
Routines and incentives: the role of communities in the firm

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The purpose of this paper is to contribute to clarifying the concept of routines, by focusing on a specific aspect of this concept: namely the question of *localization of routines within the organization*. We consider that one of the main weaknesses of the theory in the analytical treatment of routines comes from the fact that the local context does not really matter. Our position is that, on the contrary, the local context in which routines emerge and learning takes place does matter, and leads to routines that strongly differ in terms of power of replication, of degree of inertia, of search potential. We base our analysis of the localization of routines on the concept of *community*. We consider that, as a result of the permanent interaction between the individual and organizational levels, routines are shaped and determined at an intermediate level, the level of communities. Along these lines, we show that the analysis of the localization of routines in the organization has important consequences for our understanding of the specific dimensions of routines (cognitive, co-ordination and motivational), in particular on the incentives and the structure of the firm.

1. Introduction

As emphasized by Nelson and Winter in *An Evolutionary Theory of Economic Change* (1982), the notion of ‘routine’ is a key concept in the foundation of their evolutionary theory. Routines are the ‘genes’ of the organization, and constitute the element of heredity of the evolutionary theory. Evolutionary approaches to economics are grounded on an explicit dynamic account of the interaction between mechanisms of variation (which constantly introduce variety, novelty and heterogeneity among routines) and mechanisms of selection (which tend to reduce heterogeneity among routines). More precisely, Nelson and Winter underlined two main dimensions of routines.

- On the one hand, there is a cognitive dimension when considering that routines encompass the organization’s knowledge basis. They then constitute the organizational memory (‘organizations remember by doing’, Nelson and Winter, 1982: 99).
- On the other hand, there is also a motivational dimension associated with the control of intra-organizational conflict: routines are ‘truces’ amongst conflicts

(‘attempts to change routines often provoke a conflict which is destructive to the participants and to the organization as a whole’, *ibid.*: 134).

Nelson and Winter also consider routines ‘as targets’.

Just keeping an existing routine running smoothly can be difficult. When this is the case, the routine (in its smoothly functioning version) takes on the quality of a norm or target, and managers concern themselves with trying to deal with actual or threatened disruptions of the routine. That is, they try to keep the routine under control. (*ibid.*: 112)

This aspect of routines is essential, because routines also play an explicit or implicit role as co-ordination mechanisms. But at the same time, the organization has to change and adapt to the changing environment. Therefore, there is a need for processes to change some of the routines when needed. Thus, ‘routines’ can be viewed as a condensed way to *remember by doing why to do (motivation-incentive), and how to do things (cognition and co-ordination)*.

The seminal contribution of Nelson and Winter gave a new impetus to research on routines that were already very active, in line with the pioneering work of Simon and March (1958). The concept of routine mobilized researchers from various disciplines that included, among others, organization theory, cognitive psychology, computer programming and artificial intelligence. Nelson and Winter’s vision of routines, based on Polanyi’s (1962) distinction between tacit and explicit knowledge, contributed to anchor the notion of routine in the very centre of the economic debates on organizations.¹

However, despite a well-recognized central role in the modern theories of organization, the concept of routine still reveals ambiguities, inconsistencies and a lack of empirical verifications. As Warglien (in Cohen *et al.*, 1996) underlined, ‘the concept of routines is probably paying the price for its success: as it diffuses, its meaning gets

¹Four dimensions of research on routines are particularly active. (i) Along a tradition that comes from the earlier works of Simon, routine is considered as the main analytical tool for the understanding of cognitive processes in organizational learning approaches. This perspective (following Argyris and Schön, 1978) leads to more practical applications and empirical studies (Cohen, 1991; Egidi, 1994; Marengo, 1996). (ii) In the pure Nelson–Winter vision, routines viewed as genes of the organization in an evolutionary framework paved the way for the neo-Schumpeterian approach of the economy (Dosi *et al.*, 1988; Nelson, 1994). (iii) As the elementary building block of the ‘competence-based’ approach of the firm, the notion of routine is used in an ambitious attempt to restore a theory of the firm based on the production side as alternative to the dominant transaction-cost approach (Pralhalad and Hamel, 1990; Dosi and Marengo, 1994; Teece and Pisano, 1994; Langlois and Foss, 1996). As stated by Nelson and Winter (1982: 128), ‘the behavior of firms can be explained by the routines that they employ. Knowledge of the routines is the heart of understanding behavior. Modeling the firm means modeling the routines and how they change over time.’ (iv) In addition to competencies, and in a more dynamic setting, the notion is used to define and link together deliberate learning processes and capabilities, in particular dynamic capabilities (Teece *et al.*, 1997; Zollo and Winter, 2002).

increasingly vague and subject to arbitrary extensions. This is to some extent the unavoidable side-effect of popularity.'

In such a perspective, the purpose of this paper is to contribute to clarifying the concept of routines, by focusing on a specific aspect of the concept: namely the question of *localization of routines within the organization*. We consider that one of the main weaknesses of the theory in the analytical treatment of routines comes from the fact that the local context does not really matter. Routines experienced in a functional group, in a project team, in a network of partners, in a community of different nature, are viewed from the same angles by the theory, as if the 'geography' of the organization was completely flat and neutral. Our position is that, on the contrary, the local context in which routines emerge and learning takes place does matter, and leads to routines that strongly differ in terms of power of replication, of degree of inertia, of search potential. Along these lines, we will show that the analysis of the localization of routines in the organization has important consequences for our understanding of the specific dimensions of routines (cognitive, co-ordination and motivational), in particular on incentives and the structure of the firm.

More precisely, we will base our analysis of the localization of routines on the concept of *community*. We consider that, as a result of the permanent interaction between the individual and organizational levels, routines are shaped and determined at an intermediate level, the level of communities. We will emphasize the role of two types of communities: first 'hierarchical communities' such as functional communities, organized hierarchically, homogeneous and sharing a disciplinary specialization (finance, mechanical engineering, etc.); and second, 'autonomous' communities such as epistemic communities and communities of practice, horizontally defined either by the production of new knowledge or by a common interest in a given practice. These two types of communities can be differentiated according to the way they solve incentive problems and intra-organizational conflicts. Communities of practice and epistemic communities strongly support the cumulative process of practices and discoveries in the firm. The nature of their interactions contributes to shaping the balance between exploitation and exploration mechanisms of the firm. In addition, the shaping of the architecture of the firm (the interactions between hierarchical and autonomous communities), which determines the nature of the competencies of the firm, underlines the specific role of the manager. With regard to routines, the manager acts as an internal selection mechanism that focuses managerial attention on specific capabilities and defines the 'core competencies' of the organization. This argumentation will lead us to an additional justification of a dual theory of the firm (Cohendet *et al.*, 1994, 1998a,b, 2000a,b; Cohendet and Llerena, 1999). This type of perspective allows us to integrate the 'motivational' dimensions of routines, currently missing in the literature.

After reviewing the results and the limits of the use of 'routines' as a central concept of the theory of the firm (Section 2), we will insist on the context of formation and development of routines as a community-dependent process (Section 3). This analysis

will then lead us to re-examine the motivational and incentive dimensions of routines (Section 4).

2. Routines: what has been learned and what we have to learn

Following Nelson and Winter's seminal book, an important literature has explored the richness of the concept of routines (e.g. Egidi, 1994; Winter, 1995; Cohen *et al.*, 1996; Reynaud, 1996). From the point of view of economics, we can refer to the definition of Cohen *et al.* (1996: 683): 'Routine is an executable capability for repeated performance in some *context* that has been *learned* by an organization in response to *selection pressures*.' Starting from this definition, one can sum up the main results and debates on routines in the economic literature as follows:

- Routine is a capability in the sense that routine is a capacity to generate (collective) action, to 'guide or direct an unfolding action sequence, that has been stored in some localised or distributed form' (Cohen *et al.*, 1996: 683). Routines guarantee the regularity and predictability of individual behaviour necessary for collective action. This property refers to the characteristic of routine as organizational memory, and expresses the cognitive and co-ordinating dimension of the routine. As Paoli and Prencipe (2001) underlined, 'routines embody the successful solutions to problems solved by the organization in the past. They are retrieved and executed whenever the organization faces a problem resembling one already solved.' Thus, memories of the members of the organization store much of the knowledge (both tacit and articulable) needed to perform organizational routines in 'repertoires' of knowledge. However, for members of the organization, the knowledge required for their co-ordination is much more than knowing what is in the repertoire: 'There is much more to "knowing one's job" in an organization than merely having the appropriate routines in repertoire. There is also the matter of knowing what routines to perform. For the individual member, this entails the ability to receive and interpret a stream of incoming messages from other members and from the environment' (Nelson and Winter, 1982: 100). Routines can thus be considered as the memory of *what to do and how* (i.e. which co-ordinated sequences of actions to undertake). These routines are characterized as 'operating routines' by Zollo and Winter (2002). The learning processes are 'relatively passive experimental processes of learning' (*ibid.*: 340).
- As a cognitive device, a routine economizes on scarce information processing and decision-making capacity of agents (Simon, 1947, 1957; March and Olsen, 1976). Attention and other cognitive resources being scarce, routines as attention-focusing mechanisms economize on scarce cognitive resources in order to 'free-up higher degrees of awareness, mental deliberation and decision making for the more complex decision' (Hodgson, 1997). As underlined by Becker (1999), 'to focus attention means to reduce the space of events that managers should scan in order to avoid bad surprises and take advantage of the good ones' (Shapira, 1994). This is achieved by perceiving as noise and ignoring what does not receive attention (Garud

and Rappa, 1994). Thus focusing has two sides: it has as much the meaning of 'leaving something out of the window' as it does have the meaning of 'being aware of something', or 'drawing attention to something'. As this focusing process is not only spontaneous but also intentional, it opens the door to a specific role of managerial capabilities [and especially to dynamic capabilities (Teece and Pisano, 1994; Teece *et al.*, 1997)]. The learning processes considered in this case are more intentional. In particular the processes are 'dedicated to the modification of the operating routines, which we identify with the notion of *dynamic capabilities*' (Zollo and Winter, 2002: 340).

- Routines are essentially *context-dependent*. Execution of a routine can only be conceived in a given context that provides the natural locus of attention for collective action. The 'context' includes the physical state of equipment, external memories and the work environment. But as Nelson and Winter (1982: 105) emphasized, finally and most important, 'the context of the information possessed by an individual is established by the information possessed by all other members'. Thus, the context is generative because the

creation of shared languages and shared meanings stems from the interaction of organizational members. The relationship among organizational members is quintessential for the development and consequential execution of organizational patterned activities that embody the memory of the organization. The organizational context is both prone to active individual's mnemonic processes, and more importantly activate organizational mnemonic processes. (Paoli and Principe, 2001)

The paper focuses in particular on the role of 'communities' as context for the emergence and the shaping of routines, both operational routines and dynamic capabilities.

- As a capability, a routine results from and may be altered in the future by a wide variety of learning processes. Learning implies a modification of routines, even if the latter are usually hard to change, and are responsible for inflexibility and inertia in organizational behaviours (Nelson and Winter, 1982: 400; Langlois and Robertson, 1995). Routines change in response to experience through two main mechanisms. The first is trial-and-error experimentation. 'The likelihood that a routine will be used is increased when it is associated with success in meeting a target, decreased when it is associated with failure' (Cyert and March, 1963). The second mechanism is organizational search: 'An organization draws from a pool of alternative routines, adopting better ones when they are discovered. Since the rate of discovery is a function both of the pool and of the intensity and direction of search, it depends on the history of success and failure of the organization' (Radner, 1986). According to March (1988), the importance of search is related to the hypothesis of bounded rationality: 'Since only a few alternatives, consequences, and goals can be considered simultaneously, actions are determined less by choices among alternatives than by

decisions with respect to search.’ As repeatedly argued (Nelson and Winter, 1982; Dosi and Egidi, 1991; Dosi *et al.*, 1999), innovative activities involve a kind of learning quite different from Bayesian probability updating and regression estimation: it requires agents to build new representations of the environment they operate in (and which remains largely unknown) and to develop new skills which enable them both to explore and to exploit this world of ever-expanding opportunities. Such representations are embedded in the routines, which characterise the organization.

- Various processes of selection act as filters of evolution on routines. When an existing routine is a success, replication of that success is likely to be desired, but when a routine is a failure, Nelson and Winter (1982: 121) raised the question of its ‘contraction’. In a model of economic selection that operates on routines, many factors (the market being one selection mechanism amongst others) are involved in determining the consequences of ‘sustained adversity’ on the persistence or change of routines. Most of the selection mechanisms mentioned by the existing literature are external to the organization, and could thus be referred to as ‘natural selection mechanisms’ finding an appropriate role in the evolutionary vision of the firm. It must also be recalled that absence of action may lead to the elimination of routines. As Nelson and Winter pointed, the phenomenon of memory loss (due for instance to personnel turnover) accelerates the decay of a routine.

As we mentioned in Section 1, despite the positive results that have just been recalled, the concept of routine still reveals weaknesses and ambiguities, in particular when applied to the competence-based approach of the firm which uses routines extensively as a building block of competencies.² According to us, among the issues that deserve a

²At each point in time, a firm can be characterized by a set of productive knowledge that has been developed through a learning process and is implemented through the set of currently applied routines. Processes of selection and variation within the firm have the function to create, maintain, replicate, modify a body of distributed knowledge, which characterizes the firm. Such a set of knowledge can be called the *competencies* of the firm. The concept of competencies has recently been suggested as one of the leading explanatory variables for interfirm diversity and its persistence and, more generally, as the main dimension along which the very nature of the firm should be explained (Dosi and Marengo, 1994). These competencies are *coherent* sets of knowledge and capabilities to use them in an efficient way. The concept of competence, which relies on that of routines, refers to a view of the firm as a social institution, the main characteristic of which is to ‘know (well) how to do’ certain things.

Some of these competencies are strategic [‘core competencies’ according to Teece (1988)] and constitute the main sources of the competitiveness of a firm. They are the results of a selection process both internal and external to the firm. The management, the construction and the combination of these competencies are critical in order to understand the limits of the firm and the co-ordination as well as the incentive structure of the firm. But, and perhaps even more important, this focus on knowledge issues brings about also the issue of how such knowledge is generated, maintained, replicated and modified (and possibly also lost), i.e. the issue of learning and its nature that have been examined above.

The recent development of the competence-based approach of the firm (Prahalad and Hamel, 1990; Teece and Pisano, 1994; Dosi and Marengo, 1994) has opened some promising avenues of research for the economics of organization. The essential characteristic of this competence-based approach is that

more in-depth examination is the analysis of the complex path that leads from routines to competences. Stating that ‘competence is a set of routines’ is not sufficient for building an unambiguous theory of the firm, for at least three main reasons:

- If we recall that Nelson and Winter suggested to analyse routines along two main dimensions (the cognitive dimension and the motivational dimension), it appears that while the cognitive and co-ordination dimensions have been widely explored, the motivational one has been almost forgotten, with the exception of some few important contributions by Coriat and Dosi (1998) and Witt (1998).
- The application of the notion of routine to the competence-based approach is still too strongly inspired by a ‘natural selection’ vision of the organization, and does not yet give enough weight to a managerial vision of the firm. More precisely, besides the external selection mechanisms that operate on routines, there is a need to clearly introduce internal selection mechanisms of routines relying on managerial decisions.
- The theoretical works on routines insist on understanding *what a routine is*, but devote little attention to the nature of the group of agents who are involved in the routine. In other words, the members of the organization involved in a routine are generally considered as anonymous. We consider that routines experienced in a functional group, in a project team, in a network of partners, in a community of different nature, are all different in terms of power of replication, of degree of inertia, of potential of search.

In Cohendet *et al.* (2000a,b), we dealt extensively with the first two reasons. In particular, we stressed the idea that the role of managers/entrepreneurs in an evolutionary approach is even richer than in a classical one. Beside the classical attributes of managers, the evolutionary approach allows them to shape cognitive commonalities and socially shared interpretation patterns and frames. They also influence (indirectly) the routines at all levels of the firm. They can orient the learning processes by focusing the attention on certain characteristics of these processes (by rewarding, for instance, exploration instead of exploitation). They play also a significant role in the selection of

the firm is conceived as ‘a processor of knowledge’ (Fransman, 1994; Cohendet and Llerena, 1999; Amin and Cohendet, 2000), as a locus of setting up, construction, selection, usage and development of knowledge. In fact, considering the firm as a processor of knowledge leads to the recognition that the cognitive mechanisms are essential, and that routines play a major role in keeping the internal coherence of the organization. In other terms, the governance of the firm is not focused on the resolution of informational asymmetries but on the co-ordination of distributed pieces of knowledge and distributed learning processes. The essence of the theory relies thus now clearly on the process of creation of resources. This cognitive perspective on the study of the firm has been taken by, among others, Cyert and March (1963), Cohen *et al.* (1972), Cohen (1991), Loasby (1976, 1983), Eliasson (1990), Dosi and Marengo (1994) and Marengo (1996, 1994). This vision strongly differs from the traditional contractual approaches of the firm—transaction costs theory in particular—which consider the firm as a ‘processor of information’. For these traditional approaches, the behaviour of the firm can be understood as an optimal reaction to the environmental signals that are detected by the firm. The focus is thus on the process of allocation of resources needed to cope with this adaptation.

the core competencies of the firm, through the processes of acquisitions and mergers to reinforce existing core competencies or by allocating resources to accumulate new competitive knowledge in a specific and given core competence. In short, managers play the role of an internal selection mechanism that besides other selection mechanisms (in particular external ones such as market forces) contributes to shaping the body of competencies of the firm. All these attributes reinforce the assumption that managers, in an evolutionary context, have to set up incentive mechanisms. Moreover these additional characteristics of managers strongly speak for a richer design of incentives than in the pure transaction- and incentive-oriented approaches. After all, as Nelson stressed (1994): 'A firm can be understood in terms of hierarchy of practised organizational routines, which define lower order organizational skills and how these skills are co-ordinated and higher order decision procedures for choosing what is to be done at the lower level.'

In this contribution, we choose to focus on the motivational aspects of routines, before dealing explicitly with the context-dependent dimension of routines and their evolutions. Nelson and Winter (1982) were the first to introduce the idea that beside the cognitive dimension, routines have a motivational dimension, and suggested considering routines '*as truces among conflicting interests*'. This key statement for the building of a theory of the firm that considers routines as governance or control mechanisms, has to date not been investigated to any great extent. Only Coriat and Dosi (1998) should be credited for clearly underlining that routines may be considered 'as being a locus of conflict, governance, and a way of codifying micro-economic incentives and constraints'.³ The idea that routines contain other characteristics through the implementation of mechanisms of governance and authority, in the context of a collective behaviour where employees strive towards their own interest, is indispensable to the building of the competence-based approach of the firm. The establishment of a routine within an organization, its evolution, the testing of its problem-solving capacities, its reinforcement or its rejection, require a direct link between the notion of routine and the control and incentive mechanisms, the conflict-solving mechanisms and the sharing-mechanisms of the relational quasi-rent which govern relationships between individuals whose interests are not necessarily convergent. And, as Coriat and Dosi (1998) stressed, the governance feature of routines is strictly dependent on the given mode of organization of production:

The set of 'Japanese' production routines does not only embody different channels of information processing but also distributes knowledge within the organization in ways remarkably different from the Tayloristic/Chandlerian enterprise. And, at the same time, on the governance side, individuals' incentives to perform efficiently and learn are sustained (in the Japanese firm) by company-specific rank-hierarchies, delinked from

³The authors analyse this assumption by studying the archetypal forms of organization such as Taylorism, Fordism and Ohnism.

functional assignments, while in the Taylorian approach, the specific mechanism of incentive governance is twofold: on the one hand the design of a new pay system (the so called 'differential piece rate system'), on the other hand, incentives had to be matched by direct visual control upon work practices by foremen.

In such a context, the creation and the distribution of knowledge inherently and mainly linked to the distribution of power and of conflicts of interests induce the proposed new focus. Inequalities in the distribution of information are no longer considered to be the origin of the mechanisms of governance, but rather reveal the dynamics of the creation and distribution of knowledge. In this context, for example, setting up incentive schemes results not so much from the need to correct asymmetries of information as from the need to control learning dynamics. In fact, the existence of shared knowledge reduces, *a priori*, the risks of moral hazard and of adverse selection as the risks of asymmetries of information become less acute. One can even put forward the hypothesis that if one considers that all agents possess cognitive capacities, diverging preferences may lead to other effects than those generated by the strategic use of organizational asymmetries. Cohen (1984) thus showed that diversity with regard to preferences and objectives in a disrupted environment where learning and the creation of competencies are the main elements for success, can be a source of increased performances. He stressed that where agents pursue objectives that are specific to their units, and might be contradictory, the resulting performances are higher compared with the situation where a group of members concentrate on the same objective. Such a situation can be explained by the effects of cross-fertilization in the solution-seeking process. The collective advantage of this type of diversity is also mentioned by Loasby (1976) for whom the differences in interpretation by individuals of the same group are the source of organizational learning. The same reasoning is to be found in Schelling (1978) in the prisoner dilemma with N players. Whereas the traditional principal-agent theory is explained in a static context, a dynamic approach of learning in an evolutionary perspective leads to a thorough reconsideration of the setting up of incentive schemes. But how can one orient learning towards desired directions while at the same time ensuring the 'repatriation' of different experiences? How can diversity be stimulated while maintaining coherence? How can individuals be incited to launch a process of error-seeking, to implement new tasks and to evaluate their results and use them widely? And how can new incentive schemes be created which would make it possible to carry out, in the best conditions, processes for the creation and distribution of knowledge?

The origin of incentive schemes from an evolutionary perspective must therefore, according to us, aim to avoid, within the firm, a number of risks, which are specific to a collective learning framework. More precisely, one main task for an incentive scheme is to take into account the motivational diversity of the members of the organization and to avoid some perverse cognitive processes. Among these risks are the following:⁴

⁴This point has been developed by Cohendet *et al.* (1998a,b).

- The risk of a lack of incentives to improve an existing routine by ‘locking oneself in’ a given practice without ever seeking to change. This refers to the risk of over-exploiting existing routines and causing practices to become inflexible without questioning them in the light of new experience and new information; in other words there is a need for ‘dynamic capabilities’.
- The risk of a lack of incentives to explore new routines. As Nonaka (1994) stated, incentive schemes should influence an individual’s commitment to create new knowledge. This commitment, which aims to avoid the risk of too great a conservatism, relies on the deep-rooted ‘intention’ of the individual to evolve in a learning context;
- The risk of ‘conflicts’ between individual learning and collective learning. This type of risk of a lack of incentive to combine individual and collective learning can take on many forms. Argyris and Schön (1978) noted that a major obstacle to the evolution of learning or of common knowledge stems from the gap which may exist between what individuals say (‘espoused theory’) and what they actually do (‘theory in use’, which actually controls agents’ actions).

Our main hypothesis is that the nature and intensity of these risks are context-dependent, more precisely ‘community-dependent’. For example, these risks may be mitigated for some communities that reveal weak incentive mechanisms, associated with a strong cohesion (and strong power of replication of routines), while other communities will need strong incentives to stimulate members to explore new routines and avoid conflicts. In short, the nature of social localized interactions within the organization is a central element to understand the motivational and cognitive aspects of routines. This leads us to analyse the notion of community in more details.

3. The emergence and characteristics of routines: a community-dependent process

Following Brown and Duguid (1991), we argue that the firm is composed of a myriad of overlapping ‘communities’ (functional work groups, project teams, networks, communities of practices, epistemic communities, etc.), each of which presents a dominant mode of learning and collective behaviour. Organizational learning is thus viewed as a complex process of interaction between heterogeneous communities rather than as a direct interplay between an organizational knowledge structure and heterogeneous individual agents. Within a given community, agents act under conditions of voluntary exchange and adherence to its social norms, which leads to the formation of a nucleus of competence through the daily practices of the community. The generation of useful specialized parcels of knowledge achieved through these community practices complements, rather than challenges, the ways knowledge is constructed through classical organizational structures or market forces. Thus, the ‘geography’ of the organization is not flat or neutral. Each organization is a specific setting of localized communities that interact. The formation and emergence of routines differ according to the type of

community that is concerned. For example, routines rooted in a community that exhibits strong cohesion and respect of a social norm will not have the same strength (in terms of power of replication, degree of inertia, etc.), as routines associated with a new project team composed of heterogeneous agents, each belonging to a distinct community. From the point of view of the organization, the ‘gene’ of the organization and its power of replication may be stronger in the first case, but the second case may lead to less inertia and more ability to explore new solutions. The ‘organizational’ and knowledge environment of communities has thus important consequences for our understanding of how routines work, on their three dimensions: cognition, co-ordination and motivation, and how they structure the firm. As a consequence of both *context-dependence and capability design* of routines, the nature and the structure of the social interactions and the localization of the routines in the organization are essential. The nature of the activities concerned (production, research development, finance, etc.), the goals and motivations of the potential users and developers of the routines contribute to shaping the speed, the inflexibilities, and the different dimensions of the emerging and used routines.

To specify in which way the mode of learning and the collective behaviour differ from one community to the other, we need to present briefly the main different types of communities. Then, we will be able to characterize their properties in terms of learning processes, co-ordination principles and incentive mechanisms. Finally this will allow us to sketch an analysis of the management structure of firms.

3.1 *Some definitions about communities*⁵

When considering communities, it appears that some of them are rather knowledge creation oriented and some others are action oriented; some are defined and controlled by specific hierarchical mechanisms, others are more autonomous. To clarify the differences among communities, we present the best identified forms of communities existing within a firm, namely functional groups, communities of practice and epistemic communities.

Functional groups. *Functional groups* are traditional communities characterized by homogeneous agents, homogeneous in terms of disciplinary background and of mission (e.g. marketing, finance, accounting). These communities form the basis of the division of work and specialization. They play the key role in the functional structures of the firm as described by Chandler (1977). They are also present both in divisional structures and matrix structures of the firm. In this type of community, the production of knowledge within the firm is unintended. The original knowledge is defined in the codebooks of the respective disciplines, and agents communicate with one another

⁵See Cohendet *et al.* (2000a,b) for an extended development of the arguments.

⁶We use “codebook” both to refer to what might be considered as a dictionary that agents use to understand written documents and to apply it also to cover the documents themselves’ (Cowan *et al.*, 2000: 225).

through codes and local jargons developed in their own disciplines. The dominant learning mode is learning by doing, and the recruitment procedure is based on the recognition of the mastering of the discipline (diploma) by the hierarchy of the firm. They are dominated by a vertical relationship to the hierarchy.

The two other communities, communities of practice and epistemic ones, are the most relevant types of groups in the case of a firm considered as a knowledge processor (Fransman, 1994), since they are the place where the intended knowledge creation is likely to occur. The key point to distinguish them is that epistemic communities are truly oriented toward new knowledge creation, whereas communities of practice are oriented toward the achievement of an activity.

Communities of practice. The concept of *communities of practice* was introduced by Lave and Wenger (1990), who, by focusing on the practices of individuals, identified groups of persons engaged in the same practice, communicating regularly with one another about their activities. Members of a community of practice essentially seek to develop their competencies in the practice considered. Communities of practice can then be seen as a means to enhance individual competencies; they are oriented toward their members (Lave and Wenger, 1990; Brown and Duguid, 1991). This goal is reached through the construction, the exchange and the sharing of a common repertoire of resources (Wenger, 1998). Wenger (1998) and Brown and Duguid (1991) stated that self-organization is an essential characteristic of communities of practice. More precisely, autonomy and identity of communities, the key characteristics of self-organization, allow the collective acquisition and processing of stimuli from the environment (Dibiaggio, 1998; Wenger, 1998). Identity and autonomy are essential for the agent to define him/herself with respect to his/her environment and for the members of the community to behave collectively.

Self-consciousness is also visible in the mutual commitment of the community. It is built around activities commonly understood and continually renegotiated by its members. A community member feeds it with his/her experience and, in turn, relies on the knowledge capitalized by the community to carry out his/her activity. The community is able to articulate the practices into a shared knowledge of its own. For example, they develop a jargon understandable by the members only. There is 'a mechanism of development of collective competence, the process through which implicit knowledge is articulated through collective discussions, de-briefing sessions and performance evaluation processes' (Zollo and Winter, 2002: 341). It is thus a mutual commitment that binds agents within a social entity, ensures cohesion of the community and recruitment of new members.

⁷According to Lesourne (1991), self-organization is the ability of a system to acquire new properties by organizing itself or by modifying by itself its own organization. Self-organization confers on the system an adaptive ability to evolve without any constraint of authority or any determinism. The system is then autonomous and sets a boundary with respect to the other functions of the firm. It creates a sort of 'organizational closure' in the terminology of the theory of self-organization. This idea is important since it underlines the cross-functional nature of communities of practice within the firm.

In addition, Lave and Wenger (1991) interpreted the practice of these communities as the vector of learning, that is in turn the building of an individual entity. Hence, the evaluation of an individual is made by the community of practice as a system and is focused both on the values adopted by the individual and on the progress made in his/her practice, the two being co-constitutive.

Within communities of practice, the privileged knowledge is thus essentially the know-how (Brown and Duguid, 1991), which is implicit (sometimes tacit) and socially localized. The nature of knowledge is due to the objective and the structure of the communities of practice. As a result, the community tends to send no messages toward the outer world. Messages are almost exclusively exchanged among the members of such a community.

Epistemic communities. *Epistemic communities* can be defined as ‘small working groups, comprising knowledge-creating agents who are engaged in a mutually recognised subset of questions, and who (at the very least) accept some commonly understood procedural authority as essential to the success of their collective activities’ (Cowan *et al.*, 2000: 234). Epistemic communities can thus be defined as a group of agents sharing a common goal of knowledge creation and a common framework allowing the shared understanding of this trend. The goal of epistemic communities is thus simultaneously outside and above the community members.

What defines an epistemic community is thus the existence of a procedural authority that can be explicit or not. However, it must be different from the kind of authority held by a ‘guru’ to ensure a certain autonomy of the members. Moreover, the procedural authority conveys the idea of progress toward the cognitive goal set by the community. The belonging of members will thus be evaluated with respect to this procedural authority. It should be noted that this procedural authority can *a priori* emerge from the interactions among members. In that case, the organizational closure is either realized, or imposed from the outside and then not realized. In the former case, the epistemic community is self-organized and then close in this respect to a community of practice. This remark is important since it shows evidence of the possibility for one form of community to evolve into the other.

Epistemic communities are structured around a goal to be reached and a procedural authority endowed by themselves (or with which they were endowed) to fulfil that goal. Notions of autonomy and identity are thus weaker than in the case of communities of practice (see below), which favours the group’s creativity (Leonard-Barton, 1995; Kao, 1998). Thus, the community increases its ability to seize future opportunities.

Considering the heterogeneity of the agents and the objective of knowledge creation for the sake of knowledge, the first task of epistemic communities is to create a *codebook*. Hence, knowledge circulating within epistemic communities is the result of searching activities, producing not only articulated but also codified knowledge. The codification process allows for the constitution and the development of ‘codebooks’ and is itself a source of knowledge creation. Moreover

Table 1 A typology of some communities within the firm

	Objectives	Agents	Cognitive activities	Recruitment rules	Dominant learning mode	Cohesion principles	Incentives
Functional group	Ensure given tasks	Homogeneous	Disciplinary specialization	Hierarchical	Unintended learning by doing	Definition of the tasks	Meet given quantitative objective
Community of practices	Increase the skills in a given practice	Homogeneous	Articulation of knowledge about a given practice	Co-optation	Intended learning by doing and knowledge articulation	Common interest to the practice	Increased performance in a given practice
Epistemic community	Produce 'new' knowledge	Heterogeneous	Codification of knowledge (construction of languages and codes) and its circulation	By peers	Intended searching and codification	Respect of a procedural authority	Recognition by peers

... to develop a manual for the execution of a complex task, the individuals involved in the process need to form a mental model of what actions are to be selected under what conditions. By going through that effort, they will most likely merge with a crisper definition of what works, what doesn't work, and why. (Zollo and Winter, 2002: 342)

Validation of the cognitive activity of an agent occurs with respect to the procedural authority. What is evaluated is the contribution to the endeavour towards the goal to be reached, according to the criteria set within the procedural authority. Within an epistemic community, agents are bound together by their commitment to enhance a particular set of knowledge. Recruitment is decided on the basis of the contribution an agent makes to meet this goal.

3.2 Distinctive features of communities according to the creation of knowledge, the co-ordination mechanisms and the incentive structure

It is possible to characterize the contribution of the different communities to the nature of routines existing in a firm. Each community has its own process of creation of routines and each of them has cognitive, co-ordination and incentive characteristics (cf. Table 1).

Concerning the *cognitive processes*, each community has different learning processes. The learning process is essentially non-deliberate in the case of 'functional groups'. In this case, the routines developed are essentially oriented towards co-ordination mechanisms or incentives, learning appears, and can even be important, but only as a by-product of the 'main' objective: to be a specialist, or an efficient professional. For

communities of practice and epistemic ones, on the contrary, all the characteristics contribute to the creation of knowledge. In the case of ‘communities of practice’, knowledge is obtained by the ‘articulation of existing pieces of practice and knowledge’; and in epistemic communities by an explicit search process and the development of new ‘codebooks’. In these last two cases, the emergent routines constitute the so-called ‘dynamic capabilities’, as defined by Zollo and Winter (2002).⁸

In terms of incentive mechanisms, it is interesting to introduce a distinction between extrinsic incentive (adapted to the situations described by the theory of the agency) on the one hand and intrinsic motivation on the other (Kreps, 1997). The distinction relies on the intuition that some tasks, especially tasks undertaken by epistemic communities, cannot abide by standard incentive constraints. More generally those are the tasks for which creativity and quality are essential dimensions. They are, moreover, multifaceted tasks, the more important aspects of which are difficult to measure. In such situations, it may be difficult to work out the proper incentives (Kreps, 1997: 361). More precisely:

- Either one considers that there are actual intrinsic motivations, such as pride in carrying out one’s work as in the case of academic research and there is no ‘desutility of effort’, on the contrary. In this case extrinsic incentives should be as light as possible for they are not necessary and could be counter-productive.
- Or one considers that intrinsic motivations are actually vague extrinsic incentives (e.g. respect of colleagues) and incentive mechanisms to be implemented must remain vague. In such a context of limited rationality where it is impossible to foresee everything, the use of rather vague evaluation criteria *ex ante* makes it often easier to mobilize agents than criteria resting on rigid and precise formulas (Kreps, 1997: 361).

On the one hand, according to this classification, functional groups would develop rather extrinsic incentives schemes and on the other, epistemic communities and communities of practice would have a tendency to adopt intrinsic motivations: the pride to do ‘good work’ or to be recognized as ‘a peer among the peers’. The functional group will have a principal/agent type of incentive structure. In communities of practice, the ‘best practice’ implies both financial rewards and mutual recognition by the ‘profession’. And in epistemic communities, the endogenous evaluation process induces the recognition by the procedural authority, and finally ends with the mere involvement in the procedural authority itself.

The co-ordination mechanisms are directly linked to the internal organization of these communities: the functional one, being vertically structured and co-ordinated; the two others being horizontally co-ordinated: among homogeneous practitioners in the former case; among peers in the latter.

⁸A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness’ (Zollo and Winter, 2002: 340).

But once the mere fact of a diversity of communities is accepted, then new questions emerge:

- What can be said about the degree of ‘compatibility’ of the rules and routines emerging in those communities?
- What can be said about the ‘coherence’ of the communities, in terms of achieving the general goal of the firm, in addition or in opposition to the specific goal of the communities?
- What can be said about the frontier of the firm, knowing that communities such as the communities of practice and the epistemic ones cross very often the boundaries of existing firms?

Even if many of these questions are items for further research, we can already indicate some main properties and features of the organization of the firm resulting from the views presented in this paper.

4. Routines, communities and the structure of the firm

Considering the ‘compatibility’ and the ‘coherence’ aspects which have just been underlined, we should keep in mind that if a routine usually ensures a main function, whether activating a learning process, preventing an opportunistic behaviour or co-ordinating individual actions, it entails at the same time implications regarding the two other functions in addition to the main one. Any routine supports side (or related) functions as well. In other words any routine must be considered *a priori* as ambivalent, i.e. as a vehicle of several functions (Llerena *et al.*, 1999; Avadikyan *et al.*, 2001). Consequently the performance of the organization will depend on the existing balance between different communities as well on the compatibility and coherence of the set of rules and routines mobilized by them. As for the ‘frontier of the firm’ question, our approach leads naturally to a ‘dual’ theory of the firm (Cohendet and Llerena, 1999, 2001). In such a context, the representation of the organization of the firm is composed of an entrepreneurial capability, a set of communities and a dual organizational structure.

4.1 Entrepreneurial capability encapsulated in the managerial level of the firm⁹

This capability is at the source of the control and monitoring activities of the firm. Within this evolutionary perspective, we can now try to define more precisely the content that should characterize this entrepreneurial function.

First, the entrepreneurial function has to characterize the *dynamic capabilities* of the organization, i.e. the ability to manage strategically the adaptation, the integration and the reconfiguration of internal and external organizational skills, resources and functional competencies towards a changing environment; where time to market and timing are critical, the pace of innovation accelerates, and the nature of future

⁹See Cohendet *et al.* (2000a,b).

competition and markets is difficult to determine (Teece and Pisano, 1994: 538). This capability means that in particular the entrepreneur has a representation of not only the possible evolution of his external environment but also of the corresponding internal configuration, which is relevant for meeting the requirements of the external environment. In other words, the key entrepreneurial function in an evolutionary approach is to organize the matching process between internal and external environments.

Secondly, to act as an active interface between the internal and external environments of the firm, the entrepreneur has to develop and diffuse a specific 'vision' of the firm's context and future. The vision of a firm is defined as the dominant set of beliefs in the firm regarding the firm's internal and external circumstances, shaping the future, and, in the light of these factors, the way the firm should 'play its cards'. Since vision depends on the particular construction of particular beliefs, vision is by definition always bounded. Bounded vision and the possibility of vision failure are therefore logical implications of the concept of vision (Fransman, 1994). It is in accordance with this vision that the entrepreneur positions the firm in its environment, defining both its strategy and its internal structure. It should be emphasized that by an active position towards the external environment, we mean that the entrepreneur is able to influence the competitive context in which he evolves. Innovations of different natures will allow him to determine at least partially the selection mechanisms at work outside the firm. In fact, he might endogenize the external environment, and build a flexibility of initiatives (Amendola and Bruno, 1990). This capacity of shaping the external environment is also a way to influence the nature of the industry evolution. Expectations and visions are of major importance for the understanding not only of the evolution of firms, but also of the evolution of industries. Consequently the entrepreneur should match his vision of the firm, the existence and the effectiveness of relevant communities, in particular those which are at the core of 'dynamic capabilities'.

Thirdly, the vision or the business conception, which is a primary entrepreneurial input (Witt, 1998: 162) will have an impact on the organization of the firm itself. In fact, we even strongly argue at this point that there is, in this respect, room in the evolutionary approach for a hierarchy and a managerial components. Some authors (Loasby, 1991; Witt, 1998) have already reappraised the role of entrepreneurs, and underlined the role of leadership as provision and enforcement frames in an evolutionary context.

Cognitive commonalities, that is, socially shared tacit knowledge including knowledge about social models of behavior, may emerge spontaneously from intense communication as an unintended collective outcome and may, as such, be difficult to influence. Sometimes, however, the institutional set-up of the interactions assigns certain individuals a position in which they get a chance to shape the communication processes and thus to exert an influence on the collective outcome. The firm organization is a case in point. Indeed, the social-cognitive implications of bounded rationality are the key to the understanding why firms, as organizations, are able to

achieve internal consistency and co-ordination of individual efforts.

(Witt, 1998: 166)

4.2 *A set of communities of different types*

As each community has its own mechanisms of emergence of routines, and as the cognition, co-ordination and incentive are specific, with different properties in terms of knowledge production and allocation, the main task of the management is to define the relevant trade-off according to the external selection mechanisms to which the firm is exposed: nature of the competition, specificities of the technology and products, etc. It is at this level that the risks mentioned in Section 2 reach their real dimension, incorporating the 'inter-community' aspects.

All routines, independently of their origins, contribute to the cumulative process of knowledge creation and of allocation, to the searching processes, to the building of core competencies, but in different ways:

- Epistemic communities are leading actors in the searching activities. They have an important capacity to replicate the relevant routines, to evaluate the new experiments, to capitalize them, creating new knowledge blocks. Epistemic communities develop 'codified' knowledge and codebooks. The hierarchies can try to monitor and control them but leaving them some degree of freedom to allow for dynamic flexibility.
- Communities of practice are the repository of an important potential for the exploitation of existing routines, for increasing their efficiency, by exploiting the best practices. They are able to articulate pieces of knowledge emerging from current practices in order to increase their efficiency. There is in this case a strong tendency for hierarchy to control these routines and to capture them, in particular their replication. One possible practice is the development of 'apprenticeship' or 'learning on the job' mechanisms. Functional groups can then be viewed as the operators of the manager and the hierarchies using the existing routines and practices as yardsticks.

The balance between the different groups and communities will definitively shape the behaviour of the firm in terms of exploration and exploitation, i.e. the nature of its comparative advantages, and *in fine* its performance. In other words, the key factor for success can be interpreted as the development of a relevant composition of the firm in terms of communities, in order not only to have the effective 'operational routines' but also to develop 'dynamic capabilities', in terms of knowledge articulation and codification.

For example, the development of project teams (hierarchical by definition, with a 'project leader') is a good case of an organizational tool which tries to create 'hybrids' of the different communities. The objective is to create some specific 'quasi-communities' with respect in particular to incentives. The main remaining problem is certainly the capability to repatriate the knowledge created during the project in the existing

communities and in the following projects, which means that there is an open question about the cumulateness of such an organization, i.e. the codification of new knowledge and the replication of the new routines.

In addition, the performance of the firm implies that the architecture of communities (and in fact of routines) includes, in each community, capacities of mutual communication and absorption of knowledge.

Finally, the mere fact that attention is the key limiting factor implies that only a subset of communities will be integrated into the core of the firm . . . or even into the firm. It means in particular a selection of the relevant communities, which induces *de facto* a loss in the degree of flexibility (in particular in the static sense). In fact, the 'entrepreneur' has to find the relevant trade-off between the gain from dynamic flexibilities (through an investment in exploration activities in epistemic communities) and the loss of static flexibility (through the selection of a short list of core competencies).

4.3 *Towards a dual governance structure of the firm*¹⁰

A key feature of the evolutionary theory of the firm is that it proposes an in-depth reconsideration of the governance mechanisms. According to Williamson's conception, governance mechanisms are intrinsically linked to the information-processing nature of the firm: transaction costs are a kind of information-processing cost, and governance structures are so designed as to minimize such costs. As Milgrom and Roberts (1988) suggested:

The incentive based transaction cost theory has been made to carry too much of the weight of explanation in the theory of organizations. We expect competing and complementary theories to emerge—theories that are founded on economizing on bounded rationality and pay more attention to changing technology and to evolutionary considerations.

What the evolutionary theory proposes is more ambitious: it is the setting up of governance mechanisms based on the need for co-ordinating distributed knowledge and distributed learning processes.

Evolutionary approaches emphasize that in a world where agents differ in their perceptions of the environment, and where communication, acquisition of information, and computation are limited and costly, co-ordination can only be achieved by means of the definition of a common set of rules, codes and languages which are well understood and shared by all the members of the organization involved in a certain interaction. Routines, rules, procedures, standards, etc., then become central in the conceptual framework, but incentive schemes and information-sharing rules have also to be analysed as devices for the co-ordination of distributed pieces of knowledge and distributed learning processes. As stated in this paper, the emergence of routines is community dependent. The communities have to be combined and co-ordinated in a

¹⁰See in particular Amin and Cohendet (2000: 100) and Cohendet and Llerena (2001).

proper way, in order to obtain the most satisfactory result, from the point of view both of the shareholders and the stakeholders.

In line with the above development, the consideration of knowledge management conceived as a strategic necessity for the firm, on which the long-term competitive capabilities are based, implies significant consequences. More specifically, knowledge management can also be seen as a form of 'community management'.

In our view, if the core statement of the modern theory of the firm is that the firm must be seen first and foremost as a processor of knowledge, and not just as a mere information-processing device, then we have to reconsider the structure of the firm according to the priorities of the 'manager/entrepreneur'. To be more specific, in a context in which the focus of attention is the key limiting factor, the firm will focus its limited attention on its core competencies. Within this set of core competencies, the firm functions as a knowledge processor giving full priority to the creation of resources. Such a focus means that the activities that belong to the 'core' of the firm are not considered as being tradable on a market: they are 'disconnected' from any 'make or buy' trade-off as suggested by the transaction cost theory. However, the scope of the set of core competencies is very limited, for managing core competencies is by definition very costly: it requires specific sunk costs, forging and managing alliances and other types of cooperation with those institutions that have the complementary forms of knowledge, accessing and absorbing the most recent scientific results related to the domain of core competencies, etc. That is the reason why companies generally choose some few core competencies to develop, extend and protect in the long run. Seen from a different perspective, it means that the 'manager/entrepreneur' will consider the 'dynamic capabilities' embedded in the relevant communities of practice and the epistemic ones differently. But in addition he/she will also keep in house the corresponding 'operational routines' to allow for future development implementations.

Once the set of activities that belong to the core competencies has been defined, the other activities that do not belong to the core (the 'periphery' or 'non-core activities') are then managed through traditional methods which may rely on the transaction cost approach. These activities are necessary to support core activities, and they generally correspond to the larger number of activities and employment positions in the firm. By definition these activities do not require a strong commitment in terms of knowledge management. The firm just needs to 'be informed' of the best practices of external firms and organizations that can offer equivalent support services, and if it appears that these activities are too costly to be run within the firm compared with market mechanisms (according to transaction costs criteria), they will be outsourced. But in this case, the 'manager/entrepreneur' may still wish to keep some 'dynamic capabilities' in house, i.e. the capability to articulate new knowledge and to codify it, or to keep sufficient absorptive capabilities.

The consequence of this 'lexicographic' choice (first the focus on core activities, then managing the periphery) is that the firm needs to define two distinct structures of governance to manage the different domains: a first structure of governance to manage

core competencies in order to align dispersed knowledge and expectations, and a second structure of governance conceived along the transaction costs criteria to manage the periphery.

- The first structure of governance will be designed to orient the learning processes that are critical for strengthening the core competencies of the organization (in order, for instance, to avoid conflicts and inconsistency between individual and collective processes). Within this 'core' structure, some contractual schemes may naturally be implemented (stock options, or specific rewards for inventors within the organization, for instance), but they are not essential when compared with the priority given to the stimulation of collective learning processes.
- In the second structure of governance, classical contractual schemes are dominant to ensure the information processing that is central to the functioning of the periphery.

However, the conditions that are required to 'hold' the firm together as a coherent entity have not yet been underlined in this section. In particular it has been explicitly assumed so far that the firm can be considered as a unique cognitive entity, represented by a manager acting with procedural rationality, and distributing the incentive schemes within the organization according to his/her sole vision of what the domain of competence is. In fact, in the 'learning domain', organizational and management practices must facilitate the creation and circulation of knowledge as well as strengthen recursive decision-making. The challenge is to build trust, long-term commitments and knowledge externalities, to encourage experimentalism, variety and creative friction, to mobilize memory, to forget old routines and to facilitate the conversion of knowledge (between tacit and explicit, from individual to collective, between local and global). The costly process of allocation (and control) of extrinsic incentive mechanisms by the hierarchy should be balanced with the autonomous functioning of communities that relies on intrinsic incentive schemes. All these goals tend to privilege decentralized management, distributed capability and, to a certain degree, organizational 'excess' (Nohria and Ghoshal, 1997). By contrast, the transactional domain (e.g. securing supply, achieving economies of scale, make-buy trade-offs) demands the efficient allocation of resources, largely through substantive or procedural responses to the environment. Here, as ever, the governance choice is between hierarchy, market and network, dedicated to cost-efficiency in dealing with transactions largely of a contractual nature. Organizational excess here is simply a waste of resources.

We propose that communities, considered as a mode of co-ordination, can correct some major 'learning failures' characteristic of hierarchical organizations, and can provide specific advantages in terms of co-ordination that cannot be obtained by a hierarchical approach. However, there are also limits to the conditions under which such a new type of management, encouraging and supporting communities in a decentralized and weakly rational understanding of learning can be actually implemented. Like any co-ordination problem, co-ordination through communities also faces certain risks of failure. We suggest that in practice circumventing these risks

implies exploring hybrid forms of management able to provide complementarity between what can be called ‘management by design’ and ‘management by communities’.

5. Concluding remarks

As Coriat and Weinstein (1995) have pointed out, the evolutionary approach of the firm offers a unique advantage, compared with other competing theories, to provide explanations for three key issues of importance to understand the theoretical foundations of firms:

- It explains how one can define a firm: through the set of competencies that the firm encompasses.
- It explains why firms differ: because they rely on different routines and competencies that are specific and that cannot be transferred (at low cost).
- It explains the dynamics of firms: through the combined mechanisms of selection and variation of existing routines as a map to transform a set of secondary routines into a new core competence.

In this paper, we presented a case for an intermediate level of analysis: the community, in order to explain the diversity of cognitive, co-ordination and incentive mechanisms in organizations such as firms. In particular, we showed that ‘operational routines’ and ‘dynamic capabilities’ emerge in different types of communities, i.e. with different cognitive, co-ordination and incentive principles. The decomposition of an organization such as a firm into communities and/or competencies induces new questions. In particular, the possibility of a dual governance structure arising within the same firm raises the problem of internal coherence. The tensions within a firm that is at the same time trying to organize and to manage its information flow and its knowledge base were, for instance, analysed by Marengo (1994) when discussing the limits of the well-known multidivisional (‘M-form’) and functional (‘U-form’) forms. He noted that these traditional forms are conceived to solve information problems (information overload by managers, in particular) and that they are not appropriate for creating knowledge.¹¹

¹¹Marengo notes, for example, in the case of the U-form, ‘It can be argued that the U-form centralizes competencies in inter-functional coordination and decentralizes instead to functional departments competencies in many strategic issues concerning products and diversification. With the growing multiplicity of products the functional structure does not seem that of information overload, but that of mismatch between competencies and tasks. Chief executives are unable to do their job effectively, not because they are burdened by excess information, but rather because the organizational structure does not enable them to develop the necessary competencies. Chief executive should respond to environmental changes, but when such changes push towards product diversification, many of the competencies that are necessary to promote and manage diversity remain, in the U-form, at the level of functional departments’ (Marengo, 1994).

In fact, in the classical cases of M- and U-forms, priority was given to information processing and not to the knowledge processing of the firm, i.e. to the process of allocation of resources and not to the process of creation of resources. What is assumed in a dynamic perspective centred around the focus on core competencies is precisely the reverse hypothesis: priority given to the process of knowledge creation, and then, bounded by this priority, the definition of the mechanisms of allocation of resources. This, however, raises in a renewed way the problem of the internal coherence of the firm (Cohendet *et al.*, 1998a,b).

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