Entrepreneurial activities are intricately linked to innovation and competitive advantage. Without opportunities entrepreneurial activities cannot take place. Many researchers therefore focus on the nature and drivers of opportunities, i.e. whether opportunities are discovered (Kirzner, 1997; Alvarez, Barney, 2007) or created (Lachmann, 1986; Garud, Karnoe, 2001) and how they are exploited. These studies have drawn from a variety of theoretical perspectives (Short et al., 2010), and have emphasised the differences of the two views in terms of epistemology (Alvarez, Barney, 2010) historical roots, the nature of the entrepreneur and the characteristics of the knowledge involved in the opportunity formation process (Alvarez et al., 2013). In this line, several studies have emphasized theoretically how insights from knowledge management (KM) can help to understand the learning processes associated with opportunity discovery and creation, showing that entrepreneur’s ability to discover, create and successfully exploit opportunities is closely related to their cognition (Gaglio, 2004) and mode of learning (Corbett, 2005; Bingham et al., 2007). The central argument is that the main two types of knowledge – technical and market knowledge – that affect the opportunity process are based on the existence of learning asymmetries – i.e., individuals acquire and transform their experiences and learn in different
ways (McKelvey, Lassen, 2013, p. 20). Technical and market knowledge are viewed as drivers of opportunity capture, while successful accumulation and mobilisation of knowledge depend on the entrepreneur’s cognitive representations, behaviours, past experiences and social capital.

However, few studies empirically investigate this relationship between KM processes and entrepreneurial opportunity formation. We assume that the context in which the entrepreneur is embedded also influences both the type of knowledge issued and mobilised by the entrepreneur and the type of opportunity whether discovered or created. This call for a greater understanding of the formation of entrepreneurial opportunities by looking at how entrepreneur’s KM processes and the context in which they are embedded interact and mutually impact opportunities. Investigating entrepreneur’s KM processes in specific contexts can offer a more profound contribution to the field of Entrepreneurship.

Our particular interest is to explore empirically the formation of opportunity creation and discovery through the entrepreneur’s KM processes in specific contexts. Thus, the main purpose is to contribute to the Entrepreneurship literature in two ways: by explaining (i) why entrepreneurs in different settings are creating or discovering opportunities (ii) and in each setting, how knowledge is used in different ways. We will illustrate through two case studies of entrepreneurs in two clusters showing how these entrepreneurs use knowledge to form and exploit innovative opportunities. In this investigation we articulate three complementary approaches; those of knowledge management, entrepreneurship, and clusters.

Section 1 will briefly introduce an analysis of the relevant literature in localised knowledge management and the debate about the creation of versus the discovery of opportunities. Section 2 presents the research design of this study and details the methodology. The two cases explored are presented in Sections 3 and 4, showing how entrepreneurs use inputs from their environment in their knowledge management processes and how that in turn forms entrepreneurial opportunities. Section 5 presents the discussion, conclusions and implications.

ENTREPRENEURIAL OPPORTUNITIES IN GEOGRAPHICAL CLUSTERS: A KNOWLEDGE-BASED VIEW

In this section, we present the three approaches we aim at articulating to understand why entrepreneurs in different settings are creating or discovering
opportunities using knowledge in different ways. First, we present the debate over entrepreneurial discovery and creation. Then, as the context in which the entrepreneur is embedded is assumed to be highly influential, we present the question of localised context. Finally, because we investigate the formation of entrepreneurial opportunities by looking at entrepreneur’s KM processes, we define these KM processes.

### Formation of entrepreneurial opportunity: creation versus discovery

Opportunities are a condition to entrepreneurship. Although entrepreneurship literature has a series of debates about whether opportunities are discovered or created (Alvarez, Barney, 2007; Alvarez, Barney, 2013), one main definition of opportunities is accepted: “Entrepreneurial opportunities are those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production (Shane, Venkataraman, 2000).

In the view of ‘discovered’ opportunities, opportunities exist, and some individuals and teams can more quickly identify and act upon them, based on the possession of prior information necessary to identify an opportunity and on the cognitive properties necessary to value it. These are often called Kirznerian opportunities. This type of opportunity is described as a potentially profitable situation that is “readily available” (Kirzner, 1997, p. 72). The opportunity exists in the external world waiting to be discovered (e.g. Baron, 2007, Casson, Wadeson, 2007; Barreto, 2012, p. 358). In this perspective, opportunities have two main characteristics: the context at their source is considered to be independent of actors’ efforts (e.g. Shane, 2003; Shane, Venkataraman, 2000); and the ability of actors to anticipate possible outcomes associated with the opportunity as well as their probabilities (Barreto, 2012, p. 358). This is the reason why the discovery perspective typically focuses on contexts where the information generated by the exogenous shocks enables the estimation of the opportunity’s expected value (Shane, Venkataraman, 2000).

In the view of ‘created’ opportunities, opportunities do not exist a priori but come together through the actions of entrepreneurs. These are often called Schumpeterian opportunities. Within the creation view, opportunities don’t exist in the external world. They are endogenously constructed through entrepreneurs’ actions and reactions, and can be different from existing markets or industries (Alvarez, Barney, 2007). Opportunities that are created are characterized by the fact that they do not exist independent
of entrepreneurs’ perceptions and actions (Weick, 1979). Entrepreneurs iteratively try to form different ways to combine what they have at hand (Baker, Nelson, 2005). They create (rather than discover) opportunities as part of the entrepreneurial process (Sarasvathy, 2001; Barreto, 2012, 360); and as far as they don’t exist prior to the entrepreneur’s actions, it is difficult to anticipate the opportunities’ possible outcomes (Alvarez, Barney, 2007). In other words, the would-be entrepreneur starts the creation process ‘without any certainties about the existence of a market or a demand curve, let alone a market for his or her product’ (Sarasvathy, 2001, p. 249).

This article’s aim is not to solve the debate whether opportunities are discovered or created. Rather, we want to contribute to this literature, based on the characteristics of each opportunity type described above, by showing empirically that there are contexts where opportunities are discovered and some contexts where they are created. And, in each situation, we analyse how entrepreneurs mobilise their KM processes and we suggest implications on entrepreneurial processes.

**Entrepreneurial opportunities in localised contexts**

Entrepreneurial opportunities rarely emerge alone. They are part of a larger socio-cultural environment, and a large part of their discovery or creation depends on entrepreneurs’ ability to shape, reshape, and coexist with their environment. This calls for very important individual abilities on the part of entrepreneurs to exploit networks in order to discover, create, and successfully exploit opportunities, in turn emphasising the importance of their environmental context and social embeddedness. According to Granovetter (1985, 1992), embeddedness refers to the fact that “economic action and outcomes are affected by actors’ relations and by the structure of the overall network of relations” (Granovetter, 1992, p. 33). As He (2006) highlights, by stressing structural embeddedness, Granovetter (1992) argues that not only personal relations matter, but also the structure of the overall network of relations.

Within geographical clusters, structural embeddedness can help explain how particular network structures can lead to mutually adaptive learning processes, with consequences for opportunity discovery and creation. Clusters are here defined as processes of spatial concentration of business and/or other organizations involved in a core activity, which are based on local interactions between actors and/or based on factors that enhance the number of firms at a faster rate than elsewhere, and which may, but need not, involve the exchange of knowledge in network settings (Maskell, Lorenzen, 2004, p. 168). Within the cluster, the rich history of social interaction
generates multi-level relationships between individuals and organizations, which link actors in multiple ways, offering a great deal of channels through which information is transmitted from one end to another (Uzzi, 1997). Over time, an “information and communication ecology” (Bathelt et al., 2004), or ‘buzz’ to use the terminology of Stoper and Venables (2002), is formed in which information and knowledge is transferred with high velocity and is continuously updated.

The environmental context and social embeddedness of entrepreneurs are thus particularly important elements to be considered when exploring the link between KM processes and entrepreneurial opportunities, but a limited number of empirical studies investigate this link.

**Knowledge management processes: a definition**

There is a lack of empirical research linking KM processes, entrepreneur’s environment and opportunity formation. The objective of this section is to define knowledge management and its main processes, in order to describe through the cases presented in the next section how they unfold in specific localised contexts, and how this has an influence on the nature of opportunity formation.

KM consists in the creation, sharing and application of knowledge as the main strategic resource (Spender, 1996; Grant, 1996). An extensive literature has argued that effective KM processes may contribute to better performance and are an important determinant of innovation: companies that are able to create, manage and apply knowledge have a competitive advantage (Nonaka, Takeuchi, 1995; Desouza, Evaristo, 2003; Hall, Andriani, 2003; Rademakers, 2005). Hung et al. (2010) demonstrates that an organisation that learns is an organisation that innovates, and has superior capability to implement new ideas, processes and products (Burns, Stalker, 1966; Hurley, Hult, 1998). There is also empirical evidence of the positive impact of learning and knowledge creation on innovation results (Kessler et al., 2000).

In addition, innovation management literature has defined that innovation is traditionally based on two types of knowledge: technical knowledge and market knowledge.

Technical knowledge refers to knowledge usually developed through science and R&D about skills required to operate particular technologies. Technical knowledge is the amount of within-field knowledge a firm possesses (Prabhu, Chandy, Ellis, 2005). Besides the technical aspect related to the depth of knowledge of a field, technical knowledge is also described as having a complex aspect as it reflects the degree to which knowledge
consists of many different, unique, and interdependent elements; such that knowing how one element works reveals little about how the different elements work together (McEvily, Chakravarthy, 2002).

Market knowledge refers to understanding the nature of market demand and the organisation of market resources in response to market opportunities and trends (Dodgson et al., 2013). It refers to the firm’s knowledge about its customers and competitors (Day, 1994).

Possessing market knowledge implies that a firm correctly identifies, collects, and uses information about customers and competitors. Market knowledge is also characterized by complexity related to the level of sophistication a firm has concerning its customers and competitors. The level of sophistication refers to the degree to which the firm is able to link the unique and interdependent relationships among the factors that describe key issues about customers and competitors. This knowledge of the interdependencies of elements such as customers’ needs, behaviours, and preferences and competitors’ products and strategies indicates that a firm has a deep understanding of its market.

There are several definitions of Knowledge Management in the literature. Bratianu and Orzea (2012) show that KM is a field of organizational processes focused on integrating and using intangible resources (knowledge) for efficient value creation. This field’s development can be divided into three phases. At first the aim of KM was to unfold knowledge to achieve objectives, but the knowledge was considered as given (Davenport, Prusak, 2000; Kermally, 2002, McElroy, 2003). In the second phase, the focus of KM was on knowledge creation and on knowledge embedding in products and services. The focus of KM was therefore the integration between knowledge demand and knowledge supply within a knowledge life cycle (Nonaka, Takeuchi, 1995; McElroy, 2003). In this perspective, KM eventually refers to designing an organizational environment that stimulates the acquisition and sharing of knowledge. In the third phase, KM integrates perspectives offered by operational management and strategic management, meaning a new mindset came about where KM could be integrated into organizational culture and linked to innovation management.” (Davenport, Prusak, 2000). In this sense, KM is a process of creating, acquiring & sharing and applying knowledge within and between firms in order to innovate (Darroch, 2003).

In this study we adopt this latter definition that defines KM as “a process of creating, acquiring, sharing and applying knowledge within and between firms in order to innovate” (Darroch, 2003) and we will briefly define each of the 3 KM processes in order to empirically investigate on the relationship between KM processes and entrepreneurial opportunity formation in our case studies.
Knowledge creation relates to the source of knowledge. It is the outcome of an active and constructive process in which an actor draws upon prior knowledge and experience to extract new information (Boisot, Canals, 2004). The creation of knowledge has two main sources: 1) intentional through trading, licensing, or – in the case of joint ventures, mergers, or the creation of subsidiaries; 2) unintentional through spillovers from the territory: including specificities of the history of the environment and industrial sectors characteristics.

Knowledge acquisition and sharing relate to the mechanisms, through which knowledge is accessible, gathered and transmitted. Knowledge can be acquired from diverse sources: from firms in which the employees have worked and moved, from networks built through clubs and associations, or through collaborations and interactions between suppliers and customers (Voon-Hsien et al., 2013). Knowledge sharing is defined as the accessibility to knowledge and information among organisational members (Ng et al., 2012). It is essential to share knowledge of individuals within and between organizations in order to be able to transform the obtained knowledge into competitive advantage (Kogut, Zander, 1992; Conner, Prahalad, 1996; Grant, 1996; Spender, 1996). Sharing consists of both donating and gathering knowledge.

Finally, knowledge appropriation and effective use means that a firm mobilises the different types of information it has access to in order to innovate. Dove (1999) further added that the faster a firm responds to customer information, the higher the overall customers’ satisfaction will be. Therefore, the successful application of knowledge is represented by both quality and timeliness of the response.

Therefore, based upon this brief literature overview of knowledge management processes, three key dimensions are identified: 1) Creation and source of knowledge; 2) Knowledge acquisition and sharing; 3) Knowledge appropriation and effective use. We will draw upon these 3 KM processes to compare two entrepreneurs in how they use the input from their environment in a case of opportunity creation and in a case of opportunity discovery.

RESEARCH DESIGN

Research setting

The paper has the objective to analyse how entrepreneurs – in the context of different types of entrepreneurial opportunities (discovered and created)
– use the input from their environment in their knowledge management processes. Such investigation requires a context able to provide fine-grained insights.

In this perspective we used two cases of entrepreneurs located in two proximate regions in France that benefit from the same supporting public policy for innovation, but where the patterns of entrepreneurial activities strongly differ. From one common institutional context two differing dynamisms emerge. These are the Nice-Sophia-Antipolis cluster operating in the ICT sector (mainly software, telecom, and microelectronics design) and Marseille cluster operating in the microelectronics (fab) sector.

These two clusters have features that have made them particularly suitable for this purpose. The two cases are characterised by rich entrepreneurial activity related to their history of development. The two French clusters located in the Provence-Alps-French-Riviera Region in the southeast of France were first created by the same national industrial policy but their history of development and the resulting context of entrepreneurial opportunities differ.

On the one hand, the cluster located near by Marseille, derives from the 1970’s governmental strategy to develop the microelectronic sector. Three main firms are nowadays located in the cluster: STMicroelectronics, ATMEL, and GEMALTO (former Gemplus) and constitute one of the main pool of microelectronic activity in Europe, with a focus on microelectronics “fab” (“fab” in the microelectronics industry refer to a semiconductor fabrication plant, i.e. a factory where devices such as integrated circuits are manufactured).

On the other hand, in the French Riviera, nearby Nice, a second cluster emerged in the context of the French Government’s 1980’s strategy to decentralise activities to the benefit of regions. This has given rise to Sophia-Antipolis Science Park among the best-known centres of high technology activity in Europe. Several companies operating in the telecom and computer sectors including microelectronics but only design (not “fab”), decided to locate their branch facilities on the site. They were primarily attracted by the quality of the infrastructure made available to them (Garnsey, Longhi, 1998). IBM, Amadeus, HP, France Telecom and Cadence are among others. The two clusters created ex nihilo have however evolved under the pressure of economic crisis that have conducted them to construct their own local specificities. Employees and engineers coming from large firms became entrepreneurs, in the case of Nice it was aimed to stay on the French Riviera when the branch facilities left the science park, and in the case of Marseille, it was the attraction provided by the high demand of innovative supporting
products for the 3 large firms’ fabs in the case of Marseille. From an exogenous creation they managed to become clusters with two distinct endogenous dynamics of entrepreneurial innovation.

The two cases are interesting to contrast, as they show opposite patterns in terms of development of opportunity. In the case of Marseille, as we will recall in the case findings section; entrepreneurs are *discovering* opportunities, while in Nice-Sophia-Antipolis they are *creating* opportunities. It is therefore interesting to present opposite cases of opportunities formation and how the KM processes of entrepreneurs unfold differently in particular contexts.

**Methods**

An extensive data collection underlies the two cases. The material was all in French, and the quotes below have been translated into English by the authors. The first stage of the data collection was an examination of available historical and archival material (265 pages) on all the entrepreneurs and the cluster in the whole region. These archival data were specific material on the firms, including observations and notes from industrial association meetings, project data and related information about each research project for the period 2006 to 2009 provided by the pole de compétitivité SCS, and archival data about the two « clusters » of Nice and Marseille (scientific papers, and journal articles).

The second stage for data collection consisted in semi-structured interviews with the two entrepreneurs contrasted below, members of the governance of the cluster, and experts of the microelectronic sector (fab and design), representatives of professional unions and networks as well as direct observation, informal discussions and monthly gathering in industrial associations. While we only report two cases below, the complete study (interviews, observation and archival data) included a total number of 28 semi-structured interviews, 463 pages transcribed, coded and analysed, and reported into two narratives, presented in the next section. In this paper we focused on the two entrepreneurs operating in the microelectronic sector (one in the fab and the other one in design) in the same region but involving two different local dynamics, although part of the same institutional environment of the pole de compétitivité SCS and where opposite cases of opportunities formation (one discovering and the other creating opportunities) are present. The narratives deriving from the analysis of the data are

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1. The pôle de compétitivité SCS is specialised in Secured Communicating Solutions. SCS originally standed for Solutions Communicantes Sécurisées.
structured following the three knowledge management processes: E.g. first, how the relevant knowledge was created, particularly the role of the innovation context in each case as a source of knowledge. Second, knowledge acquisition and sharing, describing how the entrepreneur was inserted in the right networks and why this helped him to capture technical and market knowledge. And finally, the narratives explain how the entrepreneur appropriated and effectively used the technical and market knowledge to set up her/his company.

**FINDINGS: KNOWLEDGE MANAGEMENT PROCESSES IN TWO CASES OF ENTREPRENEURIAL OPPORTUNITIES**

In this section, we present a pair of cases, firstly, that of the entrepreneur that has founded IVA venture in the Marseille context, and secondly, the entrepreneur that has founded TB venture in the Nice-Sophia-Antipolis context.

For each case, the findings are presented following each of the three knowledge management processes: knowledge creation, knowledge acquisition & sharing, knowledge appropriation and use. We follow the history of each cluster, to trace back how and why each characteristic of the context in which the entrepreneurs were active were relevant in their knowledge management processes and in the formation of entrepreneurial opportunity. What knowledge was created or provided by the environment and how the entrepreneurs have personally acquired, shared and how they applied them in setting-up their company.

**The creation of knowledge**

The first case focuses on IVA which is a privately held company founded in 2006 by two entrepreneurs in Marseille, nowadays counting 15 employees. The company provides security-related semiconductor design Intellectual Property (IP) and embedded software to ASIC\(^2\) and FPGA designers\(^3\). IVA Venture’s customers are semiconductor vendors and OEMs\(^4\) addressing

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2. ASIC designers are engineers that develop application-specific integrated circuit (ASIC) customized for a particular use, rather than intended for general-purpose use.
3. FPGA is a field-programmable gate array (FPGA), an integrated circuit designed to be configured by a customer or a designer after manufacturing.
4. OEM: Original equipment manufacturer (OEM) here refers to manufacturers involved in the final assembly of components before selling the product.
markets where security is a key requirement. Based on IVA founder’s case, the following describes how the progressive development of a pool of microelectronics “fab” activity resulted in several implications in terms of creation of technical and market knowledge.

One of the two founders of the company interviewed explained that he along with his co-founder created their company out of the specialisation dynamics existing in Marseille region. The Marseille region has a specific history of development derived from the French decentralisation policy of the 1980s-1990s. The policy was aiming at the repositioning and development of a dynamic pool of activity in the microelectronics sector in which some French companies were already leaders. Also, out of the objective of the decongestion of Paris region, the policy thus promoted the location of MNCs (Multinational Corporations) operating in the semiconductor sector in Southern France in Marseille and around the city where land was available. In this context, Marseille area was subject to successive waves of location of companies enhancing a dynamic of specialisation in the microelectronics “fab” sector around 3 main leader firms: STMicroelectronics, Gemplus (now called Gemalto) and Atmel. STMicroelectronics in 1996 became for the first time part of the 10 biggest worldwide microelectronics component companies. Also, in 1996, the fabless company ES2 was located in the region and converted into a fab company named Atmel nowadays. And, Gemplus, one of the three leaders, was created out of an informal corporate spin-off. The company was created to take over the smartcard activity that STMicroelectronics didn’t want to continue. Besides the fab activity, Marseille has thus specialised in the smartcard activity thanks to Gemplus.

Henceforth, the rich technical knowledge base in microelectronics fab has its origin in the implementation of these leader firms who became the pivotal actors locally. In order to develop and to sustainably maintain their activity, the 3 pivotal firms have developed a whole network of small firms revolving around them. The technical knowledge base is therefore enriched through the founding of firms, which bring new complementary knowledge to the fab process.

As underlined by IVA, the microelectronics network in Marseille was clearly revolving around the 3 pivotal actors as far as all the network members' projects are “oriented towards the success of the pivotal actors, here, towards Gemalto’s success”. The founder even tells us that once the solution he has

5. In the microelectronics industry a semiconductor fabrication plant (commonly called a fab; sometimes foundry) is a factory where devices such as integrated circuits are manufactured.
developed will be commercialized, it “will enable to improve Gemalto’s expertise in the EC and IP applications and will contribute to create knowledge about existing security vulnerabilities”.

The solutions proposed by Gemalto around the smart card (SIM cards for mobile phones, bank cards, etc.) are being used increasingly and significantly. More and more users interact with digital solutions, which also raise the question of associated security. This leads to the need for security solutions. Gemalto’s product strategy is to stimulate, encourage and support innovative solutions for security by ensuring their introduction on the market and by contributing to the standardization of the proposed solutions. The company plays a leading role in future operating results.

The founder recalls that IVA Venture was created thanks to a business opportunity that emerged with the merging of Gemplus and Axalto into Gemalto: “I had the knowledge of how to draw specific designs for Gemplus. (...) At the time of the merger of Gemplus with Axalto, the company has decided not to go on with microelectronics design activities. However, the group promised to work with me if I set-up my own design company. Since then, Gemalto no longer draws and uses IVA Venture for their designs”. Gemplus thus supported the entrepreneur right from the creation of his company to develop an activity the new group was not willing to maintain. It is somehow a tacit agreement between the founder and Gemplus: IVA Venture would be created if Gemplus accepts to be his first customer.

Here it is the market knowledge that is created in interaction between entrepreneurs and MNCs. Not only the structure of development of the area favoured the creation of technical knowledge by MNCs in interaction with SMEs, but also, the market knowledge was developed through recurrent interactions and subcontracting relations between SMEs and MNCs.

The second case focuses on TB venture which is a small firm founded in 1999 that became the leading provider of security solutions for mobile and connected devices. The company has very strong links with academia in Nice-Sophia-Antipolis and also abroad.

When tracing back the creation of technical knowledge in Nice-Sophia-Antipolis area, the TB founder claims that “through the attraction of private R&D centres and later public and private higher education and research institutes, I think that a real R&D-led environment with a lot of highly skilled researchers and qualified labour has emerged, constituting a place particularly favourable to the development of technical knowledge from science”.

Indeed, the Nice Sophia-Antipolis region also has a specific history of development. The region’s economy developed mainly around the science park of Sophia-Antipolis. Similarly to Marseille region, the government in
their decentralisation policy of the 1970’s supported the creation of Sophia-Antipolis Science Park in order to encourage economic development outside the already dynamic regions of France (Longhi, 1999). But the project itself originated from the private initiative of the Senator Pierre Laffite who launched the idea to transform the remaining vacant big forest of the Côte d’Azur into a high-technology park in the early 1970’s.

The starting point was the creation of a science park thanks to the development of a good quality infrastructure around a vacant site. The local public authorities were particularly supportive at the early stage of the project seeing it as a mean to diversify the Côte d’Azur’s economic activities, which were too much orientated towards tourism. Rapidly, the project’s main objective was to develop high-technology activities, which today we would say are following the Silicon Valley model.

Progressively, the presence of famous large firm’s R&D centres, the pleasant natural conditions as well as the efforts put into telecommunications and transport infrastructures including an international airport, attracted firms, mostly non-Europeans ones, that were willing to open a R&D facility close to the European market to be able to adapt their products to the new market. Thus, it turned out that the area attracted a number of international firms’ subsidiaries and mainly their R&D centres operating in the Information Communication Technology (ICT) field. In the middle of the 1980’s, another element contributed to the subsequent take-off of the park and its current orientation towards R&D activities: the location of public and private education and research institutes. Research institutes were attracted by the regional authorities’ strategy to promote synergies between science and industry.

The genesis of Nice-Sophia-Antipolis area resulted in a place with an academic predominance of activities that orientated the cluster towards fundamental research and research activities, which are not market-driven. As the TB founder stresses, “for academic R&D, I think there are a lot of strengths here”.

Most entrepreneurs in the region have an engineering background and set-up high-tech companies. The technical knowledge is indeed well developed through science – within the R&D centres of MNCs and new research institutes – but also thanks to the geographical attraction of the science park where skilled employees, researchers and entrepreneurs have come to develop their scientific expertise. The TB Venture’s expertise has been originally developed in academia and the managing team is still working closely with academia, including through hiring PhD students and PhDs as well as taking part in collaborative innovation projects. The founder emphasizes
the need for high skills “our employees frequently have an academic background with high qualifications; they need to be able to discuss in a complex or uncertain environment. We talk about innovation and of things that don’t exist yet. So we are no longer in an engineer scheme where we just receive specifications and develop them”. The founder highlights the importance of R&D in her company: “TB Venture insures its lead thanks to sustainable innovation (more than 60% of R&D on its equity capital) (...) I have always been doing some research and I generally work with people holding a PhD, The managerial competence needed in a company with such a positioning, is more ingrained among highly skilled employees like PhDs, as far as they have stronger links with research”.

In sum, in the case of Marseille, the successive waves of location of companies has enhanced a dynamic of specialisation where a rich technical knowledge base in microelectronics “fab” was created with the implementation of leader firms who form opportunities seized by entrepreneurs. The entrepreneurs enrich the knowledge base through the founding of firms, bringing complementary knowledge to the fab process. Market knowledge is created in interaction between entrepreneurs and MNCs. Quite differently, in the case of Nice-Sophia-Antipolis, the successive waves of location of R&D centres although creating a unique R&D-led environment with a lot of highly skilled researchers and qualified labour constituting a place particularly favourable to the creation of technical knowledge from science, market knowledge is absent. The academic predominance of activities has oriented the cluster towards fundamental research activities, which are not market-driven.

Knowledge acquisition and sharing

In the first case, when it comes to the acquisition and sharing of knowledge, IVA founder explains in detail the mechanisms that helped him acquire knowledge.

He underlines the role of one main industrial association created in Marseille area. According to him, the region was becoming one of the biggest pools of fab activity also thanks to important “bottom-up” industrial association initiative for the microelectronics and semiconductor activities in the Provence-Alps-Riviera region, in France: ARCSIS. The association has succeeded in maintaining the dynamics of development of the sector assuring sustainability, full economic development and enhanced competitiveness of the regional microelectronics and communicating objects industry. Given the high investments and heavy infrastructure needed to be part of the fab industry, the barriers to entry are high. From the start,
this has stimulated industrial actors and researchers in the area to a great mobilisation around ambitious shared platforms. Nowadays three main interconnected platforms have been developed: 1) “Design”, focused on the development of new designs and validation of methodologies for the SoCs; 2) Characterization: dedicated to advanced researches on materials, micro & nanostructures for microelectronics and 3) “Micro-Packs” which serve the smartcard community and provide innovative solutions for integration and for micropackaging on flexible substrates while increasing security, reliability and interoperability. As IVA founder highlights “This initiative has reinforced the technical expertise through official regular encounters within each platform and through the organisation of regular events and exhibitions”. The technical and market knowledge are also enhanced by the industrial association who enable a progressive share of vision and future technological opportunities.

Another main mechanism enhancing the acquisition and sharing of technical knowledge is local labour mobility and the emergence of a community of engineers interacting frequently both formally in their work and informally. In fact, according to the entrepreneur, both he and his co-founder were attracted by the area’s specialisation in microelectronics and held various positions at STMicroelectronics, smart card division, or other large firms located in the area and operating in digital design, analog design, product engineering and security. During more than 15 years, they have deepened their expertise in the microelectronics sector particularly in design and test of flash-based smart card products, and he even define he and his partner as “smart card industry veterans”. The company’s product portfolio nowadays spans from the basic building blocks required for simple security functions to the most secure system-on-a-chip (SoCs). The entrepreneurs’ idea is to offer new solution to protect the silicon against major security threats while minimizing the area and power overhead required by the security features. Common threats include IP theft, cloning, reverse-engineering, extracting information, tampering and all sorts of cryptosystem attacks. The founders’ technical knowledge was all the more relevant, thanks to their former positions in the local large firms.

Moreover, the founder emphasizes how they benefited from the community of engineers that emerged throughout the development from the pioneering days, when engineers took part to the first location of French Microelectronics “grand champions”, through the restructuration of the sector and the rise of a new network of companies revolving towards 3 main central MNCs. According to him the community of engineers through increasingly dense social interactions had two main interlinked roles in
the creation of the company: the relational dimension of the network, which provided with opportunities of collaborating with counterparts and an increased shared understanding of highly specialised microelectronics knowledge thanks to regular informal and formal update of knowledge and know-how.

Although not working in the same local MNCs, the two founders knew each other thanks to the local interactions among the community. The creation of the company happened due to former meetings, which also enhanced the actual entrepreneurial action. The founder, points out that the set-up of his company is directly linked to the engineers that he met during his career: “In one of the project teams, when I was working at Schlumberger in Marseille there were employees from STMicroelectronics (...) including Eric with whom I have founded IVA Venture. Eric is an electronics engineer who has spent 10 years at STMicroelectronics”. He himself is « electronics engineer, I have worked 25 years at Schlumberger in different positions in R&D and Management in France and in the US”. The founder also emphasises that he also had other partnership opportunities with local engineers: “My professional career has also briefly crossed the way of Georges (founder of ASK), I was even close to work for his start-up, but then I decided to go to Texas and develop a new technology for Schlumberger and therefore I couldn’t integrate Georges’ company”.

George has today created his own company in the area, and this quote indicates the close links existing among local engineers. The community also stimulates informal interactions outside of the professional context: “Here, we have the Sainte-Victoire mountain, a very federative mountain, we go for a running or a cycle ride there together”. Some companies even called their projects with regional names ‘Le Jubier’, ‘la Sainte-Victoire’, we are not from this region, but we are here because we have adopted this region (...) I think that among engineers there is a very strong attachment to the territory”. This relational dimension of network favour opportunities of collaborating with counterparts when engaging in entrepreneurial action.

Within this community, engineers maintain regular relationships based on common shared social codes such as a microelectronics jargon and a shared language derived from direct observation. These codes are only understandable with prior acquired technical knowledge. The company’s founder explains he was able to identify and has seized a technology evolution – “the end of communication protocol” – at the right time through these networks and that gave him the opportunity to create his company. “The idea was that if we wanted to make secure communicating objects more sophisticated, we had to change the mode of communication. And there, my colleague considered adding USB technology inside of SIM card and smart devices (...)”.

Rani J. DANG, Maureen McKELVEY
The community of engineers has forged a shared understanding of technologies and favoured the exchange of ideas enhancing IVA Venture’s motivation to go for effective entrepreneurial action, the founder also emphasizes on the fact that on the market side, the business opportunity he has seized was mainly detected thanks to his interactions with MNC in a long process. “The genesis of our company, however, was very long and is primarily based on my experience gained in the creation of a new communication protocols when I was working for large groups”.

In the second case, when the founder of TB venture explains the mechanisms that helped her acquire and share knowledge, she highlights that a feature of Nice-Sophia-Antipolis worth mentioning is the specific layout of interactions in which the companies located in Nice-Sophia-Antipolis have their headquarters – including decision-making departments – and their capital outside the cluster. From a more theoretical perspective, one can analyze that this has resulted in a “satellite platform” configuration of interactions as described by Markusen (1996): the subsidiaries usually don’t take the key strategic decisions of investments, neither the markets nor new technological area to target for the R&D centre. In the case study, if technical knowledge is developed inside the boundary of the R&D centre, the market knowledge is mainly developed in the mother company. Moreover, considering their international belonging to a mother company located outside the economic area in which they are operating, they have a wide portfolio of relations outside the boundaries of their milieu, they mainly work with outside networks, making local interactions with local organizations almost absent. In this perspective, the decisions related to market are expected to be taken at the mother firm level. The identification of business opportunities and the markets to target are developed in the specific channels between the local firm and the international mother firm.

Even after the transitional crisis when Nice-Sophia-Antipolis experienced a shift from growth led by foreign multinationals subsidiaries to growth mainly based on local spin-offs and high-technology start-ups in the 1990s, the shortcomings in market knowledge is still persevering. On the side of the large companies, the few ones that have decided to remain in the area even after the crisis – such as Amadeus, IBM or Texas Instruments – continued developing their technical knowledge and R&D activities within the boundaries of the firm, collaborating with their international partners and networks outside the area. TB founder says: “Large firms located here don’t have any territorial strategy; they really don’t care about that”.

Consequently the requirement to acquire and develop market knowledge was the most difficult to fulfil. Besides the configuration of interactions
that doesn’t favour the accumulation of market knowledge, in Nice-Sophia-Antipolis there is no dominant sector, no main application of technologies targeted neither than a formalised value chain. Therefore entrepreneurs and small firms cannot just target a need from a formalised value chain as the ones in Marseille do. The founder highlights that what was really required in the Nice-Sophia-Antipolis to successfully set-up her company and make it work was in-depth technical expertise combined with strong efforts to acquire and develop market knowledge.

In sum, in the case of Marseille, knowledge is acquired and shared through different types of mechanisms: the involvement of entrepreneurs in one main industrial association (ARCSIS), their interactions with the 3 pivotal actors, the existence of a local labour mobility and the emergence of a community of engineers. These mechanisms allow knowledge to be shared and opportunities to be seized thanks to specific networks embedded locally. On the contrary, the case of Nice-Sophia-Antipolis shows that the entrepreneurs and local companies almost exclusively interact through external pipelines. Technical knowledge is therefore shared through collaborations with universities, but the market knowledge needs to be developed. Consequently the requirement to acquire and develop market knowledge is the most difficult to fulfil.

**Knowledge appropriation & effective use**

In the first case, the main product developed by IVA Venture, “lightening”, existed at the origin of the founding of IVA Venture in 2006. The founder recalls how he effectively appropriated and used the knowledge. Having built strong links with Gemalto and his collaborators, the founder of the firm was offered the opportunity to develop solutions to overcome limitations in the field of reliable embedded security systems, a solution Gemalto needed but wasn’t able or didn’t want to develop by itself: “a ground-breaking design for an elliptic-curve hardware coprocessor which exactly fits the computational needs of cryptosystems”6. This market demand from Gemalto turned out to become

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6. Lightening aims at providing a groundbreaking design for an elliptic-curve hardware coprocessor which exactly fits the computational needs of EC-based cryptosystems: basic point operations, scalar multiplication and hardware-supported pairing computations on the widest range of elliptic curves. The Lightening coprocessor shall inherently and transparently resist the most advanced techniques of side-channel analysis and fault-based attacks while reaching unprecedented throughputs with a minimal number of gates, thus opening the way to a new generation of EC-supporting cryptographic platforms and promoting (the switch from RSA to) a wide adoption of elliptic curve cryptography on the security marketplace (Source: Pôle SCS and interviews).
an entrepreneurial opportunity for the entrepreneur who could himself seize the opportunity thanks to past relationship with the MNC.

A main leverage comes from the market knowledge provided by Gemalto: the MNC ensures that the solution is adapted to the market needs and will facilitate the use of results by being itself the first customer. IVA Venture’s offer is almost an order from the MNCs with specifications and clear boundaries.

The firm was founded after the opportunity derived from past strong relationships between the entrepreneur and the MNC. The founder of the IVA Venture describes: “we build up subsets of circuits, like the circuit that you see displayed on the wall, it is a total system that we have developed and we have the intellectual property (...) we have neither the capacity nor the intention to make the production (...). We only develop the intellectual property of these subsets of integrated circuits, and we sell them to our main partners”. He obviously underlines his ultra-specialised technical knowledge developed while not having to look for markets or applications of his new product. The anticipation of markets and of customers, which are normally main important questions for any entrepreneur, is here already identified by having the MNC as customer. This shows the importance of past relations on the on-going innovation development through the new venture in this case.

Another main feature of the type of opportunity discovered, is that the entrepreneur can quite easily appropriate the value that will be created by his solution: knowing right away the technical knowledge missing, the founders have patented the solution (the company holds 75 patents in 2011) and the entrepreneur knows at the outset that there will be a significant market and main customer for their product. Our interviewee was therefore quite confident saying, “it is only the beginning. We intend to become the leading provider of microelectronic functions for secure communications solutions in the near future and we already have plans to create 25 engineering jobs in 4 years”.

In the second case, the appropriation and effective use of knowledge is totally different from the first case: as the founder highlighted before, the context and configuration of interactions doesn’t favour market knowledge in Nice-Sophia-Antipolis. Therefore entrepreneurs and small firms of Nice-Sophia-Antipolis need to appropriate market knowledge in order to use their deep technical knowledge. The entrepreneurial opportunities don’t exist out there; entrepreneurs have to develop their own market knowledge, what TB Venture’s founder calls “prospective attitude”. By this term the founder means that the unique expertise she and her collaborators have developed is not enough to create opportunities: strong efforts were needed
to find applications, customers, and to generate and appropriate the value. The TB founder has deeply investigated the area of activity addressed gaining an exhaustive view of her possible contribution to the value chain. She even claims that nowadays the company has two main areas of expertise: technical expertise, the security, and the second one, managerial expertise concerns the knowledge of collaborators and clients’ activity. In fact, after having succeeded in setting-up her company, she has developed a branch of her company – called TB Labs – a consulting company which purpose is to provide “consulting and evaluation services in security domains”. More precisely, this branch provides: “high-end consulting for large groups on security components and embedded software and support customers in their efforts to detect security problems and certification. What certification process and what level of security do the company need? Because a smart card is not secured in the same way nor at the same level as a mobile or a subway ticket”. These side activities have enabled the young company to position itself as a prescriber and to accumulate critical knowledge on potential clients, the problem they face and the solutions they have already adopted. The company can influence the technological orientations and choice of solutions that the clients are going to make. In this way the TB can identify the market opportunity; this front-end strategic effort is core for the entrepreneurs in this case to develop the missing knowledge related to market.

Finally, the case study indicates that the entrepreneurs in Nice-Sophia-Antipolis seem to be compelled to concentrate much effort to create an opportunity of venture creation that according to TB founder, entrepreneurs of Nice Sophia-Antipolis, have all the same desire to become leaders in their field right from the beginning. Contrary to the entrepreneurs of Marseille who usually are quite loyal to the focal firm of their network, and whose first objective is to capture the first contracts, the entrepreneurs here have the motivation to become leaders. As TB founder says “People from the software field and with whom I am working have the ambition, from the day they start their company, to become world leaders and not only followers of large influencing firms of the region. They would certainly work with large firms but with the goal to have references and to be leader. So it is really not the same way of thinking at all!”

According to her, TB Venture has in fact become “the leader in its field of expertise: TB is the leading provider for secure smart cards, terminals and other software and is under the way of developing the foundations for a global offer of solutions at the convergence of digital services between telecom, banking, transportation and government digital services”.

An overview of our findings are reported in Table 1.
In summary, (as synthesized in Table 1) in the case of Marseille, the history of the region enabled the creation and accumulation of technical and market knowledge. The knowledge needed to discover and exploit an existing opportunity of venture set-up is created conjointly in networks of pivotal firms and SMEs in the specific microelectronic sector. The acquisition and sharing of the developed knowledge is also maintained and updated through a robust industrial association, the mobility within a community of engineers with a strong local identity, who are working for and moving from a.
large firm to another locally enabling to develop a shared understanding of knowledge. Both technical and market knowledge is created through recurrent interactions and subcontracting relations between SMEs and MNCs, as well as due to a defined value chain where the entrepreneur may easily identify what his potential role and could effectively use the knowledge he has accumulated to the newly discovered opportunity.

In the second case, the R&D orientation and the newly developed scientific culture of Nice-Sophia-Antipolis environment has led to an emphasis on the lack of market knowledge. While technical knowledge is mainly created, acquired and shared through academic research education, scientific collaborations and international networks; the absence of a defined value chain, the R&D and fundamental research orientated science park impede the development of market knowledge, which has to be developed by the entrepreneur’s efforts. It is only with the entrepreneur’s efforts in using technical knowledge and creating market knowledge that new entrepreneurial opportunities are created.

DISCUSSION, CONTRIBUTIONS & CONCLUSION

While past researchers have reported on KM as being a determinant of innovation (Nonaka, Takeuchi, 1995), little has been done to empirically investigate the relationship between KM processes and entrepreneurial opportunity formation in localized contexts. This article presented an empirical demonstration which identifies and describes the differences between the formation processes of opportunity discovery and opportunity creation from the entrepreneur’s perspective. In doing so, the focus in describing these two cases shows how the two different types of entrepreneurs use the inputs from the environment in their knowledge management processes.

Based upon the above two cases we draw out the main points about each of the respective entrepreneur’s trajectory. They are ideal types, in the sense that they represent two very different patterns of company creation and development.

The main differences between entrepreneur’s KM processes in the case of opportunity discovery (Marseille) and in the case of opportunity creation (Nice-Sophia-Antipolis).

The first case of entrepreneur in Marseille represents a case of opportunity discovery. One key characteristic is that the opportunities may be seen as ‘given’ in this context, and therefore this pattern is primarily about
discovering existing opportunities. In Marseille in the microelectronics industry, the large MNC tend to be the one to organize the opportunities for the small ventures. They already understand the market and may have specific needs that they communicate technical expertise. The entrepreneur can thus rely upon the MNC, and through that relationship, they have a way to discover existing opportunities. The entrepreneur can concentrate on the technical knowledge, because the market knowledge is primarily obtained from the MNC. Thus, in this case, for the entrepreneur, the main activity is to discover existing opportunities. The entrepreneur primarily supplies services for a known demand, or to the idea of potential demand that is articulated for the future (potential demand). Here the main characteristics are that the entrepreneurs and their firms could focus upon the specialization of technical knowledge to exploit an existing business opportunity.

The second case of entrepreneurs in Nice Sophia-Antipolis represents a case of opportunity creation. One key characteristic is that the entrepreneur tends to try to create new opportunities, through technical and scientific knowledge but with less market knowledge. The opportunities that they do create tend to be heavily dependent upon science and new research results, with a strong base. A related characteristic is that the previous relationships with universities, research centres and public research organizations enhance their search for new opportunities. The academic research can provide an impetus for new ideas, and having relationships with them helps stimulate the search and selection of the creation of new opportunities.

In contrast, for market knowledge, the creation of opportunities is hard to determine and so a characteristic here is that the value of the business opportunity is risky and uncertain.

A final characteristic is that the entrepreneurial process itself is more difficult, because the technical and market knowledge are only loosely coupled. The entrepreneurs need to translate the technical and scientific knowledge into products and services that are demanded by the market or customers, and this demand may neither already exist nor be easy to create. This means that developing an opportunity may involve high levels of both risk and uncertainty. The specific localized contexts in Nice Sophia-Antipolis tended to support the creation of new opportunities.

**Contributions**

Our findings provide two main contributions for bringing together the literature on Knowledge Management and Entrepreneurship.
The first contribution concerns the identification of two patterns as described previously, through an articulation of the relationships between KM processes and the entrepreneur’s environmental context, i.e. the resources and linkages of specific contexts, that affect differently the way the entrepreneur mobilise KM processes for opportunity formation. Indeed, little research investigates the influence of the entrepreneur’s knowledge management processes and the characteristics of innovation contexts on the way opportunities are formed.

In the first case, the specificities of the context have facilitated the entrepreneur’s ability to capture and use technical and market knowledge to better recognise opportunities. The experience of the entrepreneur, the leader firm in the sector and the knowledge acquired locally through labour mobility plays a key in the recognition of opportunities. One of the main elements helping entrepreneurs here are the linkages formed locally, showing that not only do personal relations matter, but also the structure of the overall network of relations (Granovetter, 1992). The case of Marseille shows how a network of linkages develops among the densely connected internal actors as the result of the history of prior interactions (Uzzi, 1997). These linkages offer privileged channels through which knowledge is transmitted. Also, as far as the type of knowledge is concerned, the entrepreneur develops technical knowledge enhanced by the local social network, while market knowledge is provided by local leading companies and enhanced by the area’s historical developments.

In the second case, the specificities of the entrepreneur’s environment resulted in a rather unpredictable context where the individual entrepreneur’s traits and cognition play an important role in the creation and use of technical and market knowledge. While individual abilities on part of entrepreneurs are essential here to create, and successfully exploit opportunities, it is still their structural embeddedness (He, 2006) that help them developing the lacking knowledge. The context provides them with technical scientific knowledge, mainly developed through academic research education and the local scientific R&D culture; however, the market knowledge is missing. This type of case constrains the entrepreneur to create both supply and demand. In Nice-Sophia-Antipolis, the entrepreneur has to develop market knowledge by her/himself. Entrepreneurs only succeed in entrepreneurial activities when they are able to accumulate technical knowledge and create market knowledge.

The second main contribution concerns the enrichment to the literature on opportunity with empirical cases. Currently, two views are predominant (Alvarez, Barney, 2007) when questioning the opportunity process:
entrepreneurial opportunities are described as either discovered or created. Some claim they “exist out there” while others argue that “opportunities are made, not found” (Ardichvili et al., 2003, p. 106). As emphasised by Short et al. (2010), a judicious middle ground position would be that some opportunities are discovered whereas others are created. But this position calls for more research on the contexts in which opportunities are found or created. Exploring this proposition was the one of the main objective of our research. Based upon the two case studies, we propose that both individual entrepreneur’s KM processes and the context are important in understanding entrepreneurial behaviour and the nature of opportunities. We explored the contextual question of how opportunities are found or created and we showed that the sector’s specificities, regional context and the entrepreneur’s individual factors interact and influence the type of opportunity whether discovered or created. According to the typology of entrepreneurial action by Alvarez et al. (2013) (nature of opportunities, nature of entrepreneurs and the decision making context: see table 1), the case of Marseille, is clearly related to the discovery theory. In fact the case demonstrates that opportunities exist independent of entrepreneurs, as they are mainly provided by pivotal firms and by the knowledge accumulated in local networks. The nature of entrepreneurs and the decision making context are also clearly related to the discovery theory: i.e.; the entrepreneurs differ in some important ways from non-entrepreneurs in so far as they seize the opportunities discovered to create their own venture. However, the nature of decision making is not particularly risky here, as market knowledge is also provided to the entrepreneurs: the market need, the first customers and the needed application are all provided by the context, making the exploitation of opportunities less risky.

The case of Nice-Sophia-Antipolis described above is a good empirical example of the creation theory (Alvarez et al., 2013): opportunities indeed do not exist independently of entrepreneurs who have to create them on their own, the nature of entrepreneurs therefore differ ex-post depending on how they manage to enact the opportunities with the scientific networks and knowledge they possess; and finally, the decision making context is clearly uncertain.

As Short et. al. (2010, p. 42) underline: the opportunity construct holds great promise as a basis for theory building. Hence, these two case studies suggest that the role of regional specificities in either discovering or creating opportunities should be integrated into theory.

Finally, on a methodological ground, a majority of research on entrepreneurial opportunity use surveys but (ibid., 2010, p. 47) such research designs are less than ideal, “given that opportunity creation, recognition, exploration, and
exploitation are dynamic processes”. Our aim was also to provide an empirical field case study allowing finer grained results – and better suited than surveys in showing the recursive, contextual and dynamic nature of the opportunity process.

REFERENCES


