CREATIVITY AND PROJECT MANAGEMENT: Managing the UNEXPECTED AND PERMANENT CHANGE

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ABSTRACT

Our aim is to analyze the management of the unexpected and the unknown and of permanent change as structural elements of creativity management in projects. To do so, starting from the concept of grounds of creativity (Cohendet et al., 2009, 2010; Cohendet and Simon, 2011), we identify the key elements of creativity and of creative players in projects. In a hybrid exploration perspective (Thiétart, 2003), we compare these results with four case studies of creative industries and one of a not creative company. The analysis of these case studies enables us to complete our research axes in order to develop a model of creativity management in projects. The essence of our work lies in the identification and description of ephemeral creative teams as a place of creativity in projects, and as a link between the processes of innovation, idea generation, and the management of the unexpected and the unknown and permanent change.

KEYWORDS creativity · project management · management of the unknown · knowledge management · management of permanent change

INTRODUCTION

Traditionally, project management is bound to control, measurement, monitoring, and evaluation of the planning and execution of a project, its results and the produced knowledge. In the context of innovative projects, the environment is often considered as unstable and dynamic; processes of idea generation are complex and difficult to manage. Agility seeks to provide answers to these questions that require a particular form of creativity. Creativity insists on a new definition to expand the analysis of the agility and management problems of the unpredictable and permanent change. Creativity is part of the idea generation process and the inventive part of product development. But in the context of a project, creativity is expressed in the permanent capacity of solving problems as management of unpredictable and unknown information. How can we manage the unpredictable and the unknown in a project? How can we combine knowledge management and management of permanent change? Ultimately, how can we manage creativity in projects?

To answer these questions, we first transfer the concept of creative cities grounds *(Florida, 2002; Cohendet et al., 2009, 2010)* and creative players to the context of projects *(Cullmann, 2012)*. A comparative analysis of case studies in creative industries enables us to identify the key factors that foster creativity in projects. These case studies analyze creativity at Pixar *(Catmull, 2008)*, organizational learning and improvisation in jazz *(Barrett, 1998)*, knowledge creation and management of projects in the video game industry *(Cohendet and Simon, 2007)*, and the application of agile methods in computer science *(Conboy et al., 2009; Cullmann, 2010a)*. These results will be complemented by a case study of a French company in the furniture industry. The results of these case studies lead us to three research axes: the more specific analysis of the combination of learning and the unpredictable and unknown, continuous change management, and the development of a model of creativity management in projects. An analysis of research perspectives concludes our study.

1. Conceptual framework and research questions

In the context of research on the factors that foster creativity, many studies aim to identify the actor in the creative environment. Part of the research literature focuses analysis on individual creativity, from a psychological perspective *(Guilford, 1950; Torrance, 1974)*, with a conative approach *(Amabile 1993)*, or in neurosciences *(Chi and Snyder, 2011)*. Another part of the research literature centers more on the individual in interaction with his/her provocative skills in conversation with the community *(Barrett, 1998)*, the relationship of the individual to the organization *(Amabile, 1983, 1999; Amabile, Goldfarb et al., 1990; Amabile, Conti et al., 1996)* or as an actor in the creative economy *(Florida, 2002; UNCTAD, 2008)*. Other research works *(West, 1990; Ford, 1996; Ekvall, 1987, 1996; Drazin et al., 1999)* offer multi-level approaches explaining the impact of individual and environmental factors on creativity and the process of creation. Inspired by these concepts, among others, Cohendet *et al. (2009, 2010)* developed an approach of the anatomy of the creative city. Their analyzes of under-, middle- and upperground aim to identify governance and interdependencies of these grounds as a source of creativity. However, their work on creative collectives as intermediaries between the underground and the upperground *(Simon, 2009)* mainly applies to creative enterprises for which they seek to decipher the process of creative projects.

These grounds, their processes, and creative collectives appear similar and complementary to creativity mechanisms and factors influencing an actor's creative project. The ecosystem and the actors of a so-called normal project certainly require a differentiated and critical analysis; a simple translation of the concept of grounds seems insufficient and inadequate. However, we will use the work of Cohendet *et al. (2009, 2010)* and Cohendet and Simon *(2011)* to identify relevant themes for our work on the management of creativity projects *(Cullmann, 2012)*.

The concept of grounds *(Cohendet et al., 2009, 2010)* refers to the ecology of creative spaces involved in the creative process. In this specific ecology of knowledge, creative ideas pass from micro- to macro-economic levels through accumulation, combination, extension, and renewal of knowledge distributed and dispersed throughout space. The dynamics of creativity lies in the interaction between the three different layers of the territory, namely upperground, middleground, and underground. Space can then be considered as a specific network of creative communities meant to interact, generate and share knowledge, and initiate common projects.

Usually, the couple creativity and project management is considered as a contradiction in itself *(Gilson et al., 2005)*. Creativity aims at improving efficiency in problem solving, creativity is considered as a pillar of organizational change and the foundation of innovation. Project management refers to the standardization of procedures and working practices with the objective to optimize organizational, control, monitoring, and evaluation performances. Midler *(2006)* describes the evolution of project management and identifies

gaps in a conventional mode of rationalization of breakthrough innovations by requiring a new approach, such as the CK concept *(Le Masson et al., 2006)*. In their recent work, Cohendet and Simon *(2011)* develop the relationship between knowledge, creativity, innovation, and projects as social dynamics: they reconsider and redefine the creative process.

Creativity is individual but also collective and interactive in communities. The effect of creativity is not necessarily and directly translated into a creative product. Creativity is also the ability to adapt and respond to new situations, to generate new knowledge and manage this knowledge to solve problems *(Amabile et al., 2005)*. Therefore, creativity can be regarded as part of agility. In our analysis, we define creativity as a dynamic process in which different actors in creative spaces generate new ideas, pass them through, and create knowledge *(Cohendet et al., 2009, Cullmann, 2012)*. With Le Masson *et al. (2011, 2010)*, we propose that creativity corresponds to the ability to think the break from the predictable, certain and known context. Therefore, we consider creativity as problem solving *(Amabile, 1983)* and knowledge creation in an uncertain, unpredictable, and sometimes even unknown context. We specify later in this paper the definition of creativity in projects.

So we can distinguish at least two different levels of creativity. As the first level, we identify the conventional perception of creativity as a process of idea generation related to invention, innovation, and product development. The second level corresponds to the continuous adaptation and responsiveness to new, unforeseen, or unknown information in a process of permanent change. This second level of creativity is located in a context of continuous change and knowledge management within new forms of community. Our analyzes aim essentially at this second creativity level. May the "desorptive" ability *(Le Masson et al., 2010, 2011)* be useful to manage the unpredictable and the unknown? How can we improve social dynamic capabilities, flexibility, responsiveness, and improvisation in a project? What is the role of communities and ephemeral creative teams?

Therefore, the research questions of our analysis are the following: How can we manage the unpredictable and the unknown in a project? How can we combine knowledge management and permanent change management? Ultimately, how can we manage creativity in projects?

2. Methodology

Our two-stage analysis is based on case studies from creative and not creative industries. As a first step, we analyze case studies of creative industries considering creativity at Pixar *(Catmull, 2008)*, organizational learning and improvisation in jazz *(Barrett, 1998)*, knowledge creation and project management in the video game industry *(Cohendet and Simon, 2007)*, and the application of agile methods in computer science *(Conboy et al., 2009; Cullmann, 2010a)*. This analysis will enable us to identify, in connection with the concept of grounds, both key factors in creativity and creative players of the project.

As a second step, we perform a first case study with a French company in the furniture industry through expert interviews with the head of industrial design. As in the four previous case studies, we study more precisely the key factors of creativity and the creative project player. Expert interviews were conducted in Autumn 2011 and Summer 2012 with an industrial designer having extensive experience in the furniture industry and also working as a freelance designer in several different industrial fields. Interviews were conducted in two stages, each time for a period of about 1.5 hours, the first was recorded and then transcribed, the second one by protocol. Protocols were submitted to the expert for validation.

During these two stages of analysis, we focused on the management of the unpredictable and the unknown and permanent change with the objective to conceive a model of creativity management in projects. This "hybrid" exploration *(Thiétart, 2003, 71)* enables us to "devise theoretical constructs highly "rooted" in facts under consideration" *(ibid., 70-71, quotation marks in the original)*.

3. Analysis of case studies

We present our analysis in two steps, first our case studies in creative industries and then a case study of a not creative industry in order to extract the creativity key factors and to identify creative players in projects.

3.1. Case studies in creative industries

Creative players interact in communities and in the organization. Factors that foster creativity in general are to be submitted to a comparative analysis of several case studies of creative industries in order to identify the different grounds and criteria favoring creativity in projects. Our case studies analyze the collective creativity observed at Pixar *(Catmull, 2008)*, organizational learning jazz improvisation *(Barrett, 1998)*, knowledge creation and project management in the video game industry *(Cohendet and Simon, 2007)*, and the application of agile methods in computer science *(Conboy et al., 2009)*.

We note that provocative skills enable musicians to voluntarily go off beaten paths, respond to others, adapt, and improvise *(Barrett, 1998)*. This ability to get out of the box was already cited in the assessment of creative potential of creative people *(Kirton, 1982; 1989 Richard, 1995)*, and in the analysis of performances and creative productions *(Nagasundaram and Bostrom, 1994)*.

These case studies evoke middle- and upperground factors each time together with elements dedicated to the community, or to the organization, and project management. The revitalization of individual and collective creativity occurs mainly in the middleground, among peers and within communities - whether they are practical, epistemic, specialists, or creative committees. We can identify organizational and structural factors of this spatial community to facilitate communication, risk-taking, and decision-making and to strengthen individual membership of the community. Factors more specific to project management evoke responsiveness through small teams, short meetings and daily debriefings, common iterative and dynamic approaches, and quantifiable and measurable tasks and deliverables.

On the upperground, the organization provides the vision, strategy, human resource management, structure, and implementation of tools and organizational identity *(Oliver and Roos, 2006)* to stimulate and foster creativity. Communication and understanding of this strategy enable individuals to adhere to it, to share and implement it in communities and projects.

The creation and management of knowledge emerge in a social process *(Polanyi, 1967; Lave and Wenger, 1991)* in which the conscious and explicit knowledge is captured, codified, and stored *(Nonaka and Takeuchi, 1995)*. Tacit knowledge, including unconscious knowledge, cannot or only hardly be captured, codified, and stored. This knowledge is developed and shared through interaction within communities of practice *(Wenger, 1998)*; this knowledge is created, nurtured and stabilized in symbiosis with the environment *(Hildreth and Kimble, 2002)*. This knowledge is known, common, and available *(Scarbrough et al., 2004a)*.

However, unknown or not yet available and common knowledge can be approached through the concept of absorptive capacity *(Cohen and Levinthal, 1990)* as the competence to evaluate, assess, assimilate, and apply new external information. Inherent in this first definition, this absorptive capacity also requires, according to Mowery and Oxley *(1995)*, the skills to manage the tacit part of the knowledge transferred. According to Kim *(1997a, 1997b, 1998)*, this absorptive capacity corresponds to the competence of learning and problem solving; it is a dynamic competence *(Cohen and Levinthal, 1990; Zahra and George, 2002; Todorova and Durisin, 2007)*. This definition is close to the proposed definition of creativity as interaction in an environment little or badly known or unknown by actors, forcing them to overcome and break away from what they control.

The unpredictable and unknown, inherent in any project, especially innovative ones, remain little studied - because it is simply impossible to capture these elements, because a classical and traditional approach does not allow it either, or because, ultimately, projects are nothing more than communities, atempting through their social processes, to make new information explicit and to exploit it. On the other hand, by approaching it through the concepts of absorptive capacity and creativity, could we analyze the production and management of unknown knowledge in innovative projects? We have previously proposed to define creativity, especially in project management, as problem solving and knowledge creation *(Cohendet et al., 2010)* in badly known, unpredictable, and unknown contexts. Creativity involves "break thinking" *(penser la rupture: Hatchuel, 2011; Le Masson et al., 2011)* compared to known, controlled, and manageable contexts.

Creativity requires and enables project participants to detect any new information and situation, to adapt to it and to apply to it their absorptive capacity. The problem is how to detect and recognize this new information: new compared to what reference and criteria for evaluation? How to identify the value of new knowledge and new information *(Cohen and Levinthal, 1990; Durisin and Todorova, 2007; Le Masson et al., 2010, 2011)* that is not related to known values or skills? The creative individual *(and the creative community)* should not only and simply be reactive to his environment. The creative individual has to anticipate social processes shared through communities of practice to which he belongs, he has

TABLE 1. *Analytical grid of factors that foster creativity in projects (SC)*

		Film	Video games	Agile	Jazz
Underground	Individual	-	-	-	Provocative skills
Middleground	Community	Peers Confidence Communication	Communities of experts Specific management of space fostering informal exchanges Communication Creative committees	Confidence and safety fostering participation Autonomy Self-organizing teams, egalitarian workplace Involvement of stakeholders (customers on site)	Solos and support Retrospective sense-making Communities of practice
	Project	Cross-company teams Communication Debriefing projects post-mortem and introspective Small incubation teams Daily reviews Most of all tasks and deliverables can be quantified	Specific management of space fostering informal exchanges Communication Daily update of maps Creative committees	Time and resources to generate new ideas, experimentation, and testing Measure of creative output Daily meetings Swap of roles and responsibilities, short and fast iterations Proximity to avoid creative abrasion	Provocative skills Errors as a source of learning Minimum structures for maximum flexibility Distributed tasks and dynamic synchronization
Upperground	Organisation	Learning environment Training Open culture, fresh blood, outsiders Close to innovation in academic communities	Cognitive platforms	Vision, business value, reality checks Understanding and communication of objectives Stakeholder involvement Continueous creativity Challenging work	–
	Project	–	Severe time constraints	Storage and dissemination of information (daily meetings, co-located teams, etc.). Tasks, methods and creative diversity to avoid abrasion	–

to be proactive. To anticipate and detect novelty in knowledge, he relies on common and existing known knowledge. He anticipates and adapts to new information using a grid based on existing perception. Through adaptation to the unknown, the creative player must decide whether the new information is useful and appropriate in his search for solutions *(Amabile, 1999)*. Learning the unknown depends largely on the ability to valuate and assess new knowledge *(Todorova and Durisin, 2007)*. But how does this valuation of the unpredictable and the unknown work?

The literature distinguishes two broad dimensions of creativity. The first is the ingenious idea and exceptional creativity matching with a capital "C" *(Stein 1987)*. This creativity can develop and produce a new idea for a new product. However, in the context of projects, creativity with a small "c" *(Stein, 1987; Feldman, 1997)* greatly exceeds everyday creativity. According to our definition of creativity, it evokes the ongoing adaptation to the unknown and novelty, learning and extraction of knowledge required by the absorptive capacity to solve problems arising in continuous and rapid generation of new ideas *(Clark and Reinertsen, 1998)* in response to new knowledge.

Moreover this second creativity, like the first, cannot be decreed, but it can be stimulated. This stimulation can be done in creative communities, in creative teams, in the interaction of the middleground as continuous communication *(Baldoni, 2003)*, frequent meetings and informal ones of the Scrum and Agile types, customer integration in rapid ideation *(Clark and Reinertsen, 1998)* or as iterations as feedback loops of the dynamics of the absorptive capacity *(Todorova and Durisin, 2007)*. Collaborative creative spaces, created for the duration of new and unknown information, are ephemeral as they are made and unmade for any new information in reciprocal learning spaces *(Hatchuel et al., 2002)*. Learning takes place in a constantly destabilized environment *(Hatchuel et al., 2002)*. Actors of these ephemeral creative spaces are not necessarily the same. At the project level, learning by absorption *(Scarbrough et al., 2004)* is fed by the distribution of common knowledge available at the moment of value recognition of any new information in order to operate creatively.

This creativity is ongoing and essential. Interaction communities are ephemeral spaces for creative learning in transition *(Hatchuel et al., 2002)* and learning of the unknown and the unpredictable through a management of new knowledge. At the beginning of the project, the required creativity is "the" good starting idea for instance for new product development *(Cullmann, 2010b, 2012)*. Throughout the project, actors are constantly confronted with new information *(illustrated by loops)*. Actors must detect this new information regarding its value recognition *(Le Masson et al., 2011)*; they have to adapt to it, manage it in relation to their expertise *(Amabile, 1999)*, build new knowledge, and generate new solutions. We can distinguish at least two creative processes in projects. Cohendet and Simon *(2008, 2011)* focus primarily on idea generation and the link between these creative ideas and the community. But creativity is a dynamic process that takes also place in unknown environments with ephemeral creative teams. Therefore, we now seek to compare this discussion with a case study of a not creative industry.

3.2. Case study in a not creative industry

Expert interviews are analyzed and structured along the following lines of research: the new process of the creative project in companies, the key factors and tools fostering creativity in projects, and a projection of the organizational ideal and the individual skills and aptitudes for the management of the unknown and permanent change.

The new process of creative projects

Companies are often confronted with their own ignorance of their products and their markets. The objective of companies is more than just to create products to sell; they must also create new solution spaces. In this context, innovation is based on a design activity which must be capable of both *(re-)*formulating the problem in the manner great inventors do, and problem solving as the incremental approach implemented in planned projects. The more target problems, i.e. new problems, are different from source problems, the more difficult it will be to define and solve them. The difficulty lies in the creation of new solution spaces that must be different from the exploration of former solution spaces. The creation of new solutions is carried out in three successive stages: to switch from product design to the design of its meta-system, to make a conceptual detour before starting the phase of product development, and to overcome contradictions. For example, instead of designing a chair or a desk whose functionalities meet the user's need, it is necessary to design a set of objects that allow their combination to meet the functionality of a space. It is a sort of expansion detour of CK spaces *(Le Masson et al., 2006)* in three steps. First, as a sociologist and anthropologist, is to observe the customer, to

film him, to take pictures, to interview him, and to investigate in order to collect new knowledge about the system under study. The second step is to identify the insights and ideas that are sharp concept elements to guide the product definition toward value creation. The third step involves formulating new problems as contradictions *(TRIZ; Altshuller, 1984)*. These insights expressed as contradictions are key to opening potential doors to yet unexplored and unknown solution spaces: I want a private space that enables me to isolate and concentrate, and I still want this space open, it should not block my view, and it should allow interaction with my colleagues *(Lerch, 2011)*. This passage from concept to product insights corresponds to a translation process. These insights are translated into marketing specifications, then into design specifications, which may lead to design principles.

Key factors and tools of creativity

This sociological and anthropological-ethnological approach *(Lévi-Strauss, 1955)* in the context of multiple references successively replaces the traditional functions in companies. If marketing, for example, is exercised in its streamlined and classic mode with statistics or quantitative methods to understand customer behavior, marketing does not bring much information needed to detect new markets, new customers, or new products. The use of concepts such as IDEO *(IDEO)*, for example, may reveal potential vulnerabilities related to prospective research starting from the existing substantive and seeking solutions in the existing system. However, rethinking the existing substantif is only possible by breaking away toward a conceptual phase; it is possible through observation, insights or even design principles. In this phase of reflection a sociological and anthropological analysis intervenes, and also analyzes of trends, observation, functionality, and behavior. Questioning such as The Golden Circle *(Sinek)* may open up the cultural perception to a space of opportunity. The use of recurrent names as icons can lead to an assumption or a basic theory to make the tacit explicit *(Nonaka and Takeuchi, 1995)*. Similarly, the visualization of a thought other than through a text, for instance with a model, is used to identify the linear pattern and the questioning. These pragmatic approaches to knowledge management are an opportunity to cause errors and mistakes as soon as possible and hence to make corrections and continuous improvement.

The management of the unknown and permanent change

Creativity is based on the observation of the relevant population *(cf. extract no. 1 of the expert interviews)*. It requires experience, inquisitiveness, commitment, and observation skills. Creativity refers to intuition and the ability to understand. In sum, creativity can be interpreted as a potential idea or a question to which we are trying to provide a solution. Ideally, we return to what is tangible and palpable. Therefore, any creative process requires an analysis and results in debriefing to manage the created knowledge.

Managing creativity requires research on new information. We must distinguish between random or chance information that is not new in itself, but the perception of which is new. Managing the learned, off-topic, irrational, forgetfulness, nebulous, intuition, observation, "dead" zones of our perception, experience, change - all these aspects are related to culture and education. Therefore, managing creativity requires confrontating different cultures and setting up multidisciplinary teams. These teams are the creative heart of any project and are to be created in all projects with creative players. The designer can thus leave the artistic connotation and reductive and simplistic perception as he helps find solutions and translate them to promote team work and develop products and tangible deliverables.

These case studies now serve as benchmarks for extracting reflections regarding the management of the unknown and permanent change in order to feed a management model of creativity in projects.

4. Analysis

The analysis of our case studies allowed us to identify key factors in management of creativity and a first synthesis of the management of the unpredictable and the unknown and change permanent. These analyzes are expanded below to propose a model.

4.1. Learning and the management of the unpredictable and the unknown

Learning takes preferably place in a stable environment with, at most and if possible, foreseeable uncertainties *(Sommer and Loch, 2004)*. However, innovation and creative output are primarily characterized by the fact that they take place in a constantly unsettled and unstable context *(Hatchuel et al., 2002)*. This instability can cause cognitive crises because systems and rules of learning and knowledge creation are constantly adapting to new information. Approaches to project management of the Agile type attempt to answer this instability with rapid and frequent meetings such as Scrums *(Cullmann, 2010a)*. How to deploy, to create knowledge and to identify known and unknown, planned and unplanned knowledge? How, in a context of creativity, to learn from the unpredictable and the unknown?

Midler *(1996)*, and Lenfle and Midler *(2003)*, insist on one of the characteristics of projects and especially innovative projects, i.e. that this is a learning process in an uncertain environment *(but not yet from uncertainty)*, a "conversation with the situation" *(Schön, 1983)* and learning to cope with surprises *(Lenfle and Midler, 2003)*. These surprises are not only classical uncertainties for which we have a minimum of benchmarks, but without mastering a manageable degree of uncertainty, for example, by using risk assessment or contingency planning. These surprises are also unforseeable uncertainties *(Sommer and Loch, 2004)* and deviations *(Hällgren, 2009b)*, which are sometimes detectable in relation to a goal or a known value. The problem is more crucial for the unexpected and the completely unknown characterising innovation. Although this has not been specified, this feature of the unknown remains unclear since learning is specific to each dimension of new information. We recall the distinction between the "sought" unknown by the CK concept *(Le Masson et al., 2006)* and the detected and "incurred" unknown *(Cullmann, 2012)*. Any new information represents new knowledge, be it explicitly missing, missing but not consciously, or simply new. Therefore, it is necessary to differentiate issues of missing knowledge and learning the unexpected and the unknown:

- How to know what we need?
- How to know if we need more information? If the information is complete?
- If we know that knowledge is not complete, how to find the knowledge necessary for innovation or projects, which might be new problem spaces (Le Masson et al., 2011)?
- What is the available knowledge and how to identify expected (and unexpected) surprising knowledge (Le Masson et al., 2011)?
- How to detect the uncertain relevance of newness (Schulz, 2001)?
- And this missing knowledge, compared to what value can it be identified and formulated (hook building, Le Masson et al., 2011)?

> **"These are the questions that everyone should ask in a creative project, but which nobody will answer. To pretend to answer them easily implies that the analysis has remained in the known and controlled; it is satisfied with the existing IDEO triangle! And to quote Louis Pasteur "freely": to see the unknown, we must be prepared!"**
>
> EXTRACT 1 FROM AN INTERVIEW WITH AN EXPERT

We could see that the creation of knowledge and learning from the unknown are inseparable from actors involved in the project. On the basis of their experiences, these actors are also used to approximating the unknown through their "eyes" and their perceptions of the known. New knowledge is collected, codified, and combined with existing and known knowledge. Uncertainty about the importance of new knowledge can be solved through vertical fluxes that expose new knowledge to a wider range of different knowledge and not directly related to the situation through trial and error learning; this may reveal its importance in a faster and more comprehensive way *(Schulz, 2001)*. Briefly, to determine the usefulness of information, we refer to Amabile's definition of creativity *(1999; Amabile et al., 2005)*. The ability to to cast a different look at, and even approach new information or the unknown without "glasses" requires creativity. What is the absorptive capacity of the unknown and in a context of creativity?

In a context of creativity in innovative projects, learning from the unknown is more particularly discussed through different design approaches, namely CK concept *(Le Masson et al., 2006)* and TRIZ *(Altshuller, 1984)*. The construction of knowledge spaces and the concept of contradiction can provide access to and facilitate the exploration of new spaces of solutions. As the two concepts are vehicles for learning, we focus on the CK approach that was explicitly designed to address first new forms of organization called design-oriented organizations, and secondly other cycles of collective learning *(Hatchuel et al., 2002)*. TRIZ is more about problems of technical guidance, while CK is structured by the exploration of the unknown.

Although for Midler and Lenfle *(2002, 13)* the CK concept is especially useful for upstream phases and the link between preproject/project with an organization of knowledge creation

outside the project, it seems that the creation and organization of knowledge take place throughout and within the project. In design, the unknown is always present and cooperation *in* the unknown constant *(Hatchuel and Weil, 2008, 12)*, but not cooperation *with* the unknown!

However, learning in projects and project-based learning are influenced by the dynamics of projects themselves and by the interdependencies between projects and different organizational contexts. Learning processes are the source of new knowledge that is formed by existing knowledge *(Scarbrough et al., 2004a)*. Organizational learning and project learning can be considered as processes of changing organizational actions through new knowledge and understanding *(Fiol and Lyles, 1985, cit. in Swan et al., 2010)*.

In projects of innovation, design, and creation, the absorptive capacity also refers to existing knowledge to recognize new information and how it can be integrated into the project. But it also differentiates the structural distribution of common and existing knowledge and the depth and degree of specialization of ties between different communities of a project. This dynamic capability *(Zahra and George, 2002)* provides an approach to unstable environments and varied experiences of communities in project learning from the unknown.

With a view to making tacit knowledge more explicit, reflective learning *(Scarbrough et al., 2004a)* is central to communities. Le Masson *et al. (2011)* redefined absorptive capacity to capture precisely the potential to "leave the beaten path" in order to discern new information to create new knowledge in the milieu, the community, or the ephemeral creative space: the "desorptive" ability makes it possible to leave the known, the hook building may link the unknown to many cognitive references, and milieu stimulation may avoid the temptation to limit the exploration to existing knowledge.

This approach can meet almost all of the issues mentioned above, such as the ability to recognize the value of external information on the basis of existing knowledge, and the evaluation of knowledge creation relevant to obtain this knowledge *(Le Masson et al., 2011)*. There are no well defined problem spaces *(ibid.)* in innovation, design, and creativity. But the creation and expansion of knowledge can help identify the issue that the project must meet. They can detect the unknown and build the ephemeral space to create continuously solutions required in project design and innovation: innovation challenges as problem solving, creativity and problem solving as creativity *(Simon, 1985; Le Masson et al., 2011)*.

> "How to create new solution spaces? Here is an example: The use of the IDEO approach: we find that people with osteoarthritis have problems handling tools. Marketing provides quantitative data on the number of sick people and statistics on identified problems. On the other hand, the observation shows that 5 to 6 year old children have similar problems in handling these tools. This observation led to the development of adapted products, to testing and validating them."
>
> EXTRACT 2 FROM AN INTERVIEW WITH AN EXPERT

4.2. Permanent change management

But why is creativity in project management perceived as disturbing? Why does this creativity appear to be a crisis causing a change to the expected? How does the detection of a change or a potential crisis seem possible? It remains unclear whether creativity in project management is seen as a crisis, a change, a risk, or an opportunity, knowing that the perception of the situation definitely has a significant impact on the ability to manage it. We discuss approaches to collective reciprocal vigilance, management of deviations, organizational improvisation, and dynamic management of projects.

A crisis is an event and/or process which triggers signals upstream and downstream consequences to be managed *(Boumrar, 2010)*. This process shows distinctive steps and phases. The crisis is defined as a global process with, in general, a low probability of happening and strong potential consequences resulting in significant organizational change *(ibid.)*. However, in an innovative project design, the crisis has no low probability, it happens constantly. Therefore, any new project information can trigger a crisis causing a change. All in all, creativity management is a permanent change management.

Research on organizational change management, including - even if this is not specifically mentioned - the risk of uncertainty, the predictable, the unpredictable or the completely unknown as just described, is more oriented towards management of change capabilities, the unmanageable and uncontrollable. It seeks to cultivate the capabilities of a learning organization *(Tarondeau, 1998)* and attempts to be more responsive to future changes *(Soparnot, 2004)*. Dealing with issues of transformation, Tarondeau *et al. (1994)* discussed the flexibility and speed of an organization to adapt. These dynamic capabilities *(Teece et al., 1997)*, and even more proactive than reactive capabilities, were already identified in the context of creativity and project management. They also call for ambidextrous capabilities of Tushman and O'Reilly *(1997)*.

However, these capabilities for flexibility, adaptability, and responsiveness are no longer sufficient in a context of creativity. The absorptive and even desorptive capacity and learning from the unknown exceed the ordinary environment and security mastering. They refer rather to the proactive ability *(Teece et al., 1997)* to anticipate a potential crisis in order to manage it so that it provides a constructive change.

Concepts of management of the unknown and the unpredictable, collective reciprocal vigilance *(Weick and Robert, 1993; Brion, 2005a, 2005b)*, the management of deviations *(Hällgren, 2007, 2009a, 2009b)*, organizational improvisation *(Weick, 1998)*, and dynamic planning and management *(Cullmann, 2010b)* all aim, to varying degrees, to improve the responsiveness or adaptation to new information.

Collective reciprocal vigilance *(Weick and Robert, 1993; Brion, 2005a, 2005b)* aims to increase the interrelations between actors; this is characteristic of the collective ability to detect and understand the unexpected in relation to the common goal. Collective vigilance is the result of a shared work experience; the actors' reciprocal vigilance seeks respective self-adjustment in order to produce in a high-pressure time context reliable actions contributing to the performance of a group in a dynamic and unstable environment.

In the context of management of deviations *(Hällgren, 2007, 2009a, 2009b)*, a deviation is considered as an event which does not match expectations and a common goal; it cannot be predetermined *(Hällgren and Maaninen-Olsson, 2009)*. These deviations are managed on the basis of organizational understanding as a Projects-as-Practice approach *(Weick, 1979)*, based on ephemeral creative spaces to develop specific solutions and communication *(Loosemore, 1998)* as the primary vehicle.

Instead of purely focusing on the formalization of a project using planning tools to reduce and control the unpredictable and the unknown, or focusing on adaptation, Weick *(1998)* suggests organizational improvisation, in a dialectical manner, to manage the tension between control and adaptation to the unexpected, resuming the debate between formalization and flexibility *(Nonaka and Takeuchi, 1995)*.

The concept of project management by dynamically decentralized information aims to detect the unknown *(Cullmann, 2010a, 2010b)* in order to establish participatory monitoring *(Smith and Reinertsen, 1998)*. Detection of the unknown is defined as a network that organizes and transmits information via communication *(Cullmann, 2010b)*. Especially in uncertain and dynamic environments, the provision of tools to manage the unknown through information may enable project stakeholders to reduce instability in the decision-making and to structure learning *(Cullmann, 2007)*.

> "To detect new information requires an open mind, curiosity, and a desire to understand and this is in each of us, whether we are a designer or someone in the chain. What makes the difference is the culture in which we work, our motivation, our pleasure. It's the intuition and experience of managing innovation. And for this to work in a more creative project, we need multidisciplinary teams in which these intuitions and experiences complement each other to capture novelty and transform it."
>
> EXTRACT 3 FROM AN INTERVIEW WITH AN EXPERT

All these approaches have the same goal of detecting and ideally anticipating new information, so they are attempts to capture the unknown. Companies mastering this art of continuous change *(Brown and Eisenhardt, 1997)* are based, among other levers, on "probes", including futurist and experimental products, and strategic alliances, to seize the future and the unknown. In addition, they also prioritize intensive communication and design freedom to create improvisation in projects.

These elements recall the different approaches of the management of so-called creative projects, which we have already mentioned in this work, namely the case studies of Pixar *(Catmull, 2008)*, video games *(Cohendet and Simon, 2007)*, Agile *(Conboy et al., 2009)*, jazz *(Barrett, 1998)*, and the expert interviews. Redefining the responsibilities of creative players and actors, limited structures, intensive communication, freedom of design and ephemeral creative communities to link the present and future are common to all these case studies. They enable them to adapt to new information, to be reactive in their management and its consequences. And even, as far as possible,

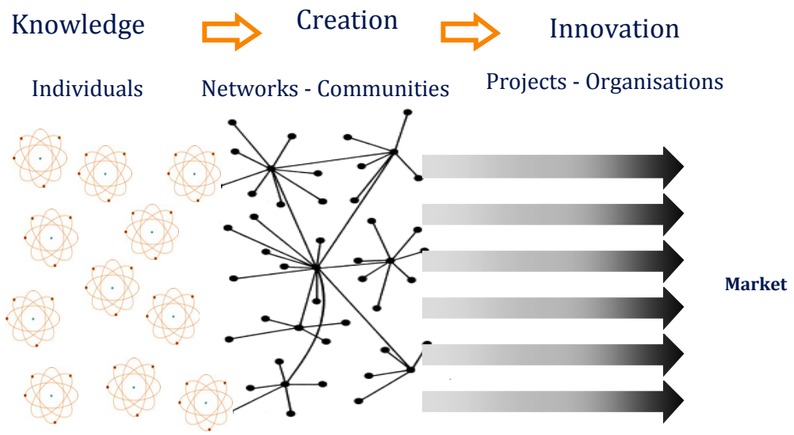

FIGURE 1. *From the idea generation process to the innovation process: a social dynamic (Cohendet and Simon, 2011)*

to be anticipatory and proactive in detecting the unknown, the recognition of its uncertain value *(Schulz, 2001; Le Masson et al., 2010, 2011)*, and learning from the unknown in ephemeral creative spaces. In short, they are able to manage permanent change through creativity in projects.

Exploited and explored knowledge now serves as a basis to continue the outline of the management model of creativity in projects.

4.3. Management of creativity in projects

These spaces are not separated from each other, they are not only permeable, but they are in permanent exchange and are fed through continuous learning by individuals, communities, and organizations, so the under-, middle - upperground of all creative players *(Cohendet et al., 2009)*.

In their recent work, Cohendet and Simon *(2011)* develop the link between knowledge, creativity, innovation, and projects as social dynamics. **Figure 1** shows the knowledge level of the individual, the creation in communities and networks, and innovation carried out in projects and organizations to access markets.

Implemented in the project management of new product development in reference to CK *(Le Masson et al., 2006)*, this reflection combines three processes, namely the conventional process of product development as a "stage-gate" process *(Cooper, 1983)*, the process of innovation *(see Midler, 2006)*, and the process of generating new ideas and creativity in project management *(Cohendet and Simon, 2011)*. These processes occur in parallel and are mutually self-reinforcing by a continuous feedback. The two processes of idea generation and innovation lead to the creative process. **Figure 2** shows the interrelation of the three processes.

The innovation process follows the "stage-gate" logic *(Cooper, 1983)* in a conventional manner. Above this first process, there is the process of idea generation that supplies a kind of new ideas cloud *(Cohendet and Simon, 2011)*. These ideas are used for the current project; useful ideas and insights are also stored for other current and future projects. The cloud feeds the innovation process.

These two processes, innovation and cloud, are connected through funnels by coupling mechanisms such as cognitive communities or platforms. These mechanisms couple and decouple these processes continuously through the creative process. Therefore, creativity can be seen as the gap between a problem and its solution.

Another place of creative coupling and decoupling, but not considered by Cohendet and Simon *(2011)*, is formed by ephemeral creative teams *(Cullmann, 2011)*, a kind of intimacy places *(Hatchuel, 2011)* but on a different scale.

These teams are not only simple funnels linking the processes of innovation and idea generation. In a project, they generate ideas, perform tasks, produce deliverables in the conventional project process, in the ideation, and the creative process. Ephemeral creative teams are set up and come together to produce a deliverable, they use existing knowledge, and they produce new knowledge available to other ephemeral creative teams, both on creativity *per se* and creativity as problem solving bridging the gap between the problem and the solution. They feed the cloud of creativity. They exploit knowledge, explore, and learn about the unknown.

The analyzed examples refer to all ephemeral creative teams: Agile concepts, Pixar, improvisation in jazz, video games, and expert interviews, but also the collective reciprocal vigilance, management of deviations or even organizational improvisation and dynamic management. These examples are based on a substructure of the organization for better proximity to the problem and to the customer, detecting new information, identifiying them by hook building *(Le Masson et al., 2011)*, and learning from the unknown. The expert interviews quote multidisciplinary teams that require a very specific culture. Therefore, the ephemeral creative team has a specific and own form, function and features, to foster creativity in the project, as they have been synthesized in this analysis. Obviously, our observations on ephemeral creative teams require further research to refine our model of creativity management in projects.

5. Conclusion and outlook

In our work, we analyzed the management of the unknown and permanent change as elements structuring the management of creativity in projects. To do this, based on the concept of creativity grounds *(Cohendet et al., 2009, 2010; Cohendet and Simon, 2011)* we identified the factors of creativity and the creative project player. With a view to hybrid exploring *(Thiétart, 2003)*, we compared these results to four case studies of creative industries and one of a not creative industry. The analysis of these case studies enabled us to complete our analysis axes, namely the management of learning, the unknown and permanent change in order to develop a management model of creativity in projects. The essence of our work is the identification and description of ephemeral creative teams.

We consider the ephemeral creative teams as a link between the process of innovation, the process of idea generation, and the management of the unknown and change - as in agility. These ephemeral creative teams generate ideas, perform tasks, and develop deliverables in a classical project, in the creative process, and during ideation. Creative ephemeral teams generate new knowledge available to other creative ephemeral teams. These teams are creative in the classical sense and in the sense of creative problem solving. As a sub-structure of the organization, they exploit knowledge, explore, and learn from the unknown. Accordingly, we develop a model of creativity management in projects.

Our added value to project management is twofold: distinguishing different levels of creativity in project management, and identifying ephemeral creative teams. In addition, we offer a multilevel model of creativity. First, we isolate creativity as the generation of creative ideas, invention, and innovation. Second, we differenti-

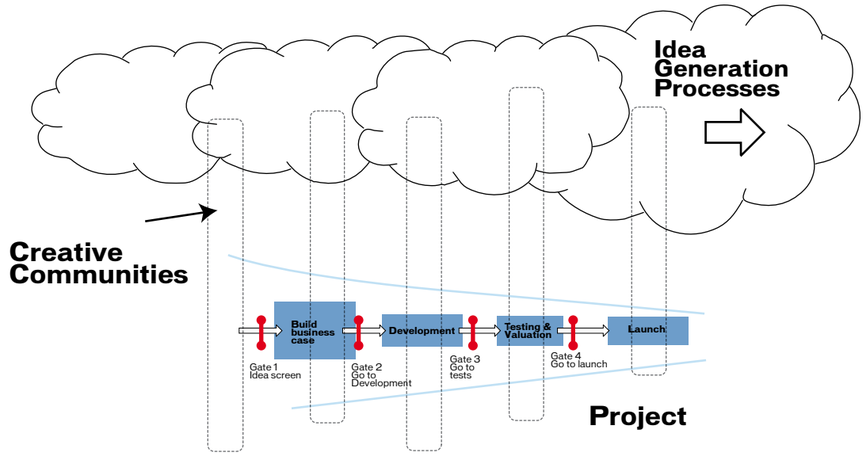

FIGURE 2. *Creative communities in the process of idea generation and innovation (Cohendet and Simon, 2011) .*

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ate creativity as problem solving in a permanent dynamic environment and the unpredictable and the unknown related to knowledge management and continuous change management. Therefore, we conceptualize the management of the unknown and the management of ongoing change within dynamic communities.

Our results are important for industry and research. Until now, tools for increasing creativity are being proposed but we still lack a comprehensive approach. Industry, not just the creative industry, is looking for aid to the implementation and optimization of creative teams. Especially not creative industries require approaches for the lack or absence of idea generation, management of the unknown and permanent change.

Overall, our results will be submitted to complementary research programs *(action research, a longitudinal program, an international comparative study and educational research)*. Our results will be implemented through collaborations with industry and training programs to improve the skills of our students' creativity management particularly in innovative projects.

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