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Creativity management: causation, effectuation and will

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Introduction

The topic of this paper is to revisit the *effectuation* theory as a way to introduce creativity in innovation management. We consider this issue in the context of our experience of analyzing innovation policies and observing creative behaviors in the field of project management and business consultancy.

The background idea of this paper is the fact that the theory of innovation is incomplete as long as the idea of creativity is not introduced in the analysis of the cognitive processes involved. In the economic literature the process of innovation, too often, is considered as pure knowledge creation (recombination of existing pieces of knowledge, etc.). In management science, as well as in economic geography or in sociology of innovation, it clearly appears that other ingredients than knowledge are needed: entrepreneurship, serendipity, capability to develop visions etc.

For a clearer understanding of such issues, is worthwhile returning first to the seminal works of classical authors like Marshall, Schumpeter, Hayek... in order to see which sort of concept of creativity is present in their understanding of innovation: what are the real characteristics of the "entrepreneur"? Is it an individuality or an element of a complex system? To what extent can we build a representation of radical innovation within a systemic framework, *ie* to "endogenize" creativity in the economy and in managerial practices. From the classical and recent literature on inventive and innovative activities, we develop an approach around three components of creativity: novelty, relevance, and "will" factor.

Saras Sarasvathy's contributions will be a key element of our analysis. We particularly want to address the question: does the effectuation approach of project management introduce the creative dimension that is lacking in the causal approach (of the theories as well as of the managerial practices and the public policies)? To which extent is it possible to apply business management concepts (and recommendations) to the management of cities or technological clusters? Another field of application we want to explore is the process of creativity and innovation within and between firms in the case of knowledge intensive business services (KIBS). This case specifically illustrates the connection between individual and collective creativity.

1 Innovation, creativity and the "will" factor

Innovation has largely been theorized in the economic literature as a process of *knowledge production*. In management sciences other elements are taken into account, like *entrepreneurship*. As a matter of fact, Josef Schumpeter, the great author in economics whose seminal contribution is based on the concept of *entrepreneur*, developed (at least implicitly) a managerial approach of innovation. We will start by reviewing the "mainstream" modeling of innovation as a purely cognitive mechanism, and the evolutionist approach, before returning to Schumpeter and look for an entrepreneurial approach of innovation which is endogenous to the economic system. In this perspective, other traditions of economic thought are also interesting to consider, from Marshall to Hayek. In terms of policy recommendations (innovation policies) it is important to benefit from a realistic vision of the economic development and of the actors who implement creative changes. We therefore conclude this section on a tentative definition of creativity at various levels, from the individual to the territory, and we underline the existence of non-cognitive aspects (linked to personality, local culture, etc.).

1.1 Limitations of purely economic approaches of innovation and growth

Arrow's microeconomic *learning by doing* as well as the macroeconomic approach of endogenous growth (initiated by Kenneth Arrow and developed by Paul Romer) were typical contributions to the *economics of knowledge*. Evolutionary economics is also to a large extent focused on the analysis of knowledge mechanisms: see Nathan Rosenberg's *learning by using* or Bengt-Åke Lundvall's *learning by interacting* for the understanding of innovation systems. Such analyses have given fundamental insights, but something is still lacking: the role of the entrepreneur. Mainstream economic models as well as standard evolutionary models do not explain the *intentional* sources of variety that lead to creative endeavors.

As the engine of innovation, the new growth theory considers *knowledge externalities*: spillovers from knowledge producers to knowledge users that play a role of "public good", *ie* a free and not exhaustible factor explaining continuous economic change. Growth is therefore an endogenous phenomenon of the macroeconomic system (a real progress in macroeconomic representation), but the mechanism is spontaneous and automatic. In this description, there is no place for the visionary and risk-taking actors that carry the creative projects at microeconomic level, and how those actors react to the macroeconomic setting, how they can be helped by appropriate structural policies, etc. The only innovation policy to be considered on the basis of such a model is based on public research and public education.

Standard evolutionary approaches also fail to explain the real mechanisms of creative development. The biological metaphor provides an endogenous theory of idea selection in the global system, but no precise description of the ideation process. The knowledge recombination at the basis of idea creation in such models does not express any economic intentionality. It is a model of selection/diffusion of new ideas (in the economy at global level or within firms and other microeconomic organizations through a process of routines selection). Here again, there is no role for entrepreneurs. What can be the policy recommendations? Mainly to

foster connections between actors in order to produce, at random, more variety in knowledge recombination. This is a possible approach of national systems of innovation or cluster policies, but not very precise and topic.

Managerial approaches complete the analysis by underlining the entrepreneurial dimension of innovation. Qualitative economic change in the long run is driven by actors who are not mainly characterized by their capability to produce and combine knowledge *per se*, but by their visionary attitude, their individual qualities in terms of leadership, resilience, positive risk preference, strategic abilities, etc. The rising economic and managerial literature on *creativity* helps to complement the knowledge-based approach of innovation and to re-focus our understanding of innovation processes (and diffusion mechanisms) on individual and collective *entrepreneurship*.

1.2 Towards a systemic theory of entrepreneurship

It is impossible to design a theory of innovation in the framework of economic models just constructed around the principles of equilibrium and optimization, and without taking into account the systemic context of knowledge creation. When Alfred Marshall tried to explain the emergence of the organizational innovation of the first industrial revolution, he built the concept of agglomeration economies and introduced the idea of local culture (*the ideas are in the air*), leading to the very relevant idea that innovation depends on actors that are embedded in concrete territories (the space of innovation systems is not neutral and knowledge is localized). The Marshallian model is also *out of equilibrium*, at least for certain stages of the competition process. This process starts with initial heterogeneity in firms' situations and behaviors; then knowledge externalities enable the less performing firms to imitate the most performing and the system can reach an equilibrium. In a way, the Marshallian representation is an evolutionary model of situated innovation.

The Hayekian tradition also brought interesting insight into the economic mechanisms that neoclassical models reduce to a simplistic vision of markets working within the overarching principle of equilibrium. As carefully analyzed by Kirzner (1997), the Austrian concept of dynamic competitive process implements a tendency to equilibrium – a state that is never met by the system and cannot really be calculated because of constant changes in the environment (products, tastes, technologies, etc.). More precisely, the mechanism called *entrepreneurial discovery* is constantly increasing mutual awareness among market participants concerning the nature and qualities of goods as well as their price. It is a "discovery process" in the sense that it is "systematically pushing back the boundaries of sheer ignorance" (Kirzner, 1997, p. 62). We are in a situation of Knightian uncertainty and not of computable risk: the entrepreneurs' action consists of finding interesting profit opportunities by a sort of search process that is not the one described in standard search theory (revealing information everybody tries to find in the same race for knowledge) but a process of discovering "unthought-of knowledge" (ibid, p. 73). In the rather realistic view of the economy of modern Austrian theorists, the rivalrous process of competition is not about revealing information people are aware of hav-

ing being lacking until now. Participating to the market is always (at least to a certain extent) an entrepreneurial attitude, and this attitude is called "entrepreneurial alertness" which means receptiveness to available (but hitherto overlooked) opportunities.

If the Austrian tradition develops, as described above, a concept of economic creativity which looks fundamentally embedded in the general economic process (entrepreneurial discovery dynamics of markets), what about the Schumpeterian concept of innovation? Building on the legacy of Marshall, Joseph Schumpeter has introduced a model of economic evolution by considering that the heterogeneity (variety) of the system is constantly reproduced through the introduction of innovative products, processes, and organizations by creative actors he called "entrepreneurs". But the role of entrepreneurship in his theory of innovation has varied and the post-Schumpeterian literature makes a difference between the so-called "Schumpeter.1" and "Schumpeter.2" visions (see for instance Burton, 2001). The representation of an innovative economy is not yet fully developed in the first book, the *Theory of economic development* (Schumpeter, 1911), since the source of creativity is exogenous: the emergence of creative actors is not explained within the economic system. In Schumpeter.2 type of works (*Business cycles* in 1939 or *Capitalism, socialism and democracy* in 1942) the entrepreneur is not "an outsider who enters the economic system guided by animal spirit" (Antonelli, 2015, p. 111), but a creative manager. Product innovation is the result of the strategies of incumbent corporations, no more the exogenous creation of new entrepreneurs. It seems to be a model of "routinized innovation" quite away from the original idea of breakthrough solo-entrepreneurship.

Antonelli (2015) analyzes a less known but important text of Schumpeter (*The creative response in economic history*, 1947) which is a sort of late synthesis of Schumpeter.1 and Schumpeter.2 visions. Here the innovator is neither a creative alien nor a perfectly planned manager optimizing R&D programs, but an economic actor facing unexpected changes in his/her environment (markets of products or factors, technological revolution...) and forced to make a *creative response*. Here the entrepreneur (whatever the size of the firm: entrepreneur or *intrapreneur*) is facing a challenge because of an initial situation of disequilibrium: a mismatch between present firm's situation and the global context. This is the first ingredient for innovation, a systemic tension impacting individual actors. The second ingredient in Schumpeter's view is the support that the system can offer to the potential innovator: knowledge externalities and the competencies of a variety of agents able to complement the innovator's endeavor. The innovator appears as an entrepreneur who is embedded in a complex system through at least two mechanisms, an incentive scheme and a supporting context. This last Schumpeterian vision looks more complete, very realistic (and also suggests a rich variety of systemic policy recommendations taking into account the precise context of potential innovations). Innovation does not appear as a pure alchemy of knowledge. Entrepreneurship is situated at the core of innovation and at the same time the entrepreneurial mechanism looks endogenous.

We consider that the recent paper of Cristiano Antonelli on Schumpeter (1947) is very useful and helps not only to better understand the late Schumpeter's view, but also to respond at least partially to the remarks done by researchers in management who find "major deficiencies" in the Schumpeterian approach of entrepreneurship and innovation (Burton, 2001). The systemic concept of *creative response* in Schumpeter (1947) complements the ideas of "entrepreneurial alertness" and "diffused entrepreneurship" proposed by John Burton. It is also coherent with seminal contributions like Amabile and Khaire (2008) who analyzed how, in an economic regime characterized by permanent innovation, competitive organizations are forced to manage creatively and out of equilibrium, implementing a sort of collective entrepreneurship. In such a context, the entrepreneur is no more an isolated individual, his/her creativity is revealed and modulated by interaction within a large system of actors and institutions. We have for instance illustrated this observation by studying the role of specific creative individuals (Knowledge Angels) within and between organizations (Muller et al., 2015). Such studies try to implement the Woodman et al. (1993) project of designing a *theory of organizational creativity*: understanding creative behavior in complex social systems.

1.3 How creativity, under various forms, contributes to innovation

As discussed above, innovation and entrepreneurship imply knowledge but cannot be reduced to pure knowledge processes. For Sternberg (2008), the most innovative managers are not the most learned, but those who are particularly able to design new representations of the world (possible futures), to think differently (out of existing codes and cognitive routines), and at the same time to be pragmatic enough for transforming those new ideas into relevant economic and/or social achievements. Let us remind from Sternberg's definition that creativity has two dimensions:

- * The new idea must be original, unexpected. It is the *novelty* factor.
- * It must also be appropriate, *i.e.* useful, adaptive concerning task constraints. It is the *relevance* factor.

Building on the literature on entrepreneurship we need to add another fundamental ingredient of innovation: the willingness to change the world. Without such a desire, visions are just dreams. Creative ideas, whatever their level of novelty and relevance, will not change the world without the implication of actors who have the desire to implement them. We don't want to analyze here their motivation: reputation and/or money and/or generosity... The important issue here is that some individuals or organizations have the desire of acting and commit themselves to a specific creative goal.

- * Let us call it the *will* factor.

Now, the interesting issue is to look at the precise way the three factors are distributed. Let us take first the example of research as a creative activity. In *scientific* domains, creative achievement is called *discovery*. The latter is sometimes attributed, afterwards, to exceptionally gifted individuals (*e.g.* Albert Einstein) who were able to "think out of the box" (*novelty* of

the model of relativity as compared to current Newtonian physics), for *relevant* knowledge constructions (explaining the trajectory of planet Mercury or the finite speed of light), and were keen to convince the scientific community (motivation for publishing).

Einstein is quite a fascinating model in the history of science, but he is not a paradigm. In the case of Louis Pasteur, the situation looks quite more complex because his discoveries implied also *technological* issues and therefore *invention* (vaccination, fermentation processes, etc.) and even directly *innovation* (for public health, industrial applications, etc.). In fact, Pasteur was not only a scientist, but also an entrepreneur, a manager, a lobbyist... In his ventures – and adventures –, he was definitely not alone: numerous people and institutions contributed to those applications of nascent microbiology. Many scientific success stories are like Pasteur's: creativity appears multi-faceted, multi-actor, deeply embedded in a complex system of *distributed intelligence*. By "intelligence" we mean not only knowledge but also entrepreneurial strategy – and both are distributed, not individual.

In scientific, technological or commercial (innovation) fields, we generally observe a complex distribution of the three basic factors: the initial *idea* is maybe formulated by some prominent person, but the cognitive revolution was prepared by the "community of knowledge" this person belonged to. The *relevance* of the idea is tested by the same community and often by other communities as well. The *will* factor is mostly carried by the discoverer, inventor or innovator, but the latter needs partners, allies, advisors, business angels and all that kind of actors that are able and willing to share the vision.

It is possible to extend the analysis to other fields of creativity. Cohendet et al. (2014) present the example of communities of artists that prepared the revolutions of the 20th century like cubism in Paris. Picasso and Braque had the merit of forging the specific wording and of writing a manifesto, but that crucial phase of formalization did in fact finalize a whole maturation process within an artistic community, in a specific location. In a similar way, Cohendet et al. (2010) document the contemporary emergence of new paradigmatic forms in creative industries in Montreal.

Referring to Cohendet and his HEC Montreal school of creativity, it is possible to distinguish three phases in the ideation process:

1. The *spark*, expressing the breaking of the rules, and leading to the redaction of a manifesto. This phase takes place in an *epistemic community*. The latter is characteristic of artistic and scientific communities whose vocation is to produce original forms of knowledge.
2. The *social construction* (referring to Callon, 1999), where the issue is to share the idea with other circles of people and institutions. This phase takes place in the concerned epistemic community (codebook writing), but it is in relationship with other communities (of *practice*) because relevance is needed in a larger sense.

-
3. The *landing*: redesigning the idea in order to make it understandable within current economic and social structures. This means an important effort in terms of relevance and the recruitment of institutional actors like firms, public organisms, local administrations, etc. Of course markets are targeted at this phase, either for addressing existing demand or for market creation.

In the preceding analysis we observe the whole range of actors contributing to the creativity in terms of novelty and relevance. We want to address also our third factor: where is the will factor manifested in the production of the breakthrough innovation?

1.4 Beyond the process of ideation: the entrepreneurial spirit

During the first phase of the process presented by Cohendet et al. (2010) it is evident that the role of individuals is essential: Pasteur, Edison, Picasso, Leary, Zuckerberg, etc. are not only gifted persons, they have a vision and want to change the world (or the representation of the world).

In the second phase, we observe a very complex collective construction, involving chains of translation and adaptation of ideas among and between several communities. But here again, motivation is essential because the transformation of cognitive routines is always painful and costly. Learning a new language is a real investment (exploration) to be done before it is possible to use it (exploitation). Many individuals and organizations must contribute to this process and the final success is not possible without their commitment. This is the reason why certain breakthrough innovations can only start in certain places, where cultural parameters in particular play an important role.

As mentioned above, Alfred Marshall explained the emergence of major innovations in specific geographical locations like Manchester, and he considered the local culture as a fundamental factor of success provided by the system to the entrepreneurs. All the literature on industrial districts, innovative milieus and other sorts of clusters proves the importance of specific entrepreneurial spirit. The specialization of territories can of course be explained by static factors (natural resources, infrastructures, labor cost, etc.) but it is also necessary to introduce cognitive assets. A part of the latter territorial characteristics belong to the field of knowledge economics (educational level and training experience of the population, localized knowledge spillovers from universities, etc.) but a part cannot be explained without taking into consideration the general entrepreneurial spirit (in Max Weber's sense) and the specific "appetite" of the local population for certain forms of ventures. Héraud (2011) for instance explains how common cultural roots and historical heritage influence the way creative cities can develop in specific territories (even across contemporary national borders and linguistic barriers in the case under consideration).

In the third phase (the *landing*) the role of institutions and organizations is essential. Small and large firms play their natural role in the development, the organization of the production and the access to markets. Smaller ones are sometimes more flexible for exploring breakthrough innovative solutions. Larger ones can help valorizing innovation thanks to their posi-

tion of global players and access to financial means. But in every case nothing will be possible without the personal enthusiasm of some individuals in those organizations. Since creative ventures are not measurable in terms of calculated risk (no previous experience implies not objective probability function of financial returns), it is not a bankers' job to invest in such projects as Schumpeter would say... For policy makers, the situation is similar: the ordinary bureaucrat or politician will not accept projects in a situation of radical uncertainty, but visionary people in local governments can convince their hierarchy or the electors and taxpayers to support a revolutionary idea that could become the icon of the region.

The complex mechanisms of territorial creativity we have described here, associating the individual personality with institutional and organizational settings, is more realistic than the Florida (2002) model of exogenous development through the attraction of "talented" individuals. We must look at the creative behavior in complex social systems in order to achieve better policy and management recommendations.

2 Analyzing creativity with the help of the *effectuation* theory of entrepreneurship

As underlined in the preceding section, innovation is an economic creative phenomenon that cannot be seriously considered in a theoretical model based on the principle of equilibrium. As a consequence, methodological tools derived from the optimization paradigm are very difficult to apply. The assumption of perfect knowledge is not applicable, even using probabilistic functions since innovation is more *uncertain* (F. Knight concept of radical uncertainty) than *risky* (in the sense of computable risks analyzed in finance and insurance). Furthermore the principle of "methodological individualism" does not apply, the actor of innovation being embedded in a complex systemic setting. Innovation - at least radical innovation - is by definition out of equilibrium and looks more like the emerging property of the system than the result of individual behavior in a purely rational framework.

Starting from such a premise the approach initiated by Herbert Simon and James March seems to be the only relevant theoretical framework. Innovation is an *exploratory* activity of organizations and the only sort of optimization we can consider is to look for an acceptable compromise between exploration and exploitation, as described in March (1991) when presenting the organizational *ambidexterity*. On the basis of the great forerunners of the theory of organization, Sarasvathy (2001a; 2001b) proposed an interesting view of entrepreneurial activities (project management) in situations where ordinary linear methods like optimization of means in view of a given goal cannot apply. The relevant approach, effectuation, is a good model for describing the action of the entrepreneur facing a radical strategic change.

The effectuation theory represents a paradigmatic shift in the way to understand entrepreneurship as well as other forms of radically creative activities within (and between) existing organizations. It is nevertheless at a "nascent" or "intermediate" stage of development as

showed in Perry et al. (2012) and needs more empirical texts. We hope to contribute a little to this research agenda with our studies of KIBS and Knowledge Angels (see Section 3.).

Let us remind the basic definitions of causation and effectuation. In causal approaches of project management, "*the focus is on achieving a desired goal through a specific set of given means. Causation invokes search and selects tactics and underlies most good management theories*". In the effectuation framework, "*the focus is on using a set of evolving means to achieve new and different goals. Effectuation evokes creative and transformative tactics. Effectual logic is the same name given to heuristics used by expert entrepreneurs in new venture creation*" (Read et al., 2011, p. 7).

As summarized by Perry et al. (2012, p. 839), the effectuation vs causation approach is about: (1) starting with the means instead of the goals; (2) focusing on affordable loss instead of expected returns; (3) emphasizing strategic alliances and pre-commitments instead of competitive analysis; (4) leveraging environmental contingencies instead of exploiting preexisting knowledge; (5) seeking to control an unpredictable future instead of trying to predict a risky future. The first two points are shared with models of research in creative organizations like Mintzberg's *adhocracies*. The fourth point is related to the notion of *serendipity*. The third and fifth principles are the same as in foresight methods like the French school of *prospective* (perspective futures developed in the 1950's by Gaston Berger, the founder of future studies in France; see also Godet, 1994).

2.1 Approaching the global rationale of creative activities

We have to underline some logical link between two pairs of opposites in the following traditions: *exploitation/exploration* (March, 1991); *effectuation/causation* (Sarasvathy, 2001a; 2001b); *novelty/relevance* (Sternberg, 2008). In exploration activities, the aim is to discover and analyze novelties, and the philosophy of action is causation. In exploitation activities, assessing relevance is at the core of the business and the philosophy of action is causation. We sum up in Table 1 some characteristics of both worlds: the world of optimization rationality and the world of breakthrough creativity.

In the *causation* process, which is the regular way to set up a project, the goal is well known and therefore the effect is given. Means are organized in a way to achieve the goal in the most efficient way. Causal links must be clear; then if the problem is clearly formulated and if we have a good knowledge of the lines of causality (technological knowledge), we find an optimal solution. This is the typical "problem-solving" attitude of the engineer. The cognitive process is linear in a sense that the sequentiality between the design of goals and the design of the means is respected. The engineering solution, if it is possible, will be perfect in the sense that it expresses absolute rationality. Of course the realization can be less perfect because other elements interfere during the implementation phase.

In the *effectuation* process, goals and means are not sequentially organized. Very often, goals are learned along the discovery path of the project. The general direction is known but aims

are not fixed at the beginning in full details. In fact, the project starts more from the existing means (assets, knowledge, competences...) and the process explores possible futures on the basis of rare means. Nobody looks for completeness in the set of solutions proposed at the beginning of the project. Ideas will appear along the process and rational validation is more a question of experimentation than initial calculation.

It is clear that the *effectuation* approach of project management reminds Mintzberg's observations concerning the unstructured nature of incremental decision making and the *garbage can* model of Cohen et al. (1972). It is the typical context of research organizations... and certainly less typical of mining industries. Nevertheless, in every organization, exploration phases are needed at certain periods of their life, and in such phases managers start decision making from the solution side as well as from the problem side.

Table 1: Some characteristics of the world of optimization rationality and of the world of breakthrough creativity

<i>Optimization rationality:</i> <i>Exploitation, relevance, causation</i>	<i>Breakthrough creativity:</i> <i>Exploration, novelty, effectuation</i>
realization	imagination
implementation	design
efficiency	curiosity
planning	serendipity
selection	variation

Sarasvathy's model does not confront two strictly alternative ways of organizing a project. It is mainly a theoretical distinction. In concrete projects, the two philosophies of action can be simultaneously or sequentially used. Nevertheless it is very important to have this distinction in mind. Creative management, particularly in deliberate exploration programs, must be mainly inspired by the effectuation model. Reminding our conception of creativity founded on three factors (novelty, relevance, will), we must now compare the attributes of both philosophies of action.

2.2 Effectuation as a creative attitude

Contrasting causation and effectuation, Sarasvathy (2001a, p. 251) looks first at different aspects of the decision-making selection criteria. Causation processes help to choose between means to achieve a given effect, whereas effectuation processes help to choose between possible effects that can be created with given means. Therefore, in the first case a relative *novelty* is expected in terms of technical or organizational ideas, but in the second case the stress on *novelty* is more important since it aims at the future goals. Another aspect mentioned by the author is the type of outcome: market share in existing markets (through competitive strategies) in the case of causation; new markets (created through alliances and other corporative strategies) in the case of effectuation. The degree of novelty is obviously higher in the second case.

The selection criteria are based on expected return in the causation processes, and more on affordable loss or acceptable risk in the effectuation processes. Therefore, the *relevance* factor seems to be stricter in the causation than in the effectuation approach.

Concerning the *will* factor, the effectuation processes require a very strong commitment of the leaders. The underlying logics concerning the future are the following: on the causation side the organization focus on the *predictable* aspects of an uncertain future; on the effectuation side the focus is on the *controllable* aspects of an unpredictable future. Predictability is about knowledge; control expresses more the willingness and the entrepreneurial spirit. Sarasvathy also underlines the fact that the ideal context of the two approaches of project management is natural situations for causation and human action for effectuation.

3 Implications for management and policies

This section attempts to provide, in a first step (3.1), an exploration of the dimensions constituting the will factor with regard to innovation and creativity. In a second step (3.2), we try to characterize the will factor as a creative response along the three dimensions. We illustrate the issue with various examples corresponding to different scales of observation. In their concluding comments, Woodman et al. (1993) explain that theorists tend to avoid multilevel research because of their theoretical orientations, and because of methodological problems in aggregating data across different levels of analysis. We modestly consider separately the case of individual creativity with knowledge angels, the group creativity with startups and the organizational creativity at the level of territorial policy. We nevertheless keep in mind that these levels are in constant interaction - in the sense of Woodman's interactionist perspective on creativity.

3.1 What can be learned about the will factor from a management perspective?

Considering the elements discussed in the two previous sections, we argue that the issue rose by the will factor can be helpful for a better understanding of creativity and innovation management. Here management can be understood in a broader perspective, *i.e.* not restricted to companies only (as it will be shown in section 3.2). The will factor need to be analyzed under several aspects: the desire to act (whatever the positive and negative outcomes that can occur), the decision making process of actors who are not "maximizers" in the sense of mainstream economics and finance; and the types of human competencies that fits to this model.

As underlined in section 1., the economics of innovation cannot just be an application of the economics of knowledge, and the creative response of the entrepreneur (in Schumpeter's sense) involves desire and imagination. Therefore the core dimensions of what we call the "will factor" involve specific cognitive attitudes more or less linked with tacit knowledge (competencies) but also the meta-knowledge of decision-making in very incomplete information and above all the desire of action. The creative organization is characterized by struc-

tures and rules that support the *imagination*, but also the *willingness to act*. Bureaucracy and vertical organizations are of course bad contexts if the aim is to support an entrepreneurial spirit among the members of the organization.

Pushing employees out of their comfort zone is sometimes given as a recipe for boosting creativity; it can work if applied to optimistic and resilient persons, but could lead to negative outcomes like burnout syndromes if the organization still remains hierarchical at the same time (applying strict controls and asking for short run results). In the framework of Sarasvathy's approach of entrepreneurship, we find a better understanding of the role of constraints. Indeed, "studies show that constraints increase creativity" (Read et al., 2011), but the "entrepreneurial response" is mainly a way to use contingencies as resources (ibid, p. 144). This idea is typical of the *effectuation* attitude, where contingencies help to trigger a creative process through the exploration of possible futures, on the basis of this new information. To sum up the possible reactions: contingencies could be felt as obstacles or at least unnecessary elements (events, information, people...) found on the way of the actor if the latter is particularly passive or stubborn; it induces an adaptive response within existing cognitive framework if the actor is reactive; it can push the actor out of his/her box (the "heroic response"); or can be used "to leverage the revised box in a new direction" (ibid, p. 144). In Sarasvathy's vision, even negative contingencies can be turned into positive forces in a person's entrepreneurial career, and it doesn't necessarily mean to start a strategy completely from scratch, but to consider the new situation as an additional source of inspiration.

Creative people have a strong preference for freedom and not necessarily a strong one for money. As expressed in Sarasvathy (2001b), where she develops her theory of "entrepreneurship as economics with imagination", the entrepreneurial spirit is not about optimizing ROI under stochastic conditions, but about freedom: "it is not that the entrepreneur loves risk, it is just that he loves independence (or some other value) more than security (op. cit., p. 5). Concerning the decision-making, it is important to focus imagination on potential success, and not on the objective of lower probability of failure. The author explains that the creative entrepreneur accepts to "plunge" into a world of success and failures. Conversations with entrepreneurs show that "the entrepreneurial experience is composed of the temporal steam of the varying degrees of success and failures" (ibid). Therefore intrapreneurship becomes "the art of learning to outlive failures and cumulate successes over time" (ibid). Creative persons can have some sort of fun in overcoming difficulties, because it is part of the game. The worst for them is life without surprises – obviously not the theoretical vision of the rational economic agent in mainstream economics.

At the light of the previous analyses, we propose the following description of the management of creative activities. The creative attitude is analyzed along three dimensions affecting the "will factor": (i) desire and determination; (ii) decision making; (iii) competencies and skills. Table 2 displays some keywords linked to these issues, opposing the situations and characteristics that seem supporting (incentives) or unfavorable (hindrances) to the creative attitude. We try to illustrate here Woodman's interactionist perspective: "*creativity is the complex*

product of person's behavior in a given situation. The situation is characterized in terms of the contextual and social influences that either facilitates or inhibit creative accomplishments" (Woodward et al., 1993, p. 294).

Table 2: Managing the will factor, some examples of incentives and hindrances

<i>Core dimensions affecting the will factor:</i>	Incentives	Hindrances
<i>(1) Desire & determination</i>	<ul style="list-style-type: none"> • Pushing out of the comfort zone • Freedom over money • Diversity of the population (co-workers) 	<ul style="list-style-type: none"> • Hierarchy and bureaucracy • Money over freedom • Corporate clones and cast system
<i>(2) Decision making</i>	<ul style="list-style-type: none"> • Right to fail • Garbage can model 	<ul style="list-style-type: none"> • Employee of the month • Benchmarking
<i>(3) Competencies & skills</i>	<ul style="list-style-type: none"> • Experimentation and fun factor • Curious minds 	<ul style="list-style-type: none"> • Need for hyper specialization • Rational minds

In the following, we intend to provide illustrations of what can be observed if one considers the introduction of the will factor as one of the keys of creativity management. In order to show the broad spectrum of possibilities we deliberately choose heterogeneous examples at different scales, *i.e.* individuals, companies and territorial levels.

Successes and failures help to explore the potentialities, rather than exploiting known recipes or benchmarking external experiences. James March (1991)'s model of *ambidexterity* expresses the idea of finding in the management of organizations the relevant balance of exploration and exploitation. The creative firm needs a minimum of exploration and therefore it needs some diversity in the human resources (but only rational minds but also curious minds, and a variety of competencies). Globally, the success/failure trajectory of the entrepreneur described by Sarasvathy looks like a "garbage can" model of activity in the sense of March, not the perfectly planned strategy.

3.2 Transposing at various scales the effects of the will factor as a creative response

We aim here at describing the role of entrepreneurial spirit in the three dimensions of the will factor for the innovative response at three levels of the system: the individual level with the case of Knowledge Angels; the firm's level with the case of the startups; and the macro level of innovation policies.

The first example deals with *knowledge angels* (cf. Table 3). According to Muller et al. (2015), knowledge angels can be defined as creative individuals fostering innovations in KIBS (Knowledge-Intensive Business Services). As such, knowledge angels display several key characteristics that are different from what is commonly observed on "average" employees.

Knowledge angels are (or may be) specific individuals, who:

- typically act as consultants (but not necessarily exclusively);
- may have the talent to "sense" (feel, detect) things before they happen, or make them happen (from the subjective point of view of an external observer);
- make a difference in the way knowledge is created, organized and flowing within the firm and between the firm and its partners.

Table 3 shows some characteristics of knowledge angels (KA) from the perspective of the constitutive dimensions of the will factor as a creative response leading to innovation. The dimension of desire and determination is of course strongly developed at such creative people, but it is particularly oriented to collective activities: in the interviews, the KAs expressed their willingness to support coworkers. Since the success/failure process is not a 0-1 variable, as described in Sarasvathy (2001b), and because assuming the unavoidable constrained sequence of positive and negative experiences as part of the entrepreneurial game, the "fun factor" appears essential.

Table 3: The case of knowledge angels as an illustration of the individual level

<i>Core dimensions affecting the will factor:</i>	KNOWLEDGE ANGELS
<i>(1) Desire & determination</i>	<ul style="list-style-type: none"> • Search for freedom and self-expression of own creativity • Willingness to support co-workers • Fun factor
<i>(2) Decision making</i>	<ul style="list-style-type: none"> • Based on intuition, visions and conceptual leaps • Strong interaction with other people, patchwork of opinions
<i>(3) Competencies & skills</i>	<ul style="list-style-type: none"> • Curiosity and multi-expertise • Ability to navigate between different worlds (separated epistemic communities) and to convince conceptually distant partners

Decision making is generally far from the linear model of causation: intuition and imaginative conceptual leaps are typical cognitive elements of the process. The most required competences are curiosity and multi-expertise since KAs must connect different worlds in order to create almost improbable new crossings of ideas, like in the model of Arthur Koestler described by Cohendet (2016). Koestler coined the term "*bisociation*" in order to make a distinction between "the routine skills of thinking on a single 'plane', as it were, and the creative act, which (...) always operates on more than one plan" (*op. cit.* p. 621). KAs constantly cross planes.

Let us now consider the firm's level with an analysis of the creative characteristics of the startups. According to the abundant literature devoted to start-ups and innovation (see for instance Freeman and Engel, 2007), it is possible to put forward some elements corresponding to the three dimensions we use for charactering the will factor as a vector of creative response (see Table 4).

The willingness to create new artifacts, processes of services is of course at the basis of such firms. Survival is a constant issue, and therefore long run planning in a causation approach is not possible. Decision-making is mainly a trial and error process. Startups must also make their choice under market pressure and in a situation of scarcity of resources (the typical effectuation process following Sarasvathy's description). Such firms strongly rely on individual values, and the governance cannot be easily adapted to the world of financial capitalism. Therefore financing schemes are very specific as well as the needed competences. Serendipity plays an important role also in terms of financing.

Table 4: The case of start-ups as an illustration of the company level

<i>Core dimensions affecting the will factor:</i>	START-UPS
<i>(1) Desire & determination</i>	<ul style="list-style-type: none"> • Willingness to create something new • Pushing forward things never made before • Survival
<i>(2) Decision making</i>	<ul style="list-style-type: none"> • Trial and error • Choosing under high-market pressure and scarcity of resources
<i>(3) Competencies & skills</i>	<ul style="list-style-type: none"> • Entrepreneurship, especially ability to identify oneself to the company created • Ability to attract the right people and the right financial resources at the right time

The third example focuses on a relatively recent development in policy making on territorial level (as opposed to national level). It concerns *smart strategies* and *entrepreneurial discovery processes* as strategies for regional development. The core idea of smart specialization urges the entrepreneurial forces of a region to take action and define the role of policy as that of a moderator (Foray et al., 2011). The wording "entrepreneurial discovery" seems to be borrowed from the Austrian economics (cf. Section 1.2) and Hayek is quoted in Foray (2015, p. 25), but here, the precise meaning is the following : the entrepreneurial discovery process "is basically economic experimentation with new ideas", the latter coming to a great extent from scientific discoveries or technological inventions, but it is linked to the more general notion of "entrepreneurial knowledge": knowledge about market growth potential, potential competitors, and "the whole set of inputs and services required for launching a new activity" (ibid, p. 25).

Additionally the concept underlines the idea of specialization: since regions cannot do everything in terms of developing science, technology and innovation, they have to focus on specific (carefully chosen) domains. In other words, regions should not try to imitate each other but develop distinctive areas of specialization and then strategically concentrate their policy efforts on those "smart specialization domains". In this respect, S3 (which stays now for Smart Specialization Strategies in the European Commission slang) is examined in Table 5.

The will factor plays an evident role in such territorial strategy. If properly understood S3 regional exercises are not bureaucratic top-down analyses defining a priori opportunities and

relative strengths, but interactive processes with local entrepreneurs. In this approach the most interesting factor of potential creative development is the existence of people who have visions for the territory and are ready to invest their time, individual energy and economic means into new projects. Such actors of the territorial development are not necessarily pure internal actors, the important thing is to have a project *for* the territory. As underlined by Dominique Foray, starting an entrepreneurial discovery process is particularly crucial for regions that are not among the well-developed regional innovation systems, and in this case it is often very relevant to link local innovation activities with big partners out of the territory. It helps avoiding lock-in situations and to reshuffle the cards by allowing new combinations of resources.

The entrepreneurial discovery process means more than the selection of existing well-known technological or sectoral opportunities, it is an evolutionary mechanism with experiences spread across time like in the effectuation theory. Therefore decision-making needs the willingness of individual action, instead of bureaucratic and causal selection processes.

The administrative skills should be completely transformed, because the issue here is to reveal potential entrepreneurs, to help regional actors developing new forms of cooperation, to create confidence and optimism. Such catalytic role is at opposite of classical interventionist policy culture.

Table 5: The case of S3 as an illustration of the regional level

<i>Core dimensions affecting the will factor:</i>	EU Smart Specialization Strategy
<i>(1) Desire & determination</i>	<ul style="list-style-type: none"> • Pushing forward new ways of territorial development • Avoiding lock-in situations and/or declining trends at regional level • Reshuffling the cards in allowing new combinations of resources
<i>(2) Decision making</i>	<ul style="list-style-type: none"> • Entrepreneurial discovery process (in the meaning of Foray et al.) • Evolutionary selection between techno-scientific and sector-related fields
<i>(3) Competencies & skills</i>	<ul style="list-style-type: none"> • Convincing the (mostly) regional actors to adopt new forms of cooperation • Creating confidence and policy support in the process of emergence of (mostly unexpected) ideas

Conclusion

In this paper devoted to the analysis of creative management at various levels, we have started by a review of classical theories concerning economic change and innovation, in order to provide an endogenized framework explaining creativity as an emerging characteristic of complex systems. The complexity specifically arises through the interaction between different levels (how individuals are forced by the macrosystem to find innovative response, and how in return their behaviors transform the system) and different organizations (with the role of specific individuals able to carry and translate ideas between heterogeneous cognitive settings).

We summarized several approaches of creativity from the (interdisciplinary) literature, by a three dimensional model: every act of creativity involves *novelty* and *relevance* of the basic idea, plus the *will* factor of the microeconomic actor who has to carry the project. The latter dimension is closely related to the notion of entrepreneurship. The *effectuation* theory, developed in the framework of entrepreneurship studies, helps to understand the general philosophy and the concrete procedures that are typical of creative ventures: firm's creation as well as innovative management of existing firms, or public policies like territorial "smart specialization strategies". It is important for the understanding of the endogenous process of innovation to analyze the will factor not only as an individual phenomenon, but as the result of individual characteristics in interplay with environmental factors: organizational features, social routines, public policies.

Examining how the will factor is determined by structural, sociological and cultural patterns that either hinder or promote creativity, we hope to have provided some managerial and policy implications from the theoretical framework. Precise policy recommendations were not the aim of this paper, but some general elements can be discussed, in the same perspective as Muller et al. (2013) where we considered several instruments for innovation-driven regional policies. In creative public policies, like in creative firm's management, the solution-oriented regular philosophy must be at least complemented by a problem-driven approach inspired by the effectuation theory. Expecting the non-expected is a more creative attitude than implementing planning procedures. Intrinsic motivation of creative individuals must not be spoiled by excessive financial incentives, controls, and division of labor. The will factor is precious and it goes along with the fun factor.

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