs with a technical support; should the experts in charge of those activities also be sellers, or should they be in charge of technical support to sellers, or should they be limited to marketing activities?

Two alternate organizational profiles were finally defined:

*profile 1*

- there would be 3 types of sellers: sellers P, with a sectorial specialization (sales to physicians, lawyers, accountants...); sellers R, experts in Internet and computer applications, staying at the agency to make demonstrations, to manage free self-service computers, to support users' clubs and to provide a technical support for computer technology issues; telephone proactive sellers, specialized in eXtense packages, gradually moving from the sale of simple products to more complex sales, while gradually elevating their competence level.
- a team of operational marketing would be specialized in eXtense.

*profile 2*

- demonstrations, users' club, and Internet self-services would be managed by non-seller technicians called “ADSL ambassadors”;
- ADSL sellers, level-1 (simple sales) or level-2 (more complex sales) according to their technical expertise in ADSL, would be in charge of developing all ADSL sales; sectorial experts (medical, legal or accounting

Internet applications) would be concentrated in a sectorial solution team and they would support sellers when required.

Of course the individual profiles of competence required to achieve the same collective competence would not be the same in those two organization profiles. For instance, in the 1<sup>st</sup> profile, all sellers must acquire a sectorial expertise, whereas in the 2<sup>nd</sup> profile, they are only required to have a general ADSL competence. According to the existing situation in the agency (level of sectorial competences available amongst sellers, for instance), one of those two organizational profiles could be collectively considered as likely to minimize adaptation requirements, in view of existing or reasonably accessible individual competences.

The choice between different organizational profiles can be imposed by the corporate management to local units, as a corporate policy, but it can also be decentralized to take into account specific local situations. As a rule, FT decided to leave organizational options open for decentralized decisions, owing to the high diversity of local experience and competences.

### The case of e-services to small and medium firms

The SMB division was established to sell network solutions to SMBs. In 2001, one of its main strategic objectives was the growth of Internet service sales to SMBs. In that time in France, the market was hardly emerging. The situation was quite different from the ADSL market: most French SMBs were not aware of the potential that Internet and Intranet solutions offered them to re-engineer their own processes, except in specific sectors such as road transports where specialized solutions were already well known by firms. The SMB market was undergoing a deep transformation: it migrated from a dominant *product* approach (sales of technical Internet products, services and software to support the sale of telecommunication products) to a dominant *solution* approach (sales of packaged solutions, which are complete responses to final user needs). Solutions combine network products, basic and application software, design, customization and installation services. The industrial sectors covered by solutions were widening. There were already available solutions for SMBs in diverse areas, for instance to manage transport networks, the population of on-site maintenance technicians (for instance on-site after-sale technicians in domestic electronic products), customer interface (CRM<sup>3</sup> solutions), logistic flows and inventories (supply chain), health or education networks...

In 2000 the SMB division had published a strategic charter which planned an ambitious growth in sales (+ 300 M€ in 3 years) and in market share, high levels of customers' satisfaction and the complete restructuring of the sales networks. The division strategy followed two guidelines:

- On the offering side, there was a clear will to industrialize Internet solutions for corporate customers; to conciliate cost reduction and service customization, a mass customization strategy was adopted (standard modules were industrialized and engineered; they were assembled to order in a customized fashion); in that way economies of scale and cost-sharing should be achieved without sacrificing customer satisfaction. Partnerships with editors, software houses and process-re-engineering consultants would be negotiated at the corporate level.
- On the demand side, it was decided to rationalize the sale network, by establishing selling forces specialized by professional sectors (transport, health, education...) or by functional applications (human resource management, logistics, CRM...). It was planned to develop project management for the larger projects and indirect sales for the more ordinary sales.

The "e-service" working group made a reflexive inquiry about the long-run (3 to 4 year) evolution of three business processes: "selling standard e-solutions" "selling complex e-solutions", "managing order-to-delivery flow", identifying critical activities in each of those processes (table 4). Different options of organizational profiles (different mixes of technology, division of labor, expertise pooling or decentralizing, in-house integration or subcontracting to local partners) were identified to reach the collective competences required by the strategy.

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<sup>3</sup> CRM = Customer Relation Management.

Processes:	strategic objectives at the process level	critical activities/collective competences
Selling standard solutions	level of sales, market share, customer satisfaction and attachment, competence development, involved sales of other telecommunications products	“Understanding and analyzing customer needs”, “Preparing a proposal”, “Getting the order”
Selling complex solutions	same as standard solutions sales, with specific importance of competence building, plus image and strategic presence in some sectors (health, education, etc.) with reference acquisition	“Integrating partners in the project”, “Designing solution”, “Managing the project in the design phase”
Managing order-to-delivery flow (logistic process)	delivery date respect, customer satisfaction, short delivery lead time, cost of delivery	“producing the solution”, “managing incidents when starting the solution”, “control the order-to-delivery flow”, “supporting the customer when starting the solution”, “supporting the customer in the subsequent utilization phases”

Table 3: e-service business process analysis

Critical *activities*, identified with critical *collective competences*, were analyzed in a more detailed mode. For instance, the competence “understanding and analyzing customer needs” was decomposed into: “interviewing the customer with an interview guide about his main business issues (market, products, organization, processes, resources)”; “completing the interview with documents and e-data available about the situation of the firm”; “making use of general knowledge in business organisation and economics to qualify the situation of the customer firm”; “gathering information about the relevant industrial sector situation and perspectives”; “exploring the customer process re-engineering opportunities”; “combining the business process re-engineering opportunities and the knowledge of FT solutions to explore the potential contributions of FT solutions to the customer process re-engineering”.

The group mapped the main actors involved in selling e-services to SMBs.:

- Commercial agency management,
- Sales administration,
- Marketing of e-solutions,
- Sales: sellers, commercial engineers specialized in e-services, experts coming from engineering subsidiaries,
- Solution design: technico-commercial and support engineers, support managers, designers of complex or customized solutions, design managers, telecommunications product technical experts, developers,
- Project management: “beginning-to-end” project managers, or partial project managers (first phase: design and engineering, second phase: production of the solution, installation)
- Production: intervention technicians, production managers, delivery supervisors,
- Partner management: partner managers, corporate division “Partners”.

The activity content of sales processes very much depends upon the complexity of the commercial project: for instance, if the project is complex, project management is a more important issue and entails specific activities which are not required for simple solutions; if the project is complex, some customized design is required, which is not the case for simple sales; etc. But what does “complexity” mean in that context? The working group defined “complexity level of commercial projects” as the combination of three criteria:

1. the degree of customization of the solution (“serial” complexity),
2. the degree of innovation of the solution (was it already sold or not? is there experience feedback?) (“innovation” complexity),
3. the number of different FT and external products to assemble in the solution (“combinatory” complexity).

Based upon the experience in distinct commercial territories where e-services to SMBs developed faster than average, four organizational profiles were identified by the group.



*Profile 1 (figure 9)*

There is a clear cut separation between selling and delivering. The seller can ask for the support of a solution designer if he feels he needs it, for the more complex sales: he must take the initiative to require support. There are two types of solution designers: some are application-oriented, and often specialized for specific professional or functional sectors, and they design solutions in which application complexity prevails; other designers are technique-oriented (network and telecommunication protocol specialists) and they tend to design solutions in which technical complexity prevails. In any case, the seller judges if he needs some designer and if so, which profile is required. Once the design and sale phase is over, an installation technician takes over the project, plans and supervises the delivery of the solution. This organizational profile, which requires a fairly wide population of sellers able to propose and evaluate e-solutions, is generally adopted where there is a significant population of sellers already familiar with Internet and e-solutions.

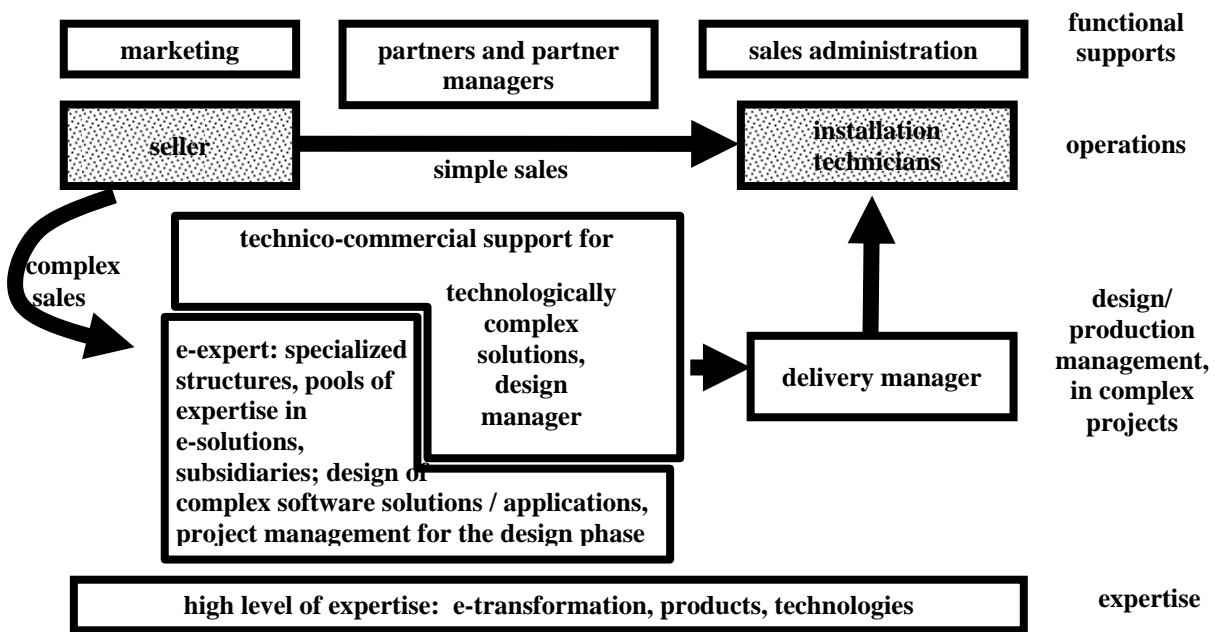


Figure 9: e-service organizational profile N°1

*Profile 2 (figure 10)*

In this organization, often implemented where sellers are not yet familiar with this new market, in the sale and design phase, the seller is normally supported by a specialized technico-commercial engineer, who decides when the dimension and the complexity of the project justifies the contribution of a solution designer and assembler. When projects are simple and do not justify the intervention of a solution designer, the production phase remains separate from the design phase. In most cases, when the support engineer calls for the support of a solution designer, it means that the commercial project is important and complex, and therefore logically requires to be managed as a project. Neither the seller nor the support engineer can play the role of project manager, for competence and time availability reasons. That is why in the cases of complex sales, the solution designer becomes the project manager on the whole duration of the project, from the very beginning to the final delivery. In that case, he also supervises the production phase. The production phase remains separate from the design phase when the project is simpler: then the solution designer transfers the project responsibility to the production service for the production phase.

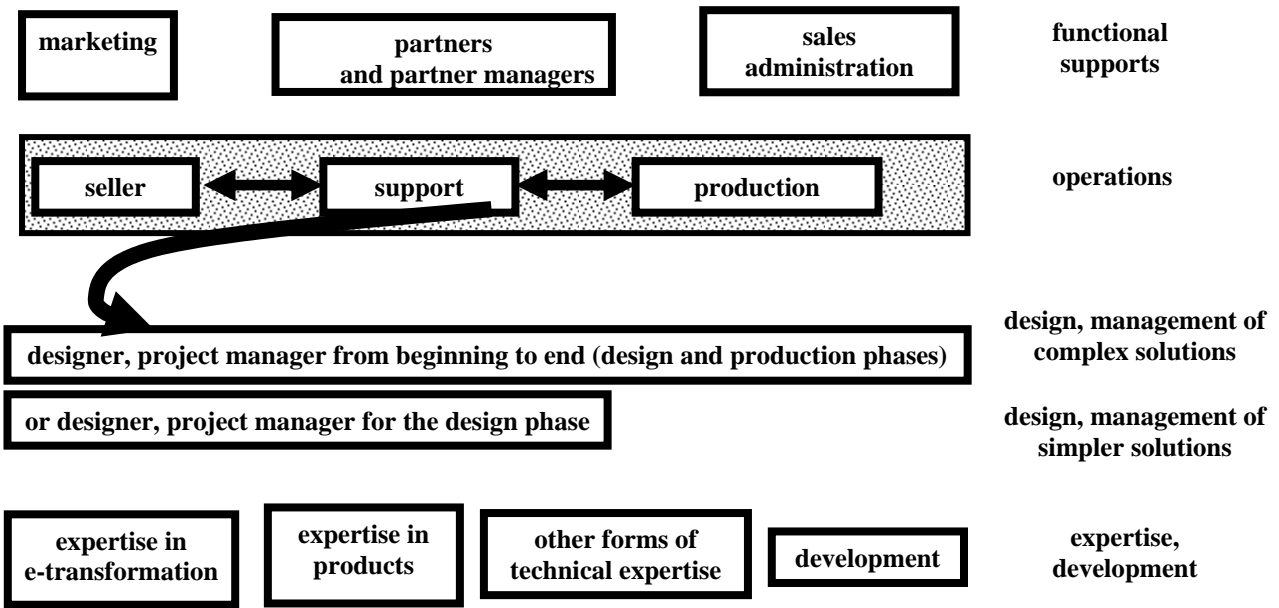


Figure 10: e-service organizational profile N°2

*Profile 3 (figure 11)*

There are two project managers, one for the design and sale phase, who coordinates sellers, support engineers and external partners if any, and one for the production/delivery phase, who coordinates FT and external partners' technicians for the installation of the solution, for complex and simpler solutions. This organization tends to prevail in territories where managers do not wish in-house integration and widely use external partners and subcontracting, to limit risks and radical changes in the competence profiles. They consider that in most cases the "e-service" market involves several types of actors and requires a great deal of coordination and project management.

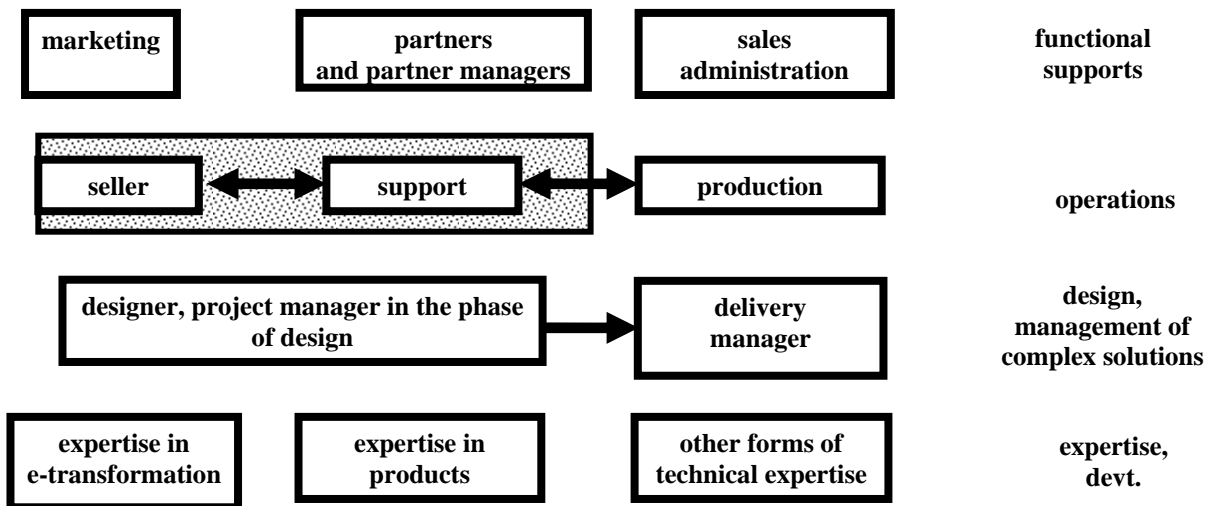


Figure 11: e-service organizational profile N°3

*Profile 4*

The same as profile 3, except that for the most important projects the project manager manages the whole project, both in the design and in the production phase, to ensure continuity and coherence. This organization – and the resulting need for "high profile" project managers - is given much importance where FT mostly faces bigger customers (medium rather than small firms), particularly in urban territories with a high concentration of firms and fairly big projects. In that case, the project managers are often solution designers, facing complex coordination with external partners, different types of designers, suppliers. It can happen that FT local managers consider that it is more convenient to create a specific structure (pool of expertise, subsidiary, joint venture with partners) to take

over this type of activity. In this case, the internal transformations of FT organization and competences are minimum, since most of the changes are externalized towards the specific entity.

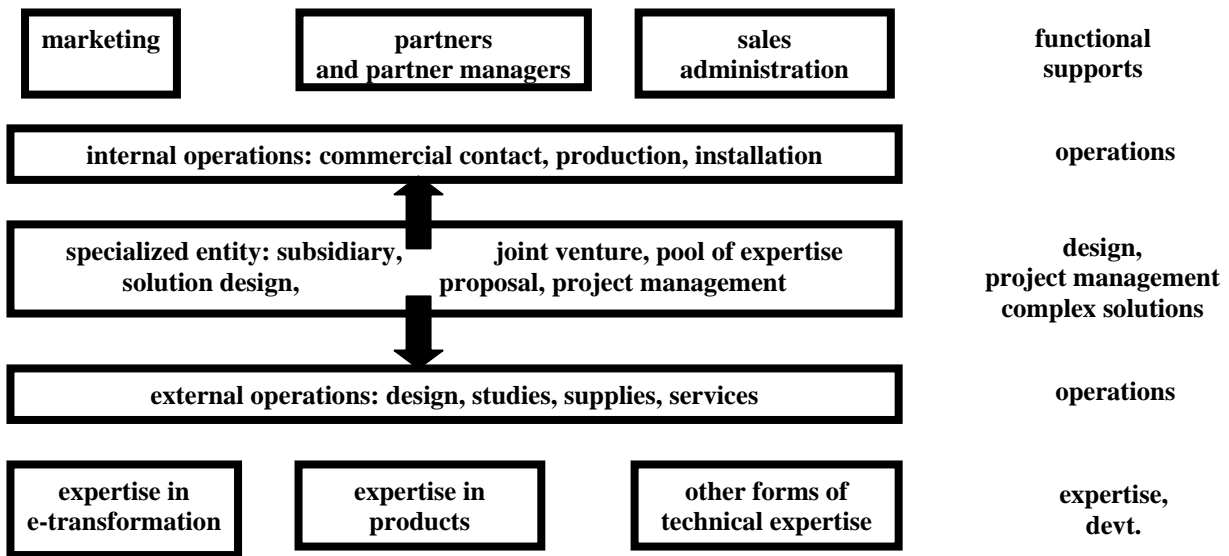


Figure 12: e-service organizational profile N°4

The working group determined the factors which can orientate the organizational profile: number of sellers familiar with e-solutions, average size of projects, average complexity of projects, customers sectors concerned on the territory, availability of competent external partners in the local environment. The group also studied the impact of organizational profiles upon the required individual competences, particularly for two key actors: the project manager(s), the solution designer (which can, but must not, be merged in the same person).

For instance, for the project manager, profile variations were related with the level of complexity of the commercial project (figure 12), considering that, the more complex the project is, the more complex coordination issues are, justifying to move from a no-project organization (ordinary functional teams for selling and support), towards “light project management” (project managers who are only responsible for specific phases and can have a fairly specialized profile – design or production) and “heavy project management” (polyvalent project managers who can manage the whole project). The starting situation is the sale of a simple solution: an already well known solution, sold in its standard packaged solution, combined with few other products and services. In that case, usual sellers and technicians of installation should be able to manage the sale by following the usual procedures. From there complexity can grow along three axes (combinatory complexity, customization complexity, innovation complexity). The design of the solution, the coordination of multiple contributors become issues. If complexity and innovation remain moderate, there can still be a clearcut separation between design and production/installation. Some design specialist and some installation specialist can sequentially manage the project. But when complexity and uncertainty increase, the adaptive loops between production and design become fundamental, and the project should be managed globally, which requires high level project managers (polyvalent, with some competence in design, installation, partners control and project management).

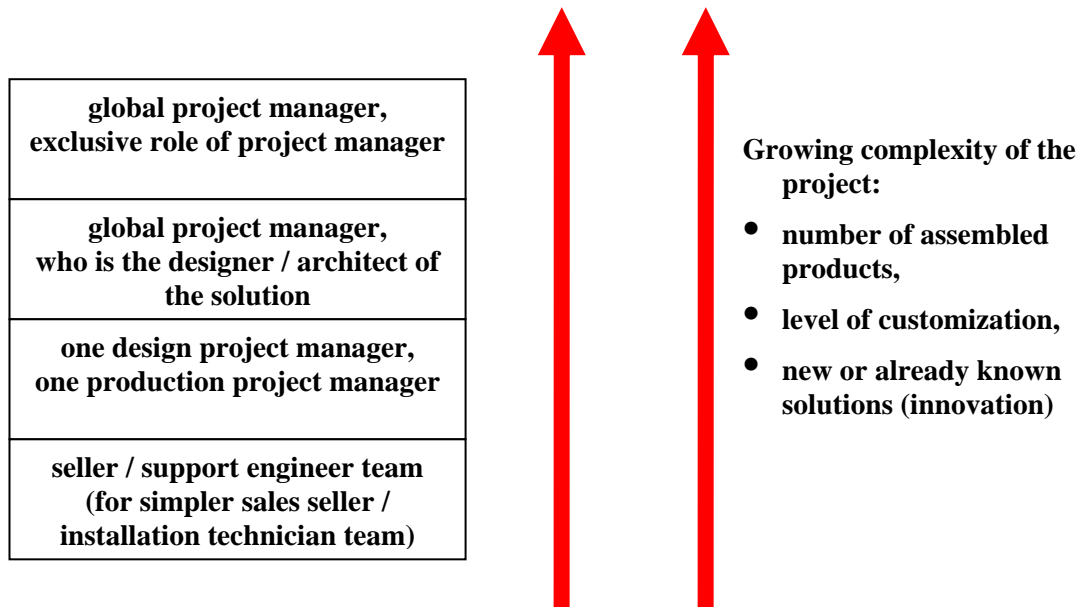


Figure 13: project manager profiles

Research outputs: instruments, seminar, extension to new fields

FT did no longer consider as relevant to build heavy analytical systems describing individual competences, since they would always be obsolete. The H.R. team and the researchers developed a methodological package for the ongoing reflexive analysis of competence critical issues by operational actors themselves:

- establishment of process teams as “communities of inquiry” [Dewey, 1916],
- analysis of business processes,
- deployment of strategy to processes,
- identification of critical activities,
- design of optional organizational profiles, on the basis of a few parameters (e.g., the level of specialization or polyvalence, the choice between centralized competence pools or disseminated competences, the level of automation in information processing, subcontracted versus internal operations),
- individual contributors to the collective competence for each organizational profile,
- criteria of choice between organizational profiles and resulting requirements for individual competences.

Furthermore both groups (ADSL and e-service to SMBs) proposed guidelines to delineate the sphere of imperative rules (corporate policies) and local free initiative (choice amongst different options). The limit between centralized and decentralized choices will move, according to the gradual upgrading of competence levels over the whole company (trend towards homogeneous and standardized policies) and the emergence of new issues (trend towards new differentiation factors). Therefore, to take into account the need for a dynamic approach in this fast evolving context, the groups designed typical *paths* for migrations through several organizational profiles, in concordance with the gradual evolution of the individual competence portfolios. For instance, in the case of e-service sales to SMBs, the organization could migrate through distinct organizational profiles in concordance with the growing size of the population of project managers and the population of solution designers, and the dissemination of basic Internet and process re-engineering competences in the sales force. It was considered that within two years all FT sellers should have acquired a basic Internet competence, making local specialized pools of Internet competence less necessary. Considering how scarce the competences for the design of complex solutions and the management of projects were on the short run, the group proposed successive organizational stages: first, pooling competences in central competence centers; projects should be systematically managed by an experienced and a learning project manager (apprenticeship); competences would be gradually disseminated in the sales networks; later, the aptitudes to manage smaller projects and to design simpler solutions could be considered as

basic competences required from all FT sellers. At the same time, organizational profiles required by scarce e-service experience within sellers might move towards organizational profiles allowed by a reasonable e-service experience of all sellers.

### **Towards a pragmatic and semiotic theory of management instruments**

Management research and theories of organizations do not always formulate the theory of instruments they tacitly use to study the role of management instruments, such as accounting, performance measurements, planning and budgeting, in organizational dynamics. Some theoretical frames were nevertheless proposed:

- For the cognitivist theory of artificial systems [Simon 1981], instruments are imperfect representations (in the sense of replications) of the world and reproducible models of reasoning procedures about the world; for instance, instruments for competence management would be some type of modelling individual competences in the organization that different actors can use and improve through time.
- For the new institutionalist approach of accounting [Carruthers], instruments are implemented in the organization as visible signs of its conformance to social standards (respect of regulations, imitation of successful firms, adoption of state-of-art systems...) and are decoupled from the actual activities which are performed in the organization. For instance, competence management software would be introduced in the firm to follow managerial fashions, or to show external observers (unions, candidates to recruitment, media) that the firm faces the challenge of competence development.
- For the critical research in accounting [Hopwood 1987 & 1990], instruments are vectors of political and social domination of some groups over others. For instance, individual competence management practices can be seen as a way to weaken the traditional practices of industrial branch contracting and salary regulation, based upon standardized qualifications.

One common feature of those different approaches is their shared lack of interest for activity, and particularly collective activity, for the concrete settings of activity (context, situation), and for actors' interpretation and sensemaking leading to concrete activity. Instruments, whatever word is used to point at them ("artificial systems, tools, instruments, techniques..."), are supposed, either to own an independent agency power (they determine reasoning in new situations in the cognitivist approach; they impose and maintain domination relations in critical approaches), independent from the setting of concrete activity here and now, or to be decoupled from actual activity (new institutionalist "decoupling" theory).

It seems to us unrealistic and ineffective to ignore the close and flexible link between situated activity, instrument utilization and actors' interpretation: on one side, *there is* a link between instruments and activity, on the other side this link is *not deterministic* (instruments do not determine activity). To analyze the type of link between instruments (management instruments, technology, division of labour) and activity that we studied in the case of FT, we propose to recur to a semiotic and pragmatic theory of instruments.

**Semiotic:** instruments are sensemaking signs interpreted by actors to make sense of the situations and to converse about them. Why a semiotic frame? Because we believe that the relation between instruments (artifacts) and activity is mediated by actors' interpretation, and that actors interpret situations through signs. In other words instruments do not play any role in human collective activity if they are not interpreted by actors – if they are not signs.

**Pragmatic:** actors make sense of the situations of collective action in which they are involved to orientate the subsequent phases of collective action. Why a pragmatic frame? Because we believe that actors' interpretation and the meanings it builds always start from experience and result in new experience. In the pragmatist philosopher Peirce' words, "since obviously nothing that might not result from experiment can have any direct bearing upon conduct, if one can define accurately all the conceivable experimental phenomena which the affirmation or denial of a concept could imply, one will have therein a complete definition of the concept, and *there is absolutely nothing more in it.*" [Peirce, 1958].

In this frame of analysis, organisational activities appear as a creative game, whose rules are at the same time invented by actors *and* constrained (but not determined) by instruments. On this basis, we identify two broad theoretical positions about instruments:

1. The first position is based upon the concept of *representation* and therefore we shall call those theories "theories R". They are substitutive (instruments are bound to replace human activity) and computational. They can respond both to positivist taylorian [Taylor, 1911-1972] or cognitivist [Simon, 1981; Simon, 1982] theories of action and decision-making in organizations. For instance, competence management systems are seen, either as the true image of the competence structure of the firm, or as the best objective

way actors can represent competences at some moment in time, providing a model which they can repeatedly use without remaking the competence analysis and which unifies their mental representations. In this type of approach, the operational effectiveness of management instruments is credited to their capacity to replicate and simulate some kind of reality, be it the reality of action (*substantive* rationality) or the reality of logical processes of thought about action (*procedural* rationality). The tool is supposed to offer an amplifying substitute to human action (economies of attention, human action substitution). Management instruments are seen as symbolic reproductions of logical phenomena which enable actors to “translate” their complex concrete activities and decision-making procedures to computable models. The tool is expected to escape human subjectivity, except the rational limits of human information processing. In other words, subjectivity is identified with information limits. Management instruments aim at “exact economic measurement” or “relevant decision-making procedures” or, in our case, “relevant description of required and existing competences”. They only leave residual space to emotion and passion: if they were perfect, there would only remain rational decision modelling. Emotion and intuition appear as the measurement of how imperfect rational management instruments are.

2. Another position, pragmatic and semiotic, is based upon the concept of interpretation and therefore we shall call those theories “theories I”. They view the tool as a semiotic artifact which is interpreted by actors as a sign [Eco, 1973, 1983] and enables them to make sense of their collective action [Weick, 2001]. In this view, the essence of instruments is not a specular reflection of reality, but rather a mediation between actor’s subjectivity and real objects, a way to build meanings from a priori chaotic situations. Management instruments act as a language: they are designed, read, used, interpreted, and handled by human subjects, who have specific points of view. Tool utilization appears as a permanent interpretive interplay between human subjects and objective contexts. From the infinite diversity of concrete experience, actors abstract and build schemes of action, which can be re-implemented in new situations, *provided those new situations belong to a certain class of situations, a “genus”*. The schemes of action are *generic*, i. e. limited to a practical “*genus*” of situations [Dewey, 1938]. This pragmatic view opens the way to the theory of activity, focused upon human activity as an interpretive and situated practice [Vygotsky, 1934-1986] [Luria, 1979; Leontiev, 1981]. According to the Russian education psychologist Lev Vygotsky: « To explain work as a human activity appropriate to a specific purpose, we cannot limit ourselves to say that work originates in aims, in the problems human beings face, but we must explain it by the use of instruments, the application of specific means without which work could not appear »[Vygotsky, 1934-1986]. Instruments establish vocabularies which point to generic schemes of action. This approach was already explored in previous studies about Target Costing in new product development [Lorino 2001], or in business process analysis [Lorino, Tarondeau 2002]. In our case, the research focus moves from the competence modelling tool to the competence assessment recurrent activity.

In theories R, instruments multiply the capacity to act. In theories I, creativity multiplies the capacity to use instruments. There is a huge universe of potential uses which will never be achieved, and the human actor permanently reviews actual activity by comparing it with his virtual world of action, his “proper body” in the philosopher Merleau-Ponty’s words [Merleau-Ponty, 1945]. In the same way as the poetic imagination of the artist is permanently faced with the limits of technical processes available for expression, the formal procedures and the instruments oppose their resistance to the subjective aspirations of intelligent actors who strive to transcend those limits.

In theories I, instruments combine two components [Rabardel, 1995, 1999]: an objective artifact or tool (a material object, a computer program, a mathematical model, a drawing, a diagram, a text) and a subjective scheme of utilization, which is generated by the user of the instrument, when he/she interprets the instrumented situation in which he/she must act. Therefore the role of management instruments in shaping new forms of collective action is twofold:

- on one side, as a material or informational object, the management tool is an objective artifact, or a system of material or symbolic artifacts, which constrain utilization and action, but does not determine a unique way of acting; it is constraining, not determining; for instance, the process and activity model for “selling simple e-solutions to SMBs” is an informational artifact which does not determine the actors’ judgment about competences;
- on the other side, on the subjective user’s side, the tool appears as a mental scheme of utilization, i. e. an interpretive scheme which enables the subject to interpret the artifact (for instance, the management accounting system) into a certain type of action, a specific utilization (for instance, using the management accounting system to report and control the performance of divisions with a specific focus upon non-quality cost); for instance, the

process and activity model for “selling simple e-solutions to SMBs” is used by actors to identify critical collective competences in a way which is influenced by their personal and professional experience, by the practical uses of the process and activity concept within the firm, by the margin of free choice actors can imagine they have in a certain phase of collective history.

Both components, artifact and scheme of utilization, are linked, but they have a certain level of mutual independence. The artifact leaves space for the personal “style” in tool utilization, or even, in some situations, a complete reinvention of the instrument utilization. In the semiotic approach of management instruments, actors are permanent creators of their collective activity, sense-builders involved in the ongoing interpretation of instrument utilization. Instruments play a key role in the collective activity, since they make up the organizational language through which cooperation, communication, game and collective sense-making are channelled. They allow to “carve” meaningful discrete elements out of continuous shapeless processes. By cutting off pieces of meaning, they frame action potential and, furthermore, the very shape of the organization. For instance, the structure of the accounting system points to management objects such as “division” (“profit of division”) or “product” (“cost of product”) but ignores others (for instance, the management accounting system may ignore the “profit of distribution channels”, the “cost of customer”, the “cost of lead times”), which consequently to some extent do not exist because they are not designated by the instruments. The process and activity model points to activities – and collective competences - as management objects, by grouping or separating elementary tasks, by identifying some and ignoring others.

Those two classes of theory about instruments respond to two theoretical positions about knowledge. Representation-based theories (theories R) define knowledge as representations of some objective reality. In this theoretical perspective, “organizational knowledge” is often identified with *common* knowledge, i.e. shared representations. It is seen as a major way to make knowledge organizational, i. e. shared, to make it explicit: since the interpretation by actors is residual, if representations are made explicit, they are appropriated by all and become part of the shared cognitive patrimony. Transforming tacit representations into explicit representations equals transforming individual knowledge into organizational knowledge: hence the importance given to the “explicit/tacit” issue [Nonaka & Takeuchi, 1995]. This move from tacit to explicit also appears as a way to memorize and to accumulate knowledge in the course of time by stocking and gradually sophisticating *representations*. The attempt to manage competences through analytical information systems (detailed lists of individual competence profiles) refers to this view of organizational learning as completing and sophisticating explicit representations.

On the other side, interpretation-based theories (theories I) define knowledge, or rather “knowing”, as a dynamic and situated process: the process of interpreting situations to act upon them. They are close to theories of situated action or cognition [Suchman, 1987] and compatible with the structuration theory [Giddens, 1984] [Orlikowski & Robey, 1991]. Collective activity raises the issue of *making sense of the situation* in such a way that collective activity can be performed rather than the issue of *representing* the situation. “Knowing” appears as a tendency to interpret a certain type of situation in a certain way. This tendency is not a routine, which mechanically reproduces schemes of action, since it is always submitted to situated reinterpretation and it permanently evolves through the on-going interpretation of experience. Interpretation processes are rooted in concrete collective action and social interactions.

In this approach, organizational knowledge is not identified with common shared representations. Distinct but “conjoined” interpretive schemes provide organizational “knowing” as well. For instance, in a jazz quintet, the saxophonist does not share his instrumental technical knowledge with the other musicians (piano, trumpet, etc.), but they can jointly use their respective technical knowledge to play together finely, thanks to empathy, mutual understanding, and mutual feelings. The art to play saxophone and the art to play piano are organizational forms of knowledge, though they are not shared, because saxophone and piano combine harmoniously in this type of music. In the same way, in the cross-functional working groups established in FT to study strategic competences, there were sellers, Internet experts, business re-engineering experts, project managers, marketeers, who obviously had different professional representations and “play different instruments”. But they can jointly use their respective forms of knowledge to design and sell adequate e-solutions to customers. Then the status of management instruments is quite different from “representations”. They are artifacts involved in activity to support sensemaking, they have a semiotic function (they are a sort of language) and provide resources for action, without necessarily “representing” anything. In FT case, the will to systematically build multiple options for organizational profiles enforces changes in the way to view present and future situations. Table 1 synthesizes R and I theories of knowledge and instruments. Of course, those theories should not be considered as excluding each other, but rather

as complementary, according to the environmental and organizational level of complexity and uncertainty: in fairly simple and foreseeable environments, theories “R” can be good and effective approximations.

Theories R	Theories I
Adapted to low levels of uncertainty	Required by high levels of uncertainty
Representation	Sign
Organizational knowledge = common knowledge	Organizational knowing = conjoined, mutually combinable habits of action
Objectified, reified knowledge (storable, transportable)	Interpreting subjective habits (likely to produce signs for other actors)
Making instruments = making knowledge explicit	Making instruments = producing new signs to make sense of action
Dyadic instrument: artifact A representing B	Triadic instrument: artifact A meaning B for someone C in a context

Table 4: theories “R” and “I” of knowledge and instruments

## Conclusion

Strategic competence management is not mainly a matter of implementing the right information systems and training people to use it. It is a complex, dynamic and idiosyncratic organizational competence, made of collective capabilities to achieve reflexive and situated inquiries about collective processes of action (“selling standard solutions”, “selling complex solutions”, “managing the sale-to-delivery flow”, etc.) in their present state and moreover in their potential future states. It requires the experience-based individual competence of all managers concerned, rather than some specific technical expertise of human resource managers or specialized consultants. Operations managers, who can have an insider’s view of the core processes of the firm, should play a leading role. This organizational “competence about competence” (strategic competence management) must be instrumented. Instruments play a key role in the process-based inquiries, by providing an organizational language and by enabling actors to build meanings and sense out of their collective activity.

The issue of strategic competence management illustrates the more general issue of management instruments. Management instruments are signs which combine objective artifacts and situated interpretive schemes of utilization. The relevant instruments for strategic competence management do not principally aim at modelling analytical competences on an exhaustive basis at a certain point in time. They rather aim at providing cross-functional process groups (communities of inquiry) with dynamic methods to identify critical collective competences on a selective and an on-going basis. They also aim at showing how to create options in what we called “organizational profiles” at the very first stages of strategic changes (large projects, new markets, new technologies). Collective and individual competences should appear as *ex ante* strategic levers rather than *ex post* control variables, bottlenecks and constraints: when the main orientations for organizational changes have already been decided, the range of possibilities in the combination of organizational profiles with individual competences becomes limited.



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