

The role of authority in the governance of knowledge communities.

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Abstract - The aim of this contribution is to pinpoint some elements dealing with the governance of knowledge intensive communities. Traditional approaches are usually dealing with hierarchy as a transaction costs reducing device. However, such approaches are mainly based on the assumption of opportunistic behaviours resulting from divergences between personal objectives and the objectives of the organization. At the opposite, the governance of knowledge intensive communities relies on the close coupling existing between impersonal and personal authority. The first coordination mechanism is materialized through norms governing the cognitive work of the community by allowing a better assessment of future behaviours. On the other hand, personal authority constitutes a complementary coordination device which relies on the strong complementarities between reputation and trust.

Introduction.

In the frame of the Knowledge Based Economy, is developed the idea that a growing part of the processes of knowledge production and knowledge spreading is provided by knowledge communities. However, instead of the growing interest and the growing literature treating the issue of knowledge intensive communities, the contributions aiming at shedding some light on the organization within communities remain rather uncommon. Actually, most of the work has been focusing on the cognitive aspects of such communities in different contexts such as the firm (Amin, Cohendet [2000]²) and open source software (Cohendet, Créplet, Dupouet [2000]³)⁴.

The aim of our contribution is to point out some of the organizational features of knowledge communities by focusing on some of the governance mechanisms occurring within them. More precisely, our aim is to show that, as in the case of 'formal' organizations, the coordination of the cognitive work done within communities is partially based on the interplay between norms and some kind of 'informal' hierarchy. However, in contrast with the traditional approaches, such hierarchy bases its legitimacy on reputation and trust effects.

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I would like to thank Prof. Patrick Cohendet and Christophe Lerch for their helpful comments. Remaining errors are at the charge of the author.

² Amin, Ash, Cohendet, Patrick, 'Organisational learning and governance through embedded practices', Journal of management and governance n°4, 2000.

³ Cohendet Patrick, Créplet Frédéric, Dupouët Olivier, 'Organisational innovation, communities of practice and epistemic communities: the case of Linux', in Kirman A., Zimmermann J.B. (Ed), 'Economics with Heterogeneous Interacting agents', Springer, 2000.

⁴ Some recent contributions tend to precise some organizational features of knowledge intensive communities (cf. Cowan, Robin, Jonard, Nicolas 'The working of scientific communities', Merit-Infonomics Research Memorandum n°2001-031, 2000, Cowan, Robin, Jonard, Nicolas, 'Network structure and the diffusion of knowledge', MERIT Working Paper, 1999).

Moreover, this hierarchy is being characterized by a turnover corresponding to the evolution of the reputation of each member within the community⁵.

The paper is organized as follows. Firstly, we will make a brief flashback over the orthodox approaches of the governance of organizations (by focusing more specifically on the theory of teams and on the transaction costs theory) in order to pinpoint their limits in the frame of the Knowledge Based Economy. Secondly, we will focus on the governance mechanisms occurring within knowledge intensive communities by, firstly, making a short description of this concept. Then, we will point out their own governance mechanisms, by making a distinction between an impersonal authority, articulated by norms, and a personal authority built on reputation and trust. Thirdly, we will suggest a model aiming at describing the dynamics of authority in the frame knowledge communities.

The traditional approaches of hierarchy : description and limits.

Theory of Teams and Transaction Costs Theory : a short description.

The theory of teams, developed notably by Marschak and Radner [1972]⁶, is based on the following acknowledgement: under certain circumstances, the coordination of economic agents stemming from their grouping within the frame of an organization is able to imply a greater productivity of the entailed endowments than in the case of a coordination implemented by market mechanisms.

However, this theory, built on the hypothesis of perfect, far-sighted rationality, assumes that agents are adopting strategic behaviors in the game-theoretic sense. Being aware of their strategies and the according payoffs as well as the payoffs of the organization, the agents tend therefore to maximize their own payoffs, independently of the overall payoff of the organization. This may lead to matching problems given that the payoffs of each agent might be different to the organization's. Moreover, according to Alchian and Demsetz [1972]⁷, such an organization of the production may imply the following limit: within organizations, the link between productivity and reward is more indirect than in the case of the market. Indeed, given that a given task may involve several team members in a complementary way, there is no direct link between the production of the team and the marginal contribution of each of its members. Measuring the productivity of endowments therefore becomes a difficult task. This may increase the risk of prisoner's dilemma. Actually, given the fact that there is no direct link between each team member's effort and the system of reward and sanctions, it is in their interest to decrease the effort dedicated to the fulfilling of the common task. Such a risk leads, thus, the team to appoint one of its members to the management of the team, its main task being the supervision of each member's contribution to the team. Nevertheless, the issue of information asymmetries still remains, given that the supervisor is not able to assess effectively the abilities of each member. Such an issue leads the team's supervisor to implement incentive mechanisms in order to force them to reveal their potential productivity.

⁵ In fact, the reputation of each community member is evolving relative to the other member's reputation. Indeed, if the evolution of a given community member is positively higher than the overall evolution of the community member's reputation, the former will gain a higher rank within the hierarchy of the community.

⁶ Marschak, Jacob, Radner, Roy, 'Economic theory of teams', Yale University Press, 1972.

⁷ Alchian, Armen, Demsetz, Harold, 'Production, information costs and economic organization', American Economic Review, vol. 62, n°5, 1972.

However, according to the standard neoclassical view, the firm has mainly to cope with production costs.

Transaction Costs Economics constitutes an extension of the standard neoclassical view of the firm. This theory assumes that agents are endowed with bounded rationality involving neurophysiological constraints on human cognition, meaning that human agents face limits in their information storage and processing capabilities. The second type of limits lies in language limits, referring to the inability of individuals to articulate their knowledge and feelings, putting thus constraints on their ability to communicate with other people. Those constraints put on human cognition and communication capability give rise to costs associated with transactions. Thus, according to Coase⁸, organizations serve to economize on transaction costs in two respects. Firstly, the firm becomes a sole source supplier to transactions that are shifted out of the market and into the firm, suppressing thus costs associated market transactions. Secondly, the organization substitutes a single incomplete contract for many complete contracts, economizing thus on costs for negotiating and concluding separate contracts. However, the grouping of individuals within a single organization does not necessarily imply a convergence of interests between the agents and the rest of the organization. This may thus lead, opportunistic behaviors (Williamson[1975]⁹). According to this author, 'Opportunism extends the conventional assumption that economic agents are guided by considerations of self-interest to make allowance for *strategic* behavior' (p. 26). Thus, at the conjunction between bounded rationality and opportunistic behavior, appears what Williamson calls 'Self-interest seeking with guile'. Consequently, the main tasks of the hierarchy are to alleviate the problems arising from assets specificity, bounded rationality and opportunism.

Orthodox approaches: some limits in handling communities.

One of the main hypothesis upon which the Theory of Teams and The Transaction Costs Theory are based, lies, for the former, in the divergence between the overall and the personal interests and that agents tend to adopt opportunistic behaviors for the latter, implying, for both of the theories, a decrease in the productivity. The authority relationships rely, thus, on a strong distrust between members of the organization and the supervisor. Indeed, given the strong divergence between the interests of the former and the objectives of the latter, the supervisor has to base his assessment solely on the observation of the actual contributions in order to be able to implement a coherent incentive device¹⁰. However, for the viability of the relationship between the supervisor and the individual, the former has to be certain that any perceived counter productive behavior will be immediately punished. Consequently, such a relationship might, for the former, be described by an economic computing : given sanctions, the best strategy for the agents is to conform to the agreement (explicit or implicit) they passed with the organization they are belonging to. This might

⁸ Coase, Ronald H., 1937, 'The nature of the firm', *Economica* N.S., p. 386-405.

⁹ Williamson, Oliver E., 'Markets and hierarchies : analysis and antitrust implications', The Free Press, 1975, p. 26.

¹⁰ We could note that such an arrangement has some similarities with a tit-for-tat behavior described in the frame of the prisoner's dilemma game (Axelrod, Robert, 1990, 'The Evolution of Co-operation', Penguin Books). Such strategy is based upon the following features : firstly, the supervisor commits himself not to exploit a high productivity level. Secondly, the supervisor has to punish every counter-productive behavior he detects. Thirdly, after a punishment, the supervisor has to reward every contribution accordingly. Fourthly, the behavior has to be univocal in order to enhance the adaptation of the employees.

therefore be efficient when it faces routine tasks but faces some limits when confronted with a varying environment, where innovation is becoming a major issue (Adler [2001]¹¹).

Moreover, Theory of teams and Transaction Costs Economics, by assuming strategic behaviors for the former, and ‘self interest seeking with guile’ for the latter, assume that agents are only motivated by economic motives. This view tends to ignore the integration of the individual within a wider social context, made of informal interactions with other members of the organization. In this respect, according to those approaches, the only communication channels are formal and provided by the hierarchy. Thus, the view of hierarchy power is oversocialized in the sense of Granovetter [1985]¹² (meaning that individual behaviors are entirely determined by hierarchy). As Granovetter [1985] argues in the case of Transaction Costs Theory :

The appeal to authority relations in order to tame opportunism constitutes a rediscovery of Hobbesian analysis, though confined here to the economic sphere. [...] [Williamson] notes that complex, recurring transactions require long-term relations between identified individuals but that opportunism jeopardizes these relations. The adaptation to changing market circumstances required over the course of a relationship are too complex and unpredictable to be encompassed in some initial contact, and promises of good faith are unenforceable in the absence of an overarching authority. [...] This analysis entails the same mixture of under- and oversocialized assumptions found in Leviathan. The efficacy of hierarchical power within the firm is overlaid as with Hobbes’s oversocialized sovereign of state (p. 494-495).

Thus, by controlling the formal communication channels, hierarchy, according to the traditional approaches to authority, is therefore able to entirely determine each individual’s behavior, leaving no room to some ‘social artifacts’ such as norms of behavior and reciprocity. However, this appears to be the case with knowledge communities, where informal relationships are at the root of the work of such communities. By acknowledging this, hierarchy is therefore able to monitor only a part of agents’ behaviors and needs therefore to raise their adherence to the goals of the organization by other means than the single coupling between incentives and sanctions (Witt [1998]¹³). Such adherence may be obtained by the introduction of norms of behaviors within the organization, the main objective of such norms being to model individual behaviors in such a way that they may arouse the adherence to the objectives set by the hierarchy. Put in an other way, as soon as we consider that the individuals forming the organization are integrated within a social context, interacting with one another in a formal as well as in an informal way, we are urged to introduce some lines of conduct

The governance of communities: the role played by the authority.

Knowledge communities: a telegraphic overview.

We define knowledge intensive communities as structures of social interactions aiming at the generation and disclosure of knowledge. Such communities are characterized by higher interactions frequency within communities, as well as non anonymity and an enhanced access

¹¹ Adler, Paul S., 'Market, hierarchy and trust : the knowledge economy and the future of capitalism', *Organization Science*, Vol. 12, n°2, March-April 2001.

¹² Granovetter, Mark, 'Economic action and social structure : the problem of embeddedness', *American Journal of Sociology*, Volume 91, issue 3, 481-510, November 1985.

¹³ Witt, Ulrich, 'Imagination and leadership – the neglected dimension of an evolutionary theory of the firm', *Journal of Economic Behavior & Organization*, Vol 35, 161-177, 1998.

to information about the other members of the community (Bowles and Gintis [1998]¹⁴). Within the range knowledge communities, a particular emphasis has been made about communities of practice. Such communities, which have been introduced by Lave and Wenger [1991]¹⁵ and Brown and Duguid [1991]¹⁶ and developed by Wenger [1998], represent groupings of people engaged in a common practice and interacting constantly in order to develop their competences. These interactions consist mainly on the disclosure and the evaluation of “best practices” experienced by the members of the community. By those social habits of knowledge disclosure community members are therefore able to engage in learning processes.

Moreover, communities of practice have the ability to self-organize themselves, such an ability being notably characterized by the identity of the individuals with respect to the community. The identity of individuals as part of the community of practice is being influenced by the understanding of their position within the community. There are three levels involved in the process of identity definition : engagement, imagination and alignment. Engagement arises from the gap existing between the personal objectives of the individual and the general objectives of the community (we could thus easily imagine that, the closer are the individual and the general objectives, the stronger will be the intrinsic motivation of the individual for contributing to the cognitive work of the community) as well as his ability to conform to the behavioral norms governing the activity of the community. Imagination allows the individual to connect his own experience to more general models existing inside and outside the community, leading him to recognize some similarities as well as some distinctions between his own experience and the general models, allowing him to position himself relative to the prevailing practice. Alignment allows the community to undertake more ambitious tasks by binding and directing the necessary resources and the activities of the community members. Alignment is thus closely related to power and authority relationships existing within the community (Wenger [1998]).

Authority within communities.

At the opposite to the traditional concept of authority developed in the frame of transaction costs theory, where the alignment of behaviors is operated through the coupling of rewards and sanctions, authority is here defined as the ability to coordinate behaviors through an influence exercise over behaviors and beliefs. The preceding study of communities of practice may lead to draw some conclusions :

- The first conclusion is dealing with the fundamental part played by norms as the reification of an impersonal authority (in the sense of Arrow [1974]¹⁷) for the coordination of the cognitive work, norms being defined as a general rule of voluntary behavior (Kreps [1997]¹⁸), shared with the other members of the community and notably maintained by the sanctions imposed on violators as well as the belief in their

¹⁴ Bowles, Samuel, Gintis, Herbert, 'The moral economy of communities : structured populations and the evolution of prosocial norms', *Evolution & Human Behavior*, Vol. 19, n°1, January 1998.

¹⁵ Lave, Jean, Wenger, Etienne, 'Situated learning : legitimate peripheral participation', collection *Learning in Doing : Social, Cognitive and Computational Perspectives*, Cambridge University Press, 1991.

¹⁶ Brown, John Seely, Duguid, Paul, 'Organizational learning and communities of practice : toward an unified view of working, learning and innovation', *Organization science*, volume 2, n°1, 1991.

¹⁷ Arrow, Kenneth J., 'The limits of organization', W.W. Norton & Company, 1974.

¹⁸ Kreps, David M., 'The interaction between norms and economic incentives : intrinsic motivation and extrinsic incentives', *American Economic Review*, AEA Papers and Proceedings, Vol. 87, n°2, may 1997.

relevance (Elster [1995]¹⁹). Indeed, our brief study of communities of practice shows the importance of norms in the coherence of the community.

- However, the use of norms may encounter some limitations. These limitations may lead to the exercise of a personal authority in charge, for example, of speeding up the process of norms adoption (Foss [1999]).

Norms as the reification of an impersonal authority.

Norms constitute the basis of community coherence and coordination by, on the one hand, screening the access to individuals satisfying the criteria (and, possibly, by keeping out of the community the individuals who don't correspond to the it) and, on the other hand, providing a first coordination device. More precisely, their aim is to describe the objectives as well as the appropriate behavior to reach them. By analogy with the work of Simon [1951]²⁰, community's norms delimit the set of objectives and behaviors which are accepted within the community. On their side, every individual (which may be either members of the community or newcomers) have their own area of acceptance (that is, the set of actions that each individual accepts to perform). Thus, the selection process may roughly be viewed as a matching problem between the community's area of acceptance and each individual's area: the more the both areas fit each other, the more likely the individual will be selected and will then become a member of the community. As soon as we view the matching process from a dynamic standing point, norms allow a better coordination of the community members by mean of an influence exerted on their acceptance area. Indeed, by influencing the preferences of each community member, norms tend to shape their acceptance areas which get closer to the shape of the community's overall acceptance area. This, by providing a homogenization of each member's behavior and expectation, implies economies in the communications process preliminary to the occurrence of interactions between community members.

Norms may imply in a significant way the use of emotions to their respect (Elster [1995]). Indeed, the use of emotions may be necessary to the durability of such norms given that individuals behavior may be only assessed at the lens of their results. In this context, the concept of pro-social emotion, developed by Bowles and Gintis [2001]²¹ may point out the link between emotions and the respect of norms. The goal of such emotions is the implementation of altruistic behaviors in the sense that, apart from their own individual preferences, individuals take into account the wellness of their peers. The pressure exerted by norms on the agents, and articulated through pro-social emotions may express themselves in different ways and may, thus, be split up in two effects. The first effect, interpersonal, and notably identified by Granovetter [1985]²² relies on the social structure. Complementing the interpretation of altruistic behavior based on recurring interactions, Bowles [2001]²³ shows the influence of the social structure in the behaviors, individuals being more disposed to adopt altruistic behavior in the case of a strong social segmentation. The second effect, idiosyncratic, reflect the "social learning" of the individual. Indeed, this social learning,

¹⁹ Elster, Jon, 'Rationalité et normes sociales : un modèle pluridisciplinaire', in 'Le modèle et l'enquête : les usages du principe de rationalité dans les sciences sociales', Gérard-Varet, Louis-André, Passeron, Jean-Claude éditeurs, Editions de l'Ecole des Hautes Etudes en Sciences Sociales, 1995.

²⁰ Simon, Herbert A., 1951, 'A formal theory of the employment relationship', *Econometrica*, Vol. 19, n°3, p.293-305.

²¹ Bowles, Samuel, Gintis, Herbert, 'Prosocial emotions', Workshop 'Economy as a Complex Evolving System, III', Santa Fe Institute, November 16-18, 2001.

²² Granovetter, Mark, 'Economic action and social structure : the problem of embeddedness', *American Journal of Sociology*, Volume 91, issue 3, 481-510, November 1985.

²³ Bowles, Samuel, 'Individual interactions, group conflicts, and the evolution of preferences', in 'Social Dynamics', Steven N. Durlauf, H. Peyton Young editors, Brookings Institution Press, The MIT Press, 2001.

reified through social feelings²⁴, give to the individual the ability to prevent any action which, ex post, may imply costs. Those costs may take the form of a limitation to the access to some community resources, a weakening of his personal reputation or even the exclusion from the community. Finally, the norm has to exhibit the common belief feature for two main reasons. Firstly, when a norm becomes common belief, the adherence may bring an immediate benefit by coordinating the individuals subscribing to this norm. Indeed, when two members of a given community interact, the existence of the norm allows them to save the time they would have otherwise spent for negotiating and aligning their personal objectives. Secondly, the feature of common knowledge constitutes a main factor for perpetuating it. Indeed, one basis of her respect relies on the recognition of the contributions to the community's purpose. However, the legitimating of this screening device requires, not only, that each member of the community knows the norm, but that each member knows that the other members of the community knows the norm too, etc...

However, coordination through norms may face some limitations which may be expressed through a lack of efficiency or, in extreme cases, the disappearing of the community. One of the main limitations the norms encounter lies in the implementation of the common belief feature. Indeed, in the absence of any centralized authority, agents may be confronted to coordination issues in the implementation of social norms as a result of a lack of beliefs coordination. A second limitation lies in the great inertia of social norms. Actually, their evolution implies not only, for each member of the community, an evolution of his personal approach to the norms (they have to distinguish the gains of the new norm relative to the former one) but this evolution has to include the common belief feature too. Like conventions, such an evolution may be a very slow process (cf. Young [1993]²⁵ for further discussions). Therefore, the coordination through norms must be taken into account together with a personal form of authority.

Personal authority: the role played by leadership.

The personal authority, by its ability to coordinate heterogeneous behaviors, may improve the implementation as well as the evolution of norms. This may occur in two particular instances: by coordinating individuals during the process of norm selection and by coordinating the process of norm evolution.

Following Foss [2001]²⁶, authority is here defined in the following way:

I define leadership as *the ability to resolve coordination problems by influencing beliefs* [...]. For some reason the leader is able to spot and resolve coordination problems by influencing beliefs more effectively than other people [...]. The leader's announcement of what strategy should be followed is effective in resolving the underlying coordination problem because it creates a belief structure that at least approximates common knowledge (Foss [2001], p. 358-359).

Given that the existence of knowledge communities is mainly based on the specialization and the complementarities between members, this specialization leads members to interact only with few community members. Indeed, any relationship implies a reciprocal commitment entailing costs corresponding to the signaling of their intention to cooperate in the absence of opportunistic behavior. On his part, a leader, by benefiting from his reputation (cf. further), enjoys a greater visibility within the subpart of the knowledge community he his

²⁴ 7 social feelings have been described by R. Plutchik ('Emotions : a psycho-evolutionary synthesis', Harper & Row, 1980): shame, love, guilt, embarrassment, pride, desire, jealousy.

²⁵ Young, H. Peyton, 'The evolution of conventions', *Econometrica*, vol. 61, n°1, 57-84, 1993.

²⁶ Foss, Nicolai J., 2001, 'Leadership, beliefs and coordination : an explorative discussion', *Industrial and corporate change*, Vol. 10, n°2.

belonging to. This greater visibility induces a greater ability to communicate with other community members, giving him the opportunity to be a mediator, defined by Schelling [1960]²⁷ in the following way:

‘a mediator can do more than simply constrain communications –putting limits on the order of offers, counter-offer, and so forth- since he can invent contextual material of his own and make potent suggestions. That is, he can influence the other’s players expectations on his own initiative, in a manner that both parties cannot help mutually recognizing. When there is no apparent agreement, he can create one by his own power to make a dramatic suggestion’ (p.144).

How may a mediator make influence relationships actual? The explanation may come from mimicry effects. Indeed, given the fact that the mediator benefits from a greater access to the community members, he may thus get richer information about the behaviors and the beliefs of other community members. As soon as every community member knows that he owns such information, this lead them to adopt what Orlean [2001]²⁸ calls informational mimicry, described as ‘this particular mimicry which consists of copying other individuals because one believes a better knowledge about the situation. Put in another way, we mimic other people because we believe that they are better informed’²⁹. Adopting such a behavior is rational in the sense that, on the one hand, the action on which the imitating behavior is about is supposed adequate and, on the other hand, adopting an imitative behavior allows the saving of research costs’ (p.110).

To better assess the benefits stemming from the adoption of mimetic behaviors in the process of norms adoption, let’s consider the following coordination game where individual have to choose simultaneously between two norms A and B. the gains are given by the following matrix :

	A	B
A	(1,1)	(0,0)
B	(0,0)	(1,1)

This game displays three Nash equilibria: two pure equilibria ((A,A) and (B,B)) and a mixed equilibrium ($\frac{1}{2}, \frac{1}{2}$). Let assume that one half of the community members adopt A and the other half adopt B and that each community member meets one of his peer without knowing, ex ante, his strategy. Let us finally assume a learning effect: each individual reconsiders his strategy according to his past ‘social experience’. An interaction experience may give rise to three different cases : the two first cases, the most favorable, where each A (B) type individual meets a A (B) type individual. The payoffs are (A,A) (respectively (B,B)) and players keep their former strategy, the A type carrying on playing A and the B type, carrying on playing B. when a A type meets a B type, the payoffs are not optimal. This may lead the A (B) type individual to reconsider his strategy, and, at the next turn he may play B (respectively A). This leads to a belief coordination issue about the type of norm to adopt. Given that (A,A) and (B,B) constitute absorptive states implying a convergence to one of these states (Young [1993]³⁰). However, this process may take a very long time and supposes

²⁷ Schelling, Thomas C., ‘The Strategy of conflict’, Harvard University Press, 1960.

²⁸ Orlean, André, ‘Comprendre les foules spéculatives : mimétismes informationnel, autoréférentiel et normatif’, in Jacques Gravereau, Jacques Trauman, editors, ‘Crises financières’, Economica, 2001.

²⁹ The translation is in the charge of the author.

³⁰ Young, H. Peyton, ‘The evolution of conventions’, *Econometrica*, vol. 61, n°1, 57-84, 1993.

a stable environment. However, we previously showed that the cohesion of the community requires the emergence of a unique norm. Authority may speed up this process of norm adoption by influencing the beliefs for selecting the norm the most suited to the environment (Foss [1999]³¹). Then, operates a convergence of beliefs about the norm chosen by the leader by means of informational mimicry.

The leader also possesses the ability to coordinate the process of norms evolution. Let assume two norms A and B, the prevailing norm being B (the actual state is therefore (B,B)). A norm A appears, the payoffs corresponding respectively to A and B are given by the following matrix:

	A	B
A	(2,2)	(0,0)
B	(0,0)	(1,1)

Since the absorbing state is (B,B) and that the payoff matrix is assumed common knowledge the community members sticks to the B strategy. However, a leader, by using his ability to influence beliefs may succeed in coordinating the change of strategy. The underlying process is roughly the same as in the case of norm selection in the sense that it is also based on informational mimicry behaviors. Indeed, a change in the behavior of the leader may indicate that he possesses a new piece of information concerning the state of the world. This observation may imply a reconsideration of the current strategy, resulting in the move from the (B,B) state to the (A,A) state³².

However, our preceding discussion implies some limitations:

- The only aim of the leader has been to act for the wellness of the community. Moreover, there is also lacking a regulation device aiming at monitoring the leader's behavior associating notably power and responsibility (Arrow [1974]³³). Indeed, the leader is assumed to have a relational asset over the other members. He may therefore act for his own interest. Such a device may be provided by the power acquired by norms.
- Moreover, the leader has been so far considered as a fixed entity, this coming in contradiction with the fickleness of such informal community. This implies several questions : on what foundations such authority is based? Is such construction fixed (like in the case of the Williamsonian hierarchy) or is it constantly evolving ? Which legitimization mechanisms the authority is based on ?
- Finally, authority has been only considered from the coordination standpoint. However, like more classical coordination mechanisms such as market and hierarchy, the cognitive work as well as the exercise of authority may involve extrinsic incentives

³¹ Foss, Nicolai J., 'Understanding leadership : a coordination theory', Druid working paper n°99-3, March 1999.

³² We should however note that the time horizon is unknown and that the future payoffs play a significant part in the determination of the strategy. Put another way, it is implicitly assumed that the leader and the first movers accept to bear the decrease in their current payoff because they expect the inter-temporal payoff to be greater.

³³ Arrow, Kenneth J., 'The limits of organization', W.W. Norton & Company, 1974.

devices such as the need for reputation and the acknowledgement of a specific expertise (Cohendet, Diani [2002]³⁴).

We argue that the answer to these issues involve for a large amount a strong link between trust and reputation for the building of authority. Indeed, the process of personal authority building is mainly based on the reputation of the leaders, the latter being perceived as the only individual who are able to direct the cognitive work of the community. We should however note that the building of a reputation is closely related to trust, on the one hand, by boosting the building of the latter and, on the other hand, on an increase in trust may lead to a reinforcement of the former. Reputation and trust may eventually lead to a virtuous circle where the former and the latter are reinforcing each other.

Reputation is here understood as a set of information³⁵ about a recurring past behavior, which may be submitted to a reassessment according to the information update. Besides, reputation may feature public properties in the sense that it is revealed to the entire community and must be the object of a consensus. This particular feature may be sometimes so strong that reputation might be considered as a public good³⁶ (Kreps [1990]³⁷, Lorenz, Lazaric [1998]³⁸). When this reputation is taken in a positive sense, it may display some advantages such as a decrease in the transaction costs. However, when the costs of maintaining a reputation are higher than the advantages, it may not prevent opportunistic behaviors. This leads to the implementation of devices aiming at punishing any deviation from it. Such devices may consist of a loss of reputation leading to a decrease in future opportunities. Such punishing mechanisms assume however that the behavior is not subject to ambiguity and the consequences are observable and verifiable in order to legitimate at the level of the community the reassessment of the reputation.

As Kreps [1990] points out, the notion of reputation may be useful in situations characterized by a strong uncertainty, where expectations about behavior are impossible. In such situations, the notion of reputation possesses a strong syllogism with the concept of focal point developed by Schelling [1960] described by Kreps [1990] as '*some principle or rule individuals use naturally to select a mode of behavior in a situation with many possible equilibrium behaviors*' (p.121). This definition may imply some remarks. Firstly, in the case where the outcome resulting from different actions is known, the behavior corresponding to the focal point may be sub-optimal ex ante. Such behavior may however be rational in an interpersonal perspective, for example, by providing further opportunities. Lastly, the chosen focal point, resulting from a process of trial and error and of selection, may provide better results (Kreps [1990]).

The concept of trust has been defined by Gambetta in the following way 'Trust [...] is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action [...] When we say trust someone or that someone is trustworthy, we implicitly mean that the probability that we will perform an action

³⁴ Cohendet, Patrick, Diani, Morad, 'L'organisation comme une communauté de communautés : croyances collectives et culture d'entreprise', Working paper Beta, 2002.

³⁵ These information may come from different sources which might be external or from past interactions. However, such information have to be reliable and objective, any subjective content may not be taken into account.

³⁶ This public good feature is referring to the ability of a given individual to enjoy the reputation of an organization without having necessarily contributed to it. Such a feature may however not be applied to the individual relationships occurring within a community because it can be transferred from one person to another.

³⁷ Kreps, David M., 'Corporate culture and economic theory', in 'Perspectives on positive political economy', James E. Alt, Kenneth A. Shepsle, editors, Cambridge University Press, p. 90-143, 1990.

³⁸ Lorenz, Edward, Lazaric, Nathalie, 'Introduction : the learning dynamics of trust, reputation and confidence', in 'Trust and economic learning', Edward Lorenz, Nathalie Lazaric, editors, Edward Elgar, 1998.

that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him' (Gambetta [1988]³⁹, p.217). However, in a context of strong uncertainty and without any previous experience, individuals are led to base their judgment on reputation. Thus, reputation might be viewed as a set of information determining the decision of an agent about trusting one of his peers (Granovetter [1985]⁴⁰). Thus, when trust corresponds to a subjective assessment on the expected behavior based on private information, reputation is based on a commonly acknowledged assessment built on information coming from different sources. In this respect, trust exhibits a relative superiority over reputation. Indeed, when the latter is built on "public" information (which is common to the whole community), which might be corrupted, the former is based on private information which is assumed to be richer and more reliable. This explains the necessity for the reputation to be built on verifiable facts. However, trust and reputation are complementing the one of each other in the following way : reputation might be a prerequisite for a first interaction to take place by decreased the uncertainty and other costs (such as coordination costs) it entails, trust might influence the evolution of a reputation (Coriat, Guennif [1998]⁴¹).

We have previously showed the part played by reputation during the first interaction. However, such relationships might be constantly evolving. Indeed, individuals have to continuously exchange signals about their intention to cooperate in a non opportunistic manner. Such signals may therefore reinforce trust relationships, the costs entailed by the signaling showing the truthfulness of the intentions (Brousseau [2000]⁴²). Moreover, as soon as those signals are observable and verifiable, it would be easy to disclose them to the entire community, reinforcing thus the reputation of the concerned individual.

In the frame of knowledge communities, what may those signals correspond to? the two main tasks completed by knowledge intensive communities being the production and the disclosure of knowledge, the reputation will therefore be mainly built around the objectives of such communities. Reputation building may thus rely on the ability of each community member to contribute to the pursue objectives defined at the community level, these contributions being reified through the production and diffusion of knowledge or any other activities related to those tasks. However, we point out that reputation relies not only on the volume of contribution but on their quality too. Indeed, in the case of the Linux community, a ranking of the hackers is established, this ranking being based on the criteria such as the amount of code disclosed as well as their popularity (which may constitute an assessment of the quality of the code).

Given that reputation may give rise to personal relationships, her reinforcement might thus increase an individual's notoriety within the community. If the agent meets his reputation, a virtuous circle would form where the increase in the number of successful interactions would reinforce the reputation which would lead to the increase in the number of interactions. From the social networks standpoint, this might be translated in terms of a higher density in his personal network which may eventually lead to a polarization of the social network within the community⁴³. Such a polarization implies two main advantages: on the

³⁹ Gambetta, Diego, 'Can we trust trust?', in Diego Gambetta editor, 'Trust : making and breaking cooperative relations', Basil Blackwell, 1988.

⁴⁰ Granovetter, Mark, 'Economic action and social structure : the problem of embeddedness', American Journal of Sociology, Volume 91, issue 3, 481-510, november 1985.

⁴¹ Coriat, Benjamin, Guennif, Samira, 'Self-interest, trust and institutions', in Edward Lorenz, Nathalie Lazaric, editors, 'Trust and economic learning', Edward Elgar, 1998.

⁴² Brousseau, Eric, 'Confiance ou contrat, confiance et contrat', in 'Confiance et Rationalité', F. Aubert, J.P. Sylvestre editors, INRA Editions, 2000.

⁴³ From a social networks standpoint, appears a fundamental difference between hierarchical groups and "more informal" knowledge intensive communities. When hierarchical groups are often characterized by a tree shaped

one hand, the individual enjoys a central position in the community's communication network, inducing thus a belief among the community members that he may possess first hand information. On the other hand, this central position within the communication network enables him to become a mediator (in the sense of Schelling). This is becoming the starting point to informational mimicry behaviors, increasing thus the influence exerted by the agent on the community members. However, such a central position may imply some drawbacks linked to this central position within the social network. The preserving of the reputation may thus become a central concern given that any information about an unsuccessful relationship would diffuse much quicker than in a sparse network.

The dynamics of authority within knowledge communities.

In the definition of knowledge communities, it has been previously argued that each member of a given community has his own identity in the frame of the community. This identity is shaped according to three factors: commitment, alignment and imagination.

The engagement of the individual within the community is related to the richness of the experience of the individual as a member of the community and may therefore be strongly related to the participation of the member to the cognitive work of the community. Of course, the engagement of the individual is constantly evolving. This has been described by Wenger [1998]⁴⁴ as taking the form of trajectory. In this respect, this author draws a distinction between three types of evolution:

- A peripheral trajectory occurs when a member of the community chooses to commit himself slightly. Put another way, the individual chooses never to fully participate to the community.
- An inbound trajectory occurs when, starting from a low level of commitment, the agent commits himself deeper to the community's cognitive work. The more the individual chooses to commit himself, the more central is his position within the community.
- An outbound trajectory occurs when, starting from a high level of commitment, the individual chooses to step back from the community. Such trajectory may lead the individual to the community's periphery. In some extreme instances, such a trajectory may lead the individual out of the community by a process of marginalization.

However, we should note that the concept of trajectory refers to the level of implication of the individual *relative* to the other members of the community. Indeed, given that the other members' commitment levels are also constantly evolving, an inbound trajectory tends to describe a greater evolution of the contribution level relative to the other members.

network featuring properties such as transitivity (if $A > B$ and $B > C$ then $A > C$) and antisymmetry (if $A > B$ then B is not superior to A) as well as the existence of a unique root of the tree (Radner, Roy, 'Hierarchy : the economics of managing', *Journal of Economic Literature*, Vol. 30, n°3, p. 1382-1415, september 1992). At the opposite, in the frame of the social network describing the relationships within knowledge intensive communities, the informal hierarchy is made of denser subgraphs. Thus, the individuals forming the upper part of this informal hierarchy are at the middle of higher density subgraphs than the other members of the community. We may thus find an analogy with the concept of centrality developed in social networks theory (cf. Borgatti, Stephen P., Everett, Martin G., 'Models of core /periphery structures', *Social Networks*, vol.21, p. 375-395, 1999 ; Mizuchi, Mark S., Potts, Blyden S., 'Centrality and power revisited : actor success in group decision making', *Social Networks*, vol.20, p. 353-387, 1998).

⁴⁴ Wenger, Etienne, 'Communities of practice : learning, meaning and identity', Cambridge university press, 1998.

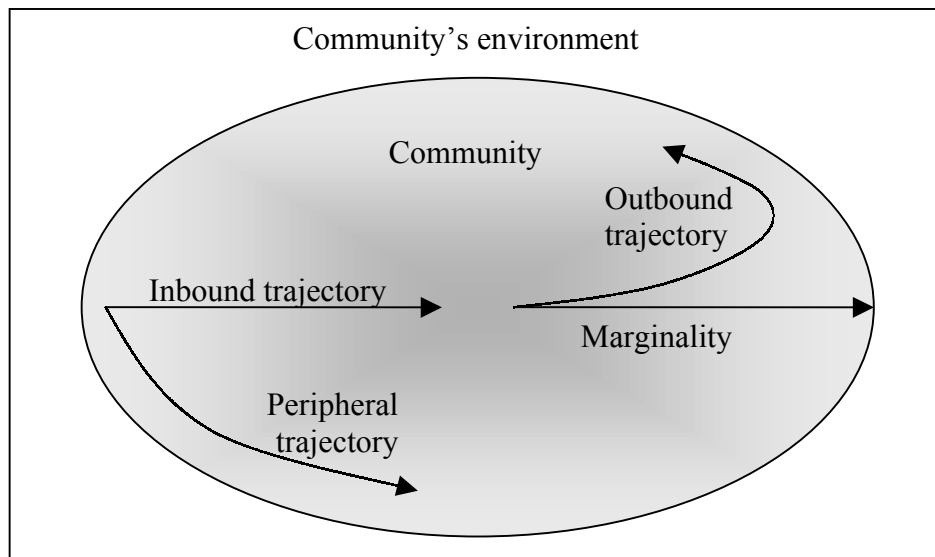


Figure 1 : Types of trajectories occurring within knowledge communities.

Moreover, we have to keep in mind that participation to the working of the community is essentially a social process. Thus, an individual following an inbound trajectory actually increases the frequency of social interactions with other members of the community eventually leading to an increase in the influence he exerts within the community. Trajectories of engagement within the community may thus describe the dynamics of power and leadership of a given individual within the community. Put in another way, an individual adopting an inbound trajectory may multiply the frequency of his interactions with other members of the community at a higher pace than the overall community. This gives him the ability to become a mediator in the sense of Schelling, leading him to gain power within the community. Conversely, an individual adopting an outbound trajectory tends to decrease the frequency of interactions with other community members leading him to lose the influence he used to have on other members.

However, this picture is far from being complete. In so far, the engagement of community members has only been approached from a quantitative standing point. Actually, contributions of each member are screened by the rest of the community and is assessed the quality of the contribution relative to the norms of the community. The use of norms (as an impersonal authority), which constitutes a reification of the process of alignment, is of first importance. Has Wenger [1998] argues:

The process of alignment bridges time and space to form broader enterprises so that participants become connected through the coordination of their energies, actions, and practices. Through alignment, we become part of something big because we do what it takes to play our part. What alignment brings into the picture is a scope of action writ large, of coordinated enterprises on a large scale, not inherent in engagement or in imagination (p. 178-179).

Are thus recognized some of the main properties of norms in terms of coordination, that is, firstly, the ability to economize on communication costs by providing a common frame of expectation about the results of the interactions and, secondly, to mitigate the uncertainty linked with the behavior of other members of the community during the interaction. Consequently, to gain reputation, and, thus, power, members of the community have therefore, not only, to keep a high level of participation to the work of the community but have to respect some standards of quality (according to the norms prevailing within the community). Therefore, a member of the community who enjoys a high participation level but

whose contributions are of poor quality may thus enjoy a poor reputation. Conversely, an individual who made a few contributions of very high quality levels is likely to acquire a good reputation inside the community.

Finally, as been previously argued, one of the main risks threatening the learning ability of a community is the risk of being stuck to suboptimal norms. Such risk may be of great importance, given that, by directing the behavior of members of the community, it thus influences the social learning process occurring within the community. Norms governing the cognitive work of the community have thus to fit to the evolutions of the community's environment, adapting to any changes in the fitness landscape of the environment. The ability to induce variations on norms requires several competences. The first competence is the ability to represent the environment of the community and, according to this environment, to deduce its fitness landscape. A related factor lies in the capacity to forecast the evolution of the environment. Those capabilities have been grouped by Wenger [1998] under the term 'imagination'. However, the basis of knowledge communities lies in the grouping of individuals endowed with differentiated knowledge and information, leading then members to different representation of the world and differentiated expectations about the future evolutions of the environment of the community. They share those different views with other members of the community. The role of leadership is therefore to collect and combine those pieces of information in order to transform it into a consistent view of the world which is shared with the other members of the community, influencing thus the evolution of the norms prevailing within the community.

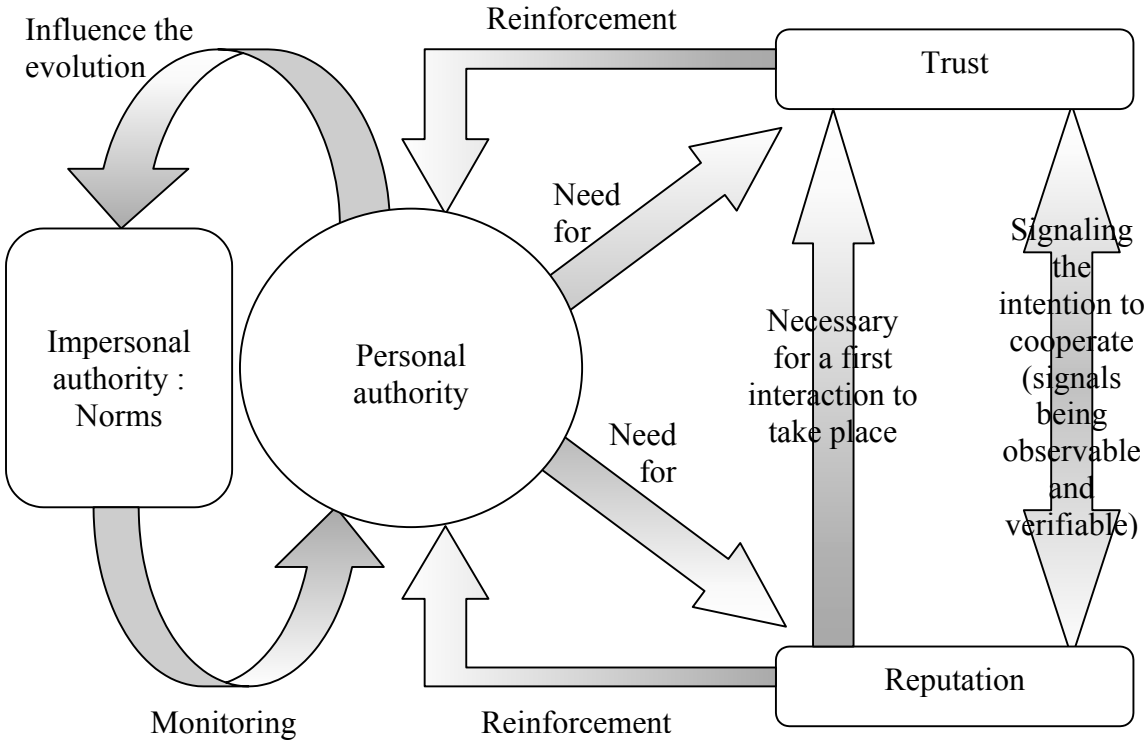


Figure 2 : description of the dynamics of authority.

Conclusion.

In this contribution, we tried to pinpoint some elements dealing with the governance of knowledge intensive communities. Traditional approaches are usually dealing with hierarchy either as a costs reducing device (in the case of transaction costs economics) or as a device

aimed at regulating strategic behaviours (in the case of the theory of teams) (Dosi, Marengo [1999]⁴⁵). However, such approaches are mainly based on the assumption of opportunistic behaviors resulting from divergences between personal objectives and the objectives of the organization. The implementation of monitoring and incentives devices are therefore required. Nevertheless, such devices have a cost. Those costs might be such as they tend, in some marginal and extreme cases be superior to the costs the firms would otherwise allow to save, in the case of Transaction costs Economics. In the case of the Theory of Agency, those costs may diminish the gains arising from the increases in productivity the monitoring device would allow. A second limitation of the traditional view of hierarchy results from the hypothesis of recurring opportunistic behaviors and lies in the a suspicious atmosphere hampering the knowledge production process.

At the opposite, the governance of knowledge intensive communities relies partly on the close coupling existing between impersonal and personal authority. The first coordination mechanism is materialized through norms governing the cognitive work of the community. In this respect, is made a distinction between cognitive and procedural norms, the former defining the cognitive goals of the community when the latter precise the means used to reach the goals. Such norms provide a first coordination mechanism by allowing an expectation of future behaviors. However, coordination through norms may encounter some limitations by, for example, the possible stickiness to a suboptimal norm. Such a limitation may be overcome by setting up personal authority which may speed the process of norms evolution up, notably by influencing the beliefs of the community members. Personal authority relies on the strong complementarities between reputation and trust which may constitute strong incentive devices to knowledge production and disclosure by helping new relationships to occur. The increase in those relationships implies an increase in the authority of the agent among community members.

However, such status is being constantly reassessed. In this paper, we suggested a model explaining the evolution of authority relationships. In this model, authority relationships are mainly built through community members' contribution to the work of the community (those contributions may consist either in the disclosure of pieces of knowledge or of information or in any other tasks aimed at enhancing the work of the community). Those contributions are being assessed following to parameter: a quantitative one, implying that an individual endowed with a high contribution level might be more recognized in the community than an individual endowed with a poor level. But, more importantly, is also taken into account a qualitative parameter. In this perspective, the quality of contributions is assessed in connection with the norms prevailing within the community. However, the interaction between impersonal authority (norms) and personal authority, far from being univocal, constitutes a two-way process. Indeed, if norms tend to determine the quality of a contribution, personal authority, through their ability to influence and to direct the communication process, are able to command an incremental evolution of norms.

However, the authority relationship we tried to point out in this paper may not be the only coordinating devices within knowledge intensive communities. However, such devices certainly have to embody trust in their working, trust being at the root of the cohesion of knowledge intensive communities (Cohendet, Diani [2002]).

⁴⁵ Dosi, Giovanni, Marengo, Luigi, 1999, 'On the tangled discourse between transaction Costs economics and Competence-Based views of the firms: some comments', LEM Working Paper n°1999/08.

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