

Let those who love me follow me: power exercises in a joint R&D project

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Abstract:

While power has been recognized as a critical issue for the understanding of knowledge creation and sharing, especially in the context of innovation, empirical works are still in their infancy. This paper addresses this issue in a twofold way: by proposing a methodological tool – the observation of “critical events” – to explore the phenomenon of power exercise and by illustrating this approach with an in-depth case study, a University-Industry R&D project. The analysis permits to identify four strategies deployed by project managers and academic professors to address dissatisfactions in the project: bonding, spinning-out, bridging and assimilating. Such strategies are used to shape the direction and usefulness of knowledge flows by taking organizational interests into account. Specific risks and stakes ensue.

Keywords: Power, R&D collaboration, University-Industry links

1 INTRODUCTION

Nowadays, organizations are encouraged to develop R&D partnerships that cross multiple economic sectors and institutions. Individuals from universities, big firms and SMEs are brought together to carry out joint innovative projects with more or less aligned goals and with a more or less stable consensus about the means to reach them.

In those projects, partners have to agree about a “problem” and ways to answer it (Phillips et al. 2000). The definitions of the problem and its solution are therefore an important stake (Friedberg 1997): partners compete to shape it, enrolling allies to their cause (Latour 1987) even if those allies come from a different world with apparently diverging interests. The joint R&D project is therefore a privileged empirical field to explore knowledge transfer as a political process: to explore how partners shape knowledge creation and sharing at their advantage by continuously competing about the (re)identification of the R&D problem, the selection of the relevant exploration paths and their implementation.

While power and politics have been recognized as critical issues for the understanding of learning processes, especially in the context of innovation (Easterby-Smith et al. 2008; Mangan et al. 2009), empirical works are still in their infancy. This work addresses this issue in a twofold way: by proposing a methodological tool – the observation of “critical events” – to explore the phenomenon of power exercise and by illustrating this approach with an in-depth case study, a joint R&D project followed from June 2007 to May 2010. The underlying managerial goal is to outline the leverages

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that partners can mobilize during power interactions to achieve organizational goals while preserving inter-organizational and individual interests.

In this case study, we observed power exercises as materialized through “critical events” during plenary meetings. We define the critical event as an observable incident which starts when an actor of the project makes himself heard through a “voice” attitude. This event comes from an increasing feeling that “something has to be done differently” (Holmqvist 2003) : it opens a negotiation space in which each partner can propose a solution and thereby activate a power relationship. Critical events were witnessed in real-life settings during plenary meetings and team building events. They were also remembered by respondents during semi-structured interviews of partners, allowing a focus on behaviors rather than impressions (Hargadon and Fanelli 2002). Their effects were traced through the minutes of the meetings, especially through the “further actions” section, as well as during subsequent interactions.

The analysis draws a particular attention to the interests that are served - and dis-served - by new arrangements, the strategy deployed as well as the modalities that were mobilized by the actors to impose their solution: the focus on critical events allows for observing the modalities (goals, roles, scripts, etc.) that are the most relevant in the project as well as their qualification through closure. Informed by the Structuration Theory (Giddens 1984), those modalities are drawn from the interpenetrating structures that are relevant for the project and that the social researcher can infer through their superficial manifestations (Nizet 2007). Moreover, their mobilization implies an impact on the structural properties of the project: relevant structures are challenged, reinforced or modified by the project’s interactions.

The paper is organized as follows. In the next section, we present the theoretical framework underpinning this work. In section three, we develop the methodological tools that were deployed to explore power exercises and briefly present the case under study. In section four, we present the main findings. Section five concludes the paper and opens future research venues.

2. THE CRITICAL EVENT

In this section, we present the theoretical underpinning of this work. First, we define power as the ability of an actor to reach some results that depend on the action of others (Giddens 1976; Chazel 1983) and propose a focus on episodic power exercise, namely the discrete and observable political acts initiated by self-interested actors (Lawrence et al. 2005). Secondly, we propose the Exit-Voice-Loyalty-Neglect (EVLN) framework (Hirschman 1970; Rusbult et al. 1982; Bagozzi 1988) as a tool to punctuate the observed episodic power exercises which we call “critical events”. Building on those theoretical blocks, we finally present the conceptual framework that shaped both data collection and analysis.

2.1 Notion of power

In a broad sense, Giddens presents power as a transformative capacity: to be able to act otherwise and to make a difference to the world (Giddens 1984; Macintosh and Scapens 1997) through the mobilization of resources. This view of power as a capacity to act diverges from the notion of power as an influence on others that emerges from the work

of Dahl who defines power in the following terms: “A has power over B to the extent that he can get B to do something that B would not otherwise do” (Dahl 1957 p. 290).

A narrower definition of power has been proposed by Giddens and combines the notion of influence on others and capacity to act (Chazel 1983). In Giddens (1976), power is seen as a property of social interactions and more particularly as the ability of an actor to reach some results that depend on the action of others. As a result, Giddens shares with authors like Friedberg and Crozier or Arendt (1972) a relational perspective on power, the fact that power is not a commodity that can be possessed or exchanged but instead becomes apparent when it is exercised between partners (Foucault 1984; Townley 1993). Unlike the early work of Foucault and the structuralist tradition, Giddens supports a constructive or collusive (Friedberg 1997) vision of power as an important driver of human cooperation: conflicts and power relationship are no longer endemic to social system (Orlikowski and Baroudi 1991) but can be considered as drivers (Chazel 1983; Giddens 1984; Friedberg 1997) of human interactions. Finally, power is instrumental as it is exercised by strategic actors who define their goals based on motives that they are able to express (Friedberg 1997; Giddens 1984). The stake of the exercise of power is thus the decision process (Bourgeois and Nizet 1995; Nizet and Pichault 1995; Friedberg 1997) inside the social system. As expressed by Foucault (1982), the exercise of power “consists in guiding the possibility of conduct and putting in order the possible outcome”, a view which is also shared by Mintzberg when he defines power as the capacity to affect organizational outcomes (Mintzberg 1983).

This notion of power as a relational, collusive and instrumental process that targets decision-making is consistent with the practical goal of this work: understand the leverages that partners can mobilize during power interactions. It also directs the attention of the researcher to what Clegg calls “episodic power”: the observable conflicts of interest between identifiable social actors with opposing objectives in particular decision making situations (Reed 2006; Clegg 1989), or in other words the discrete, strategic political acts initiated by self-interested actors (Lawrence et al. 2005). As a result, the unit of observation of this work is the observable episodes of power exercise, hereafter called “critical events”. An important methodological and conceptual stake ensues: the punctuation of the observed critical events.

2.2 Punctuation of critical events: the EVLN framework

In order to punctuate the flow of observations, we use the Exit-Voice-Loyalty-Neglect (EVLN) framework. Exit, loyalty and voice were originally proposed by Hirschman (1970) as the three main responses to organizational declines: faced with dissatisfaction at work, employees can either leave the firm (exit), remain loyal to the managerial team and hope for the best (loyalty) or try to be heard by the board and negotiate some kinds of solutions (voice). A fourth responses, neglect or apathy, was developed afterward (Rusbult et al. 1982) to reflect the situations where the discontented individual distances himself from organizational interests without actually addressing the problem.

This framework has been applied in various contexts: supplier-buyer relationships (Kingshott 2006), romantic involvements (Rusbult et al. 1982), location of R&D units (Narula 2002), choice of education system (Hirschman 1970), job dissatisfaction (Withey and Cooper 1989) and many others. In all cases, EVLN are responses to social discontent: a state of dissatisfaction which results from social interactions (Bajoit 1988). In this work, we focus on the social discontent that appears when the belief in the

collective ability to produce the desired results is put into question, when a protagonist of the project has “an increasing feeling that something has to be done differently” (Holmqvist 2003). In other words, it refers to the critical events where a discontented member of the R&D project finally identifies the source of dissatisfaction and brings it to the others.

When a member of the project is dissatisfied with its conduct – the definition of the R&D problem or ways to solve it – he can bring the source of discontent to his partners. This “voice” destabilizes the local arrangement and opens a negotiation space where any given actor can propose a solution. In this work, we therefore look for those “voicers” who trigger an episodic power exercise.

The critical event stays opened until one of the three remaining responses are used. If the power exercise leads to the loyalty of other members, the enrollment is successful and the system regains its stability. The adopted R&D problems and solutions might not be the “best” or “most valuable” ones (Lawrence et al. 2005) but it will be the problems and solutions which bring stability back to the project. As expressed by Friedberg (1997), power can also be defined as the capacity of an actor to make others agree about imperfect solutions without being excluded from social interactions.

In the case of exit and neglect, the power exercise also lead to a stabilized system through its reconfiguration: exiting and neglecting members disengage themselves from collective interests.

2.3 Conceptual framework

The observation and analysis of critical events were guided by three main analytical components (see Figure 1): (1) the opening of the critical event; (2) the translation; (3) the stabilization or closure of the critical event.

2.3.1 Opening

The critical event is an observable incident which starts when an actor of the project makes himself heard through a “voice” attitude; it acts as a trigger for the knowledge creation process (Zahra and George 2002) as it identifies potential problems and activates negotiations about an acceptable solution. As the “voicer” questions the R&D project – source of dissatisfaction – in front of his or her partners, its shaping becomes the main stake of the power exercise: decisions about which R&D problems are worthy to be noted and which paths are worthy being pursued.

In this work, we consider that the critical event can target four different phases of the R&D project:

- The identification of the R&D problem;
- The identification of alternative ways to solve it;
- The selection of the appropriate path(s);
- The actual implementation of the decision(s).

This distinction was brought by Bourgeois and Nizet who built mainly on Hicksons, Mintzberg and Heller (see Bourgeois and Nizet 1995 p. 127-140).

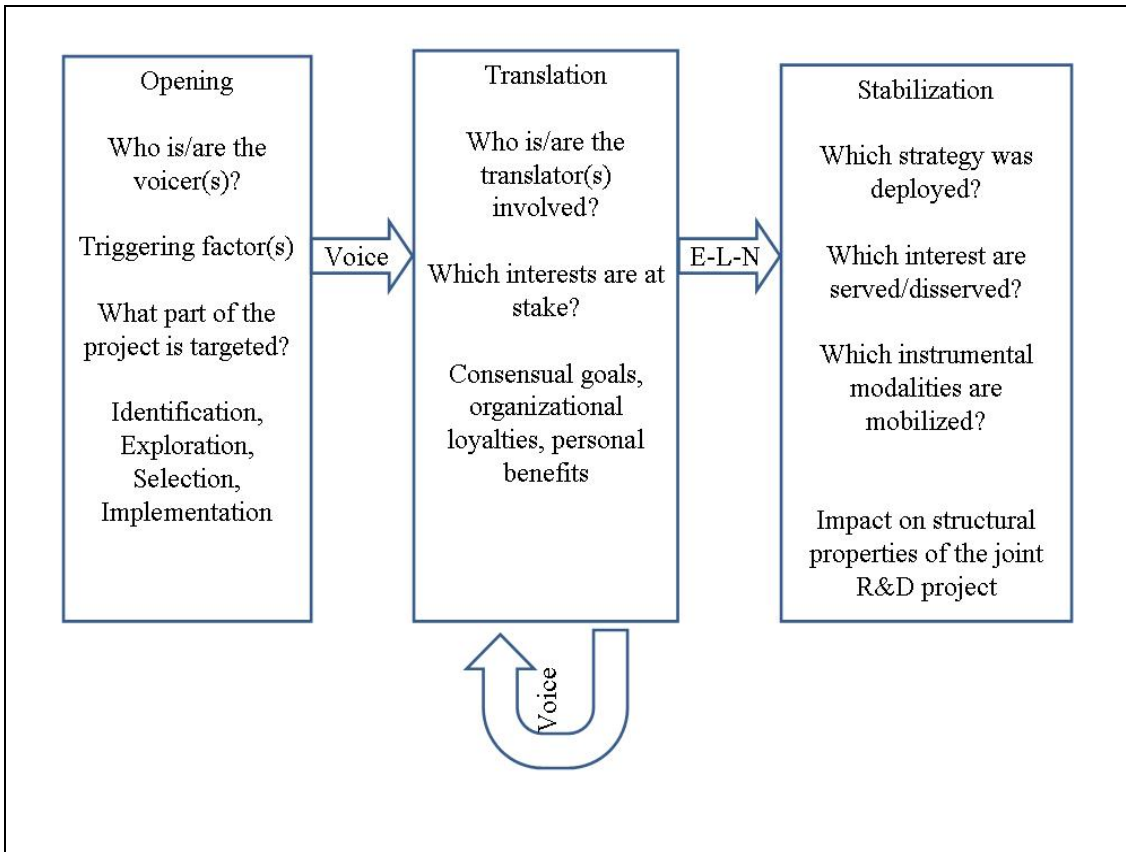


FIGURE 1 CONCEPTUAL FRAMEWORK

To summarize, this first component focuses on the triggering forces: the identification of the voicer (function in the project, hierarchical position, background, etc.), the factors that facilitated his or her intervention and the phase(s) of the R&D project which is targeted. The object of discussion can be the R&D problem itself (“is this problem still worthy to be pursued?”), the panel of possible ways to solve it (“maybe there are alternative paths!”), the choice of paths that will be pursued by the partners (“isn’t this new path worthy to be pursued?”) and their actual implementations (“is this the right way of pursuing the path?”).

2.3.2 Translation

The critical events where the “old way of acting is challenged and claimed to be obsolete” (Holmqvist 2003) have been conceptualized by Holmqvist as the learning process of “opening up”, when partners shift “from an ongoing process of exploitation to an ongoing process of exploration”. This event comes from an increasing feeling that something has to be done differently and is therefore followed by the need to experiment and the search for a solution, the elaboration of new goals and strategies. As a result, the intervention of the voicer opens a negotiation space in which each partner can propose a solution and activate a power relationship.

The second component, translation, therefore includes the identification of the actors involved in such negotiations. Indeed, episodic power is exercised by members of the R&D project to stabilize cooperative relationships and to provide direction and meaning to their partners. For Latour, Callon and their colleagues (Latour 1987; Akrich et al. 1988), the alignment of interests between members is realized by a “translator” who is able to mobilize a network of relevant contributors towards the interest of one group. As

a result, one stake of the observations is to identify those actors who are in charge of enrolling allies. Guided by the theoretical and managerial goals of this study, we looked for those translators who act at the same time as “relay” (Friedberg 1997): members of the project who are strongly linked to their parent organization, become the privileged intermediary between the project and the organization and eventually come to personify it. They might be the managers who represent organizational interests and enable access to organizational resources but researchers and other “ordinary” actors are also taken into consideration (Alter 2000). We also paid a particular attention to the ones “who listen” and did not actively participate to the negotiation.

To summarize, the second component includes the identification of the translator(s)-to-be as well as the interests underlying his or her solution(s). Indeed, this power exercise involves actors with diverging interests who compete to shape the possible conducts and outcomes of the project (Foucault 1982; Mintzberg 1983). As a result, interests influenced by the consensual goals of the project, organizational loyalty and individual benefits (Grabher and Ibert 2006) should be taken into consideration when analyzing power relationships (Foucault 1982; Friedberg 1997; Blankenburg 1998).

2.3.3 Stabilization

The third component focuses on the stabilization of the critical event: this last step is conducted when the enrollment is successful (loyalty) or unsuccessful with a closure of the negotiation space (neglect or exit).

For Holmqvist, this stabilization leads to the “*selection and modification by a dominant group (Nelson and Winter 1982; Mintzberg 1983), where one group gains the opportunity to consciously control the learning process. Thus, from the power struggle emerges a winner that, based on its authority, steers the learning into exploitation*” (Holmqvist 2003 p. 110). As a result, the analysis draws a particular attention to the interests that are served (and dis-served) by such an arrangement, the strategy deployed as well as the modalities that were mobilized by the actors to impose their solution.

Two main strategies were taken into account: pressure and legitimization (Bourgeois and Nizet 1995). Pressure refers to the threat to suppress or restrict the access to some resources. The use of a threat implies that the resulting solution is imposed on project’s members who do not recognize its legitimacy. Legitimization, on the other side, works through the perceived correspondence between the social norms that are sanctioned by the enrolled partners and the solution proposed by the actor who exercises power so that the solution imposes itself as obvious rather than through menaces.

A last conceptual and methodological stake ensues: the identification of relevant social norms and other modalities used to establish legitimacy. For instance, Foucault (1982) proposed to look at “differentiation system” and “instrumental modalities” such as explicit and implicit rules as elements with analytical interests for the study of power exercise. Likewise, Friedberg (1997) argues that the main stake for the analysis of social systems is the identification of relevant rules as it directs our attention to the resources and constraints that are relevant for the actors.

Informed by a structurationist approach, such modalities can be inferred by the social researcher through their superficial manifestations (Nizet 2007):

- Interpretive schemes (goals, roles and scripts) that enrich the joint R&D project (Hargadon and Fanelli 2002) and are evoked by the translators ;
- The social norms sanctioned in action in the project ;
- The links and configuration of the network of partners (Nahapiet and Ghoshal 1998) or, from the point of view of Giddens, the facilities (and frustrations), the access (or not) to the enabling and constraining resources that shaped the stabilization.

But the Structuration Theory also orients the analysis towards the dual process at stake in the closure of critical events: social structures are challenged, reinforced or modified by the project's interactions through the re-endorsement of the relevant norms, goals, roles and scripts. In particular, the stabilization affects the configuration of the project: the network of "partners", the relevant "Know-Who" (Jensen et al. 2007) at stake in the project. As such, impacts on the links between partners (i.e. loss of competences or lack of cooperation leading to unexplored paths) as well as on the other relevant modalities (dismissal of previously relevant schemes, reinforcement of existing scripts) were investigated.

3. METHODS

3.1 The case study as an adequate research strategy

Apart from rare exceptions like Easterby-Smith et al. (2008) or Lawrence (2005) and despite the growing recognition that researchers should focus on their intertwining for the understanding of learning processes (Ekbia and Kling 2003; Peci et al. 2009), knowledge and power are two concepts that are rarely combined in the field of knowledge management, organizational learning or even innovation studies. For Sargis-Roussel (2005), two reasons might explain this phenomenon: from a theoretical perspective, knowledge management has its roots in modeling and system theory, with few interest in power issues, and from an empirical perspective, power relationships and their effects are difficult to observe and were thus somewhat neglected by the research community. As a matter of fact, power relationships are difficult to grasp for an external researcher. In situ observations and access to the field are needed to witness the actual social interactions (Sargis-Roussel 2005) and subsequent power exercises.

The research strategy adopted in this work is the longitudinal case study: findings are drawn from an in-depth case study, an R&D project followed since June 2007, which combines data collected through semi-structured interviews, documentation (especially the minutes of plenary meetings) as well as observations during plenary meetings and other events. Long-term exposure in the case and the multiple sources of data allowed for an access to off-record issues as well as a better identification of taboos and contradictions in the discourse of actors. It was an essential tool to draw an accurate picture of "competing and opposing loyalties" (Grabher and Ibert 2006).

3.2 Unit of analysis and unit of observation

we define the unit of analysis, the case itself, as the collaborative research: the "exchange relationships in formal research projects undertaken by university researchers and other research partners" (Landry and Amara 1998). In the context of U-I links, engaging in a collaborative research thus involves "defining and conducting R&D

projects jointly by enterprises and science institutions, either on a bi-lateral basis or on a consortium basis” (Debackere and Veugelers 2005).

As informed by the Structuration Theory (Giddens 1984), this unit of analysis is an emergent construct: it takes the joint covenant as a basis for the selection of the case(s) but it may take distance from its formal definition and boundaries. Indeed, it focuses on individual partners who actually engage in exchange relationships and thus continue to jointly conduct the R&D activities throughout the project. As a result, the collaborative research 1) may involve only a subset of the original partners and 2) allows considering partners who are not formally involved in the project and nevertheless contribute to the collaborative research. As expressed by Katz and Martin, “exactly where that border (*of the collaboration*) is drawn is a matter of social convention and is open to negotiation” (1997). As a result, we used a strategy of self-reported collaboration to draw the relevant borders. This strategy is proposed by Bozeman and Corley (2004) and permits the respondent to determine which exchange relationships are part of the collaborative research.

The case explored in this paper is a collaborative research named COAT². COAT is a subpart of MEGAPROJECT and is itself composed of two sub-projects (COAT_SELF_CLEANING and COAT_ANTI_BACTERIAL) with dedicated legal agreements, resources and deadlines. Nevertheless, the majority of partners worked on both sides and considered COAT as one project: partners of the collaborative research were the people “around the table”. As expressed by one respondent:

COAT is composed of two projects that are considered as two dimensions of the same project (...) COAT is quite specific; its two internal projects have a lot of similarities and are treated in common for more interactions.

Inside the case, the unit of observation which guided the gathering of the dataset is the critical event. Its observation was supported by a strategy of fined-grain bracketing (Pozzebon and Pinsonneault 2005) as deployed through their punctuation. Critical events were witnessed through the observation in real-life settings such as plenary meetings (15 meetings of 3 up to 8 hours) and team building events. Its effects were traced through the minutes of the meetings, especially through the “further actions” section, as well as during subsequent interactions. Especially, the comparison between the observation of meetings and their associated minutes was very insightful. Finally, critical events were remembered by respondents during semi-structured interviews, allowing a focus on behaviors rather than impressions (Hargadon and Fanelli 2002). Twelve interviews were tape-recorded and a verbatim transcript of each interview was produced and sent to the respondent to trigger feedback. In one additional case, the respondent asked not to be recorded. As a result, we prepared a report based on written notes taken during the interview.

A thematic analysis was performed on the interviews with the qualitative data analysis software Weft QDA in order to highlight organizational, inter-organizational and personal interests, R&D tasks, perceived roles and other relevant interpretive schemes. Then, chains of evidence (Yin 1981, 1994) related to each critical event were constructed with analysis tables (see Table 1) in order to link constructs with extracts

² All names of projects and firms are disguised to ensure confidentiality. The goal of COAT is to develop self-cleaning and anti-bacterial coatings and to deposit the developed layers on glass and steel substrates through plasma surface treatment.

from interviews, observations, minutes, and so on. Such chains of evidence allow for a better comparison of events and conclusion drawing. It also helps managing the iterative process of explanation building as the researcher goes back and forth from new empirical evidence to theoretical explanations (Decrop 1999; Pettigrew and Fenton 2000).

Table 1 Chain of evidence related to a given critical event

Event X – Description (DATA SOURCES)					
Voice					
Who	Triggering factors	Target	Interests at stake		Comments
Translation					
Who	Relay?	Interests at stake	Modalities		Comments
Stabilization: closure of the event					
Who	Strategy and responses	Interest served/disserved	Modalities	Impact	Comments

4. FINDINGS

4.1 Overview of critical events

The plenary meetings acted as a “collective confessional” where partners shared constraints, results, frustrations and progresses. Sometimes, partners identified a source of dissatisfaction and brought it on the table, triggering a critical event: the source of dissatisfaction was discussed and a solution was proposed. 40 full critical events were observed, documented and analyzed. In Table 2, we present an overview of those events: the actors who triggered the event, the targeted phase of the R&D project, the actors who participated at the translation process and finally the actors who closed the event through decision making. Note that this Table was not produced for statistical computation but rather to illustrate the report of results (even if figures do not accurately render the richness of the dataset).

The analysis also took into account nine voice events that did not lead to a critical event. In other words, we observed and documented nine events where the expression of dissatisfaction was not followed by decision-making or even translation. Those voice events were mostly produced during interviews and informal conversations, when the respondents had the opportunity to pinpoint sources of frustration. Those events were interesting because they allowed accessing the subjects considered as “taboo” during the plenary meetings. They also shed some lights on the interactions that were undertaken outside the main scene.

Table 2 An overview of critical events

Group of actors	Voice	Target				Translt°	Stab°
		Identification	Exploration	Selection	Implementation		
Project managers	14	3	9	0	5	38	37

Academic professors	14	0	1	2	11	16	1
Front line researchers (research institutions)	13	0	3	3	7	18	2
Front line researchers (companies)	8	4	3	0	1	2	0

Some interesting trends are highlighted by Table 2. First of all, stabilizations were mostly brought by the project managers, with three exceptions. In Event 5, an academic partner expressed the need to define more precisely the processes underlying a given characterization method. As a closure, he proposed to test a number of samples with a number of procedures. Interestingly, this action was not formalized in the minutes of the meeting. In Event 41, a front line researcher proposed to transmit a message to his boss regarding the discussed dissatisfaction. More or less thirty minutes later, one of the project managers came back to the event and proposed an alternative solution. Finally, a closure was realized by operational researchers during a workshop organized for the 2009 Helicopter View (team building event) but the project managers were not part of the discussion.

Except during semi-structured interviews and informal conversations, “speaking out” was not easy for academic front line researchers. It was nevertheless favored by two main factors: the presentation of their results during plenary meetings and the intervention of their boss. Concerning the conduct of COAT, the main target was the implementation: front line researchers took opportunity of their presentation to share difficulties such as the measure of heat during the deposition process (Event 26BIS) or the access to the right equipment (Event 32). When targeting exploration or selection, the academic front line researchers did not question the choices that were made but rather proposed alternative paths. In other occasions, they also asked for more guidance: such events refer to the need of Know-Why (Jensen et al. 2007) requested by the academic partners.

Concerning their bosses, the academic professors also brought implementation as the main target of their dissatisfaction (at least during the plenary meeting). In line with the behavior of their employees, professors targeted exploration to ask for more guidance: in Event 4, the choice of material was presented as an important stake for the professor who was waiting for the industrial partners to decide on the matter. In the two events targeting the selection phase (Event 17; Event 29), the academic partners took opportunity of their “voice” to highlight a selection criterion that flattered either the technology or the competences of the lab.

In contrast with academic partners who did not question the R&D problem, industrial front line researchers targeted the “identification” and “exploration” phases as a source of dissatisfaction. They mostly recognized the difficulty of the tasks at hand and the exceptional ambitions of the project given the time span. Only one front line researcher really confronted the R&D problem tackled in COAT when he realized that the photocatalytic effects of the surfaces affected the organic pollution but not the inorganic one, thereby restricting the self-cleaning properties “per design”. This new point of view on self-cleaning products was brought by the employee of SME, who considered himself as an “U.F.O” in COAT and as an outsider.

Project managers also directly addressed the “identification” and “exploration” phases. The most important event in that matter was the 2008 Team Building Event when the R&D problem was refined and some exploration paths were closed. The focus on critical events allows for observing the modalities that were the most relevant for project managers as well as their reinforcement through closure: “the urge to get something that works at the end of the project” and “the need to focus on plasma surface treatment” provided the legitimacy of the decisions.

4.2 Leverages and impact on knowledge exchanges

4.2.1 Links creation and reinforcement

Project managers are privileged actors regarding the exercise of power in plenary meetings. Indeed, they are in charge with decision-making and closure in the critical events. They question each phase of the R&D project: the R&D problem, the exploration of alternative paths, the selection of promising ones and their implementation. As representative of their organization, they were also controlling the access to organizational resources such as equipment, technicians and experts.

we identified four complementary strategies that project managers can establish to influence value creation for their parent organization in terms of knowledge transfer: bridging, bonding, spinning-out and assimilating (see Table 3).

TABLE 3 LINKS CREATION AND/OR REINFORCEMENT IN JOINT R&D PROJECTS

	Supported interactions as part of the collaborative research	Supported interactions in periphery of the collaborative research
With existing members of the collaborative research	<p>Bonding:</p> <p>Creation of privileged opportunities for knowledge sharing</p> <p>Integration of a peripheral research</p>	<p>Spinning-out:</p> <p>Creation of a peripheral research more or less in line with the collaborative research</p>
With external actors	<p>Assimilating:</p> <p>Integration of a new participant in the collaborative research</p>	<p>Bridging:</p> <p>Granting access to organizational resources, technicians and experts</p>

In the literature on social capital (i.e. Nahapiet and Ghoshal 1998; Burt 2004; Putnam 1995), bonding refers to linkages within the focal group while bridging foregrounds to linkages between groups (Adler and Kwon 2002). In the joint R&D projects, bonding therefore implies the reinforcement of an existing link in the framework of the collaboration. It enables a privileged access to knowledge exchanges that nourish the project as well as internal R&D activities. As expressed by one respondent:

They came back with a considerable contribution at the level of the project. And I find it truly remarkable. In fact, I took up one of the presentation here internally – because we have another “self-cleaning” project – I took up their slide to share their contribution in terms of comprehension. It was quite unexpected.

By contrast, bridging implies the creation of a link outside the collaborative research with an external actor. For instance, a project manager can enable the access to organizational equipment and technicians so that the academic researcher can

experiment directly on the machine. Even if the technician does not become a “partner” of the collaborative research, such a bridge enables the access to industrial Know-How as requested in the project.

In the case study, we witnessed two additional strategies to stimulate exchanges:

- The assimilation of an external actor who become a legitimate part of the group, a “partner” welcome “around the table”.
- The reinforcement of a link between two existing partners who decide to “spin out” from the main collaborative research and create a peripheral research. Indeed, even if the actors are still part of the main collaborative research, the interactions channeled by the peripheral research are no longer part of it. This “spin-out” can feed the joint project in an indirect way or even contribute to internal organizational activities. For instance, the definition of a thesis can be seen as a “spin-out” connecting the lab and the company in parallel with the joint R&D project.

While assimilating and spinning-out are not considered in the literature of social capital, a structurationist perspective allows for the distinction of such strategies. Indeed, the Structuration Theory defines the relevant social system in terms of interdependencies of actions, not of actors, thereby introducing a complementary dimension: whether the stimulated exchanges are integrated to the main interactions of the group or on the contrary developed as part of a peripheral activity.

Each strategy has specific difficulties and risks. When bonding, for instance, the lack of transparency about the manager’s interests can lower the level of trust and goodwill of the partners. Indeed, the manager sometimes acts as a gatekeeper who accesses external knowledge and dispatches it internally. Such a behavior can be seen as opportunistic, keeping the academic partner in a position of “service provider” rather than “real partner” as expected by the participant of the collaboration. In the case of bonding through the integration of a peripheral project into the main collaborative research, managers should also pay a particular attention to the interests of the researcher. Indeed, the formal definition of the collaborative research is often the product of a compromise between the industrials and the academic professor, thereby neglecting the individual interest of the researcher.

As a matter of fact, the integration of a thesis in a joint R&D project is a perilous task. For instance, a junior researcher who is developing a cheaper component instead of a state-of-the-art solution shows loyalty to the project for reasons that are not legitimate in the context of his or her thesis. For that reason, a “spin-out” strategy might be more appropriate and allow for a better alignment of interests. By creating this spin-out, the project manager also creates new opportunities for exchanges and, more importantly, alternative ways of exploring the phenomenon under study. Indeed, the main competitive advantage of universities as a research partner is “their competence in generating new original findings and new approaches to problem solving” (Debackere and Veugelers 2005). Opportunities for creative thinking could be stimulated by the use of spin-outs that escape the definition and ways of doing of the main collaborative research.

In this case, delicate issues include:

- The allocation of resources between the main collaborative research and its peripheral parts while keeping the researcher interested.
- The blurring barriers between the main research and the peripheral parts and the risk of confusion resulting from the overlapping.

Finally, when the link creation or reinforcement involves an external actor, the main risk lies in the sharing of norms. On the one hand, bridging implies interactions with an actor who is not part of the main collaborative research, does not consider himself or herself as a “partner” and thereby does not share the norms and values of the project. On the other hand, assimilating means welcoming a new member and transferring the norms and values that may seem taken-for-granted for the other partners.

In every case, the main stake of the strategy is the definition of the collaborative research. As explained supra, COAT was seen by the partners as the relevant unit of collaboration. It was favored by the project managers in order to stimulate exchanges between people working on Titanium Dioxide, whatever the substrate and the expected properties. By doing so, they also defined the boundaries of the collaborative research and consequently the nature of the links as bonds, bridges, spin-outs or assimilations.

The critical event is an interesting unit of observation for the establishment of such links. For instance, a project manager took opportunity of Event 32 to invite an academic partner to use the equipment of the company and to meet their expert. In Event 20, she proposed a technical meeting to discuss the technical issue in depth. We also witnessed the establishment of bonds, bridges and spin-outs by other actors such as the academic professors. Indeed, academic professors are also in charge of organizational resources such as complementary equipment, methods or experts. As such, they are able to propose additional resources that underline the competences of the lab. Such links contribute to value creation at the level of the project through the supply of adequate resources and, subsequently, at the level of the laboratory through an enhanced visibility of its competences.

4.2.2 Sidetracking

While academic professors and project managers are able to create or reinforce a collaborative link, front line researchers have the opportunity to mobilize another kind of leverage for value creation: the definition of the set of possibilities within the collaborative research. As expressed by one respondent:

You need to know that in this project – fortunately because otherwise I could not get through – I am not involved in the strategic discussions. I am here to give a feedback and **tell what is possible and what is not.**

Indeed, they are in charge of producing the scientific results that will confirm or, on the contrary, close the promising paths. In COAT, front line researchers were also able to propose new exploration paths that would be of value for the project and, hopefully, for the academic laboratory in terms of new publications or thesis material: even when triggered by others or about an implementation issue, critical events were privileged opportunities to propose alternative solutions. As a matter of fact, front line researchers participated to the translation phase in 50 % of the critical events.

Nevertheless, as highlighted by Table 2, closure was exclusively conducted by project managers: front line researchers did not have the final say about the direction of the

project. The proposed path had to be supported by the academic professor, the “real expert” while being legitimate following the norms of the project. In Event 27, for instance, a front line researcher proposed a new exploration path arguing that it could bring interesting insights about the phenomenon under study. The idea was then dismissed by a project manager on the basis that the aim of COAT should be “the exposition of samples with better performance, even if we don’t understand the science which is behind”. The academic professor then backed the proposition of his researcher, this time mobilizing modalities of COAT: he rephrased the experiment as a tryout on a large sample directly on the track in order to “show something”. This time, the experiment was accepted, followed by two final words:

The project manager: “after that, let’s see if something works out!”

The academic professor: “after that, let’s write a paper!”

Unfortunately, these two conditions – support of the academic professor and legitimization through the project’s norms – were not always met. In fact, the front line researchers felt increasingly powerless and under pressure, especially after the refocus of innovative activities after the 2008 Team Building Event and the redefinition of the project. As a result, sidetracking was considered as an alternative strategy: the exploration of alternative path or peripheral phenomena that could be translated into scientific publications or even into concrete products for COAT. Such sidetracking was not conducted in plain sight, thereby avoiding the “panoptic” look of managers (see Pichault 2009) and the pressure of the project.

5. CONCLUSIONS

In this paper, we explore how actors in joint R&D projects can take opportunity of critical events to shape knowledge exchanges. We identify four main strategies deployed by project managers and academic professors as well as their specific risks and stakes: bonding, the reinforcement of a link in the framework of the collaborative research; spinning-out, the creation of a peripheral research between participants; bridging towards external actors for the access to complementary resources; assimilating through the integration of new human resources to the project. Such links were brought to the collaboration through the closure of critical events. They addressed dissatisfactions about the conduct of the project by stimulating knowledge exchanges but were also used by actors to shape the direction and usefulness of the flows by taking organizational interests into account.

While front line researchers were not involved in the closure of critical events, they contributed to the translation by defining the set of possible actions: qualifying the explored paths through the generation of scientific results and proposing new directions that were subsequently granted or dismissed by managers. In the latter case, the institutional and physical separation of the actors allowed for sidetracking at the benefit of diverse interests: contribution to the project in spite of the dismissal of the solution and/or contribution to organizational interests in terms of knowledge-based products. Future research should focus on the performance of such strategies as well as the link between side-tracking and the management style adopted by project managers.

Three important limits should be acknowledged. First, we focus on knowledge transfer within the project rather than through the project. Future research could benefit from an alternative unit of analysis: the organization. Second, we recognize that the type of

management style could have an impact on the punctuation of the critical events (Pichault 2009). It would be worthy to investigate if a polyphonic management style stimulates the “voice” of ordinary actors as well as the target of their dissatisfaction. Third, the focus on critical events during plenary meetings does not give access to strategic discussions. As a matter of fact, academic professors did not question the R&D problem during plenary meeting because strategic discussions were rather evoked at the level of the Steering Committee or during specific meetings that excluded front-line researchers. Such a limitation was tackled by the long-term immersion on the field and by multiple data sources. Nevertheless, experiencing the same fields of action as front-line researchers provided a unique perspective on their interpretations and their own roles in the process.

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