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# Born to be Sold: Start-ups as Products and New Territorial Life Cycles of Industrialization

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**ABSTRACT** *Territorial innovation models and policy practices traditionally tend to associate the emergence, resurgence and growth of start-ups with the development of local industries, either as industrial pioneers or as innovative spinoffs embedded in a regional production system. This approach is in line with a "life cycle" pattern of innovation and of industrialization marked by sequential waves of growth and decline, by technological renewal and by sectorial transitions. In a knowledge and financial economy characterized by combinatorial knowledge dynamics, by even shorter project-based innovations and by global financial and production networks, this approach is called into question. Through the case of Swiss medical technologies (Medtech), this paper highlights how local medtech start-ups' evolution is shaped, from its early phase on, by the corporate venture strategies of multinational companies. While the economic potential of start-ups was traditionally perceived in a longer run, they seem to be more often "born to be sold" today. New research avenues and policy issues are finally derived from this particular case to address territorial innovation and competitiveness in the future.*

## Introduction

In Schumpeterian ontology, entrepreneurs personalize economic change by their capacity to create and exploit new production or market opportunities. Beyond an individual action, entrepreneurship is also perceived as a collective innovation process embedded in territorialized institutions, actor relations and evolutionary pathways. Widely investigated since the 1980s, the Silicon Valley model has played a large part in carrying out and legitimizing this ontology through idealized visions of it. At the same time, it has become a reference of territorial competitiveness advocated by the current policy discourses and practices.

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Nowadays, the familiar figures of William Hewlett, David Packard, Steve Jobs, Bill Gates, Larry Page or Sergey Brin typify the iconic image of entrepreneurs developing a new idea, prototyping a new product and starting a new business in their "garage" (Audia & Rider, 2005). Start-ups symbolize contemporary entrepreneurship at the crossroads of science and industry, embedded in regional networks of firms, research and education bodies and capital ventures (Florida & Kenney, 1988). They are analysed at the core of nascent industries forging the resilience of a flexible regional production system exporting innovative and competitive products to distant markets (Saxenian, 1990, 1991).

The aforementioned entrepreneurial projects, the image of "garage" entrepreneurs and start-ups, reflect a "life cycle" pattern of innovation and of industrialization marked by sequential waves of growth and decline, by technological renewal and by sectoral transitions. Often associated with the success stories of Hewlett-Packard, Apple, Microsoft or Google, start-ups are commonly viewed as the potential inception of a new industrial trajectory which is expected to grow, create jobs and disseminate innovation locally.

In a knowledge and financial economy characterized by combinatorial knowledge dynamics (Crevoisier & Jeannerat, 2009), by project-based innovations (Grabher, 2002a) and by global financial and production networks (Coe *et al.*, 2014), this idealized approach of regional innovation and growth is called into question. Through outsourcing and corporate venture strategies, multinational companies step in at an early stage of the enterprises' incubation (Chesbrough, 2002; Garel & Jumel, 2005; Ben Hadj Youssef, 2006). While local conditions of knowledge and capital transfers can be influential in the emergence of entrepreneurship (Kenney & Von Burg, 1999; Delgado *et al.*, 2010), the growth of a start-up seems to be more than ever bound to the decisions of global stakeholders. What kinds of entrepreneurship, ecosystems and evolutionary paths are implied by such interdependencies? How does it impact on theoretical and policy models of regional innovation and territorial competitiveness?

Through the case study of Swiss medical technologies (medtech), this paper sheds light on three different aspects of this question. Firstly, it is observed that medtech start-ups' trajectories are shaped by the two contrasting territorial dynamics of knowledge and financial anchoring. While fundamental technology and incubation capital build on local resources, industrial production and market exploitation take place, from its early phase onwards, through the investments of large listed multinational companies. Secondly, the entrepreneurial plan behind the creation of a new start-up indicates a fundamental change is underway. While the economic potential of start-ups was traditionally viewed as a longer term prospect, they are now "born to be sold". Corporate venture has become a strategic tool for large companies to tap external innovation processes taking place in the local milieu. Thirdly, the identification and evaluation by investors of potentially lucrative start-ups involve complex intermediation processes. From this point of view, international fairs and opinion leaders are the key means of justifying and legitimating the value of local medtech start-ups, purchased as a product.

## Regional Innovation: Localized Entrepreneurship and Industrial Growth

In a post-Fordist era, the term innovation is commonly used to explain the success of particular enterprises, industries and regions facing production cost competition in the globalized economy. Inspired by Schumpeter's approach to economic change, many

contemporary theories and policy discourses view innovation as a dialectical interplay of "emergence" and "growth" (Cooke *et al*., 2011b).

On the one hand, economic change and evolution emerge from entrepreneurship (Rocha, 2004). Entrepreneurship is considered the fundamental socio-economic driver through which contingent resources (Bathelt & Glückler, 2005; Stam, 2010; Julien & Marchesnay, 2011) are turned into new products or production processes through creative destruction, production and recombination (Schumpeter, 1935). Emergence occurs through pioneer entrepreneurs or large incumbent firms breaking away from an existing market offering (e.g. a new product or a new use of an existing product) and/or an established production system (e.g. a new technology or a new supply chain).

On the other hand, growth in economic change is usually considered through the pattern of industrialization (Klepper, 1997; Schmitz, 1999; Chataway & Wield, 2000). For Schumpeter (1939, p. 98), innovations are not "isolated events": they "tend to cluster, to come about in bunches". We here consider industrialization, in a broad and fundamental definition, as the process by which related entrepreneurial projects and production are developed on an extensive scale. Industrialization does not restrain to intensive manufacturing or economies of scale. It more broadly characterizes the agglomerated growth (Hilhorst, 1998) achieved through "collective efficiency" and increasing returns derived from external economies and joint action in particular production systems (Schmitz, 1999). It may be driven by processes of dissemination (e.g. through knowledge spillovers or competition–cooperation dynamics), concentration (e.g. dedicated competences, workforces and infrastructures) or specialization (e.g. a specialized supply chain). Through productive, corporate or market growth, industrial development generates new employment and new commercial revenues in relation to product and process innovations (Klepper, 1997).

In regional studies, entrepreneurship is usually regarded as the capacity of local actors to foresee and undertake individual and collective projects in a changing environment, based on specific regional resources (e.g. social, cultural or technical capital) (Saxenian, 1994; Maillat, 1995; Thierstein & Wilhelm, 2001; Stam, 2007). Innovation develops endogenously within local production systems competing beyond regional boundaries (Coffey & Polèse, 1984). More operational approaches have subsequently viewed entrepreneurship as the ability of specific regional innovation systems to turn locally generated knowledge into successful entrepreneurial projects (Cooke, 2001; Doloreux, 2002) where entrepreneurs are considered not only as an individual pursuing a personal vision, but also as a social agent situated in a wider system of production (Scott, 2006, p. 4). Within this system, local venture capital investors are the key players providing capital resources and managing expertise and strategic directions in the development of nascent firms (Florida & Kenney, 1988; Kenney & Von Burg, 1999; Feldman, 2001).

In the past decades, the spatial dynamics of entrepreneurship and emerging innovations have been the subject of various analyses particularly focused on regional economic growth and clusters (Kenney & Von Burg, 1999; Feldman *et al.*, 2005; Kiese & Schätzl, 2008; Glaeser & Kerr, 2009; Delgado *et al.*, 2010; Trettin & Welter, 2011). In this context, clusters and entrepreneurship have become very popular subjects in regional science and economic geography (Sternberg & Litzenberger, 2004). According to Delgado *et al.* (2010, p. 500) and Sternberg and Litzenberger (2004, p. 770), clusters facilitate new business formation and the growth of successful start-ups by lowering the cost of entry, enhancing opportunities for innovation-based entry, allowing start-ups to leverage local

resources to expand new businesses more rapidly and offering a positive regional environment. Reducing barriers to entry and growth and enhancing regional comparative advantage, the presence of a strong cluster environment should be a central factor of entrepreneurial vitality (Delgado *et al.*, 2010, p. 498). Not merely the result of individual efforts, entrepreneurship has been depicted as a collective process embedded in particular relational, institutional and evolutionary configurations situated in time and space (Feldman, 2001; Lambooy, 2005; Ferrary, 2008). Stam (2007) emphasizes that new enterprises creation is characterized by different evolutionary phases beginning with recognition of a new business opportunity by the entrepreneurs and ending in a "growth syndrome" represented by a decrease of a firm.

Not confined to the question of entrepreneurship, industrialization has also been addressed as a *sine qua non* condition of development within territorial innovation (Scott, 1986; Scott & Storper, 1992; Hilhorst, 1998; Schmitz & Nadvi, 1999). Not only have regional innovation systems been depicted as spatial contexts of emerging innovation, but they are also particular socio-economic arenas enabling entrepreneurial projects to "take off" and, at the same time, "anchoring" them through local clusters of activities (Porter, 1998; Cooke & Martin, 2006), enhancing knowledge dissemination, flexible specialization (Scott, 1988; Simmie, 2005), related innovations (Frenken & Boschma, 2007) or spatial agglomeration (Stam, 2007; Vatne, 2011). If regional clustering of innovation does not necessarily follow the trajectory of a single industry, its endogenous development bears an industrial dimension following the sequential homogenization phases of activities in particular industrial or thematic fields (Menzel & Fornahl, 2010).

This industrial aspect of clustering has given rise to debated models of territorial competitiveness, highlighting the regional advantage created by a "Marshalian" specialization (Moulaert & Sekia, 2003) or by a "Jacobian" diversification of local innovative activities (Cooke, 2008). Nevertheless, all these models share a common view: understanding territorial competitiveness is not only about pointing out how innovation emerges in a particular spatial context, but also about addressing how innovation generates new employment and revenue through export-based (basic) and induced (non-basic) activities in this territory (Polèse & Shearmur, 2009).

## The Life Cycle Approach: A General Conception of Regional Development

The interplay between entrepreneurship and industrialization in regional innovation processes has traditionally been interpreted and conceptualized in a life cycle approach. Initially adopted by Marshall (1890), who compared the evolution of businesses in the nineteenth century with the birth, growth, maturity and death of trees in a forest, the "life cycle" metaphor has gained common currency in describing the organic nature of economic processes (Penrose, 1952). Used to describe the way in which firms and industries develop within the ecological context of technology, product and market selection, several approaches based on life cycle posit innovation as sequential waves of emergence, growth, maturity and decline (Vernon, 1966; Markusen, 1985; Klepper, 1997). Drawing upon a similar metaphor, numerous works have provided various interpretations of territorial competitiveness along with the different stages of development that particular regional production systems may face (Vernon, 1966; Stam, 2007; Menzel & Fornahl, 2010; Potter & Watts, 2011; Tichy, 2011; Cooke *et al.*, 2011a; Cooke *et al.*, 2011b).

In phases of emergence and growth, geographical proximity can provide relational (e.g. informal, multifunctional or specialized networking among regional economic and non-economic actors) and institutional facilities (e.g. routines and policy support) to stimulate new entrepreneurial projects and to overcome market or technological uncertainties related to the creation and industrialization of new market offerings (Stam, 2007; Carrincazeaux & Coris, 2011; Potter & Watts, 2011). This phase is characterized by two dominant processes related to the exploitation of new market opportunities and the delivery of products to a growing product market (Stam, 2007, p. 30). In the maturity phase, standardized technologies, production processes and markets become less dependent on a particular innovation milieu. Relocation of activities is easier and creates a new spatial division of labour in a global market (Vernon, 1966; Tichy, 2011). Increasingly based on extra-regional relations or global pipelines (Bathelt *et al.*, 2004; Isaksen, 2011), the stages of maturity and decline are usually not directly related to innovation-driven territorial competitiveness. Innovation may develop incrementally alongside a particular market positioning and sectoral trajectory, but competitiveness is primarily achieved through conservative principles (market oligopolies, technical and structural path dependencies) underlying a potential decline in the original production system through latent lock-in (Grabher, 1993; Boschma & Lambooy, 1999).

From this point of view, territorial innovation models have hitherto primarily focused on regional emergence and growth of innovation (Asheim & Coenen, 2005; Cooke *et al.*, 2011a). Phases of maturity and decline are usually regarded as inevitable aspects of new potential emergence through innovative diversification, adaptation or reconversion. Regional innovation systems do not necessarily draw upon a single product or sector. They usually build upon subsequent emergences and related industrial life cycle types (Cooke *et al.*, 2011b). In other words, regional innovation systems are fundamentally depicted as specific territorial contexts of entrepreneurial (re)emergence(s) and industrial growth through a local innovative valuation of resources (Figure 1).

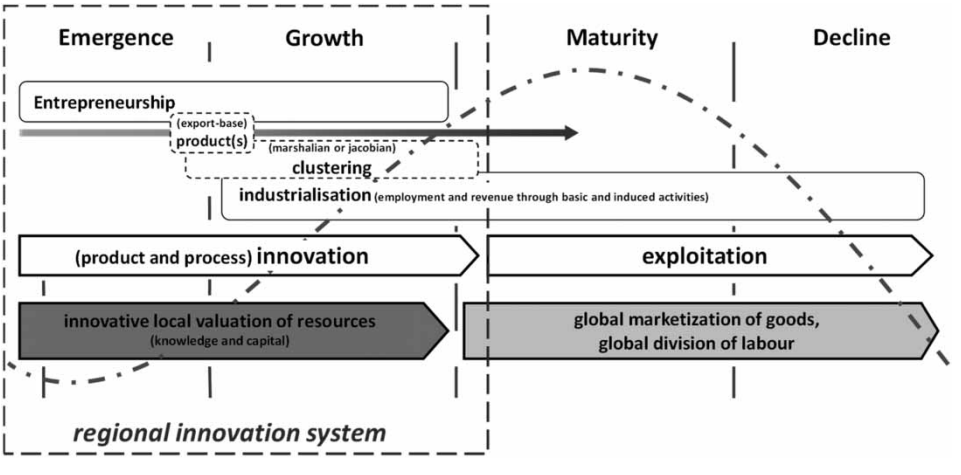


**Figure 1.** Innovative emergence and growth in regional innovation systems.
*Source:* Author's own work.

## Innovation Policies and Contemporary Reflections

In the last decade, a plethora of public initiatives has been launched to enhance regional innovation and territorial competiveness. Usually taking the case of the Silicon Valley as a reference, "technopole" and "cluster" strategies are considered as policy best practices (Martin & Sunley, 2003; Tödtling & Trippl, 2005; Brenner & Schlump, 2011). In various aspects, these policies are implicitly rooted in a life cycle approach of regional entrepreneurship and growth.

On the one hand, these policies seek to stimulate pioneer entrepreneurs and incumbent companies by providing pre-competitive funding to R&D projects and start-up ventures. On the other hand, they aim to foster creative knowledge sharing and dissemination among regional actors in related fields of activities through proactive networking. Generally speaking, public intervention tends to be viewed ideally as the third component in a triple-helix scenario, whereby it provides "assistance" for the emergence and growth of "linear" innovations taking place between science and industry (Etzkowitz & Leydesdorff, 2000; Thierstein & Wilhelm, 2001; Etzkowitz, 2006).

Such initiatives tend to share an implicit view of innovation: successful start-ups are the embodiment of innovation (Feldman, 2001) facilitating sometimes nascent industries that will underlie the resilience and growth of a regional production system; supporting the emergence of local innovation today prepares the ground for the industries of tomorrow; new regional employments and revenues will come along with innovations. This stylized approach to regional innovation and growth policies can nevertheless be challenged. Drawing upon various seminal critiques addressed by recent debates in regional studies, three prominent and fundamental issues emerge.

Firstly, in a complex knowledge-based society, economic development and competitiveness are strongly driven by combinatorial knowledge dynamics (Gibbons *et al.*, 1994; Crevoisier & Jeannerat, 2009). Innovation increasingly tends to emerge across different sectoral life cycles rather than within single trajectories. Accordingly, regional innovation tends to emerge and develop through related varieties taking place across different local clusters and life cycles (Asheim *et al.*, 2011).

Secondly, in this context of knowledge-intensive innovation, entrepreneurship builds on permanent and shorter-run projects (Grabher, 2002b). Regions are, in this context, complex "project arenas" (Qvortrup, 2006) or "adaptive systems" (Martin & Sunley, 2011) of continuous innovative (re)emergence that have to overcome the path-dependent lock-ins inherent in long industrial waves and stable phases of industrial maturity. Furthermore, regional revenue is generated from knowledge-intensive activities, selling tailor-made solutions rather than export-based products.

Finally, territorial innovation processes are embedded in increasingly global production and financialized networks (Corpataux *et al.*, 2009; Coe *et al.*, 2014). In the traditional life cycle approach to territorial innovation, spatial division of labour was traditionally described as a "push" movement (Tichy, 2011): the relocation of activities and foreign direct investments are undertaken by mature companies from their home region towards specialized and lower-cost supplying regions. Nowadays, this traditional process is challenged by two fundamental phenomena. On the one hand, global economic financialization has increased the liquidity/mobility of capital, which can be instantly invested in distant and attractive listed businesses (Corpataux *et al.*, 2009). On the other hand, large multinational companies have become global investors in outsourced innovations

through corporate venturing (Chesbrough, 2002; Garel & Jumel, 2005; Ben Hadj Youssef, 2006). In this context, relocations and foreign direct investments tend to occur at an earlier development phase in a "pull" process, which consists of "picking up" the competitive winners within global innovation networks.

How do these new challenges actually affect established models of regional innovation and territorial competitiveness? How should conventional policy and life cycle approaches be reconsidered in such a context? The next section examines these questions through the particular case of medical technologies in Western Switzerland and tries to give new keys to understanding the territorial and industrial dynamics of firm emergence and development.

## The Medtech Industry in Western Switzerland

The medical innovation literature shows that new medical devices and applications arise out of interactions between different actors such as universities, hospitals, laboratories and enterprises (Gelijns & Thier, 2002) and emphasizes that structures shaping innovations can be distinguished from pharmaceuticals and biotechnology (Weigel, 2011, p. 45).

Considered to be the area of life sciences covering the various economic activities of research, subcontracting, development and marketing of medical devices and applications (Medtech Switzerland, 2012), medtech is one of the Swiss economy's flagship industries, generating around $5 billion per annum (Klöpper & Haisch, 2008, p. 11) and employing some 50,000 people (i.e. 1.1% of the country's workforce) (Medtech Switzerland, 2012, p. 31). This sector shows a sustained annual growth of 5–20% depending on the industrial branches (Fritschi, 2006).

The Swiss medical industry currently accounts for a total of 1600 companies[1] subdivided into manufacturers, producer suppliers, distributors and companies specializing in the supply of services to medical device producers (Medtech Switzerland, 2012, pp. 30–31). According to Klöpper and Haisch (2008), changes in the Swiss medical industry have primarily been driven by three factors. Firstly, medtech companies have benefitted from the Jura region's rich technological and research environment, thanks to the existing watchmaking industry there, producing various high-quality, high-precision components. Secondly, the high prices on the Swiss domestic market have often meant that there is money available for medical investment and innovation, helping local businesses to be more innovative than their market competitors. Thirdly, research by public laboratories, both basic and applied, has enabled the development of major medical projects within the country.

Territorially speaking, most businesses involved in medical work are based in the Zürich and Western Switzerland regions (Figure 2). With a long tradition in this field, the latter region has a dense population of medical actors (e.g. state-run hospitals and private clinics), research institutes (e.g. the university institute and private research investment), industry's major multinational companies (Klöpper & Haisch, 2008, p. 12) and a growing number of medtech start-ups (Figure 3).

Compared to the rich literature on innovations and clustering evolution in biotechnology, the existing literature on medical device industry is very limited (Weigel, 2011). This lack of literature raises some important issues for terminology and definition of "medtech". While the term "medtech" is commonly used by both public authorities to define a promising industry and entrepreneurs to designate their business activity, this

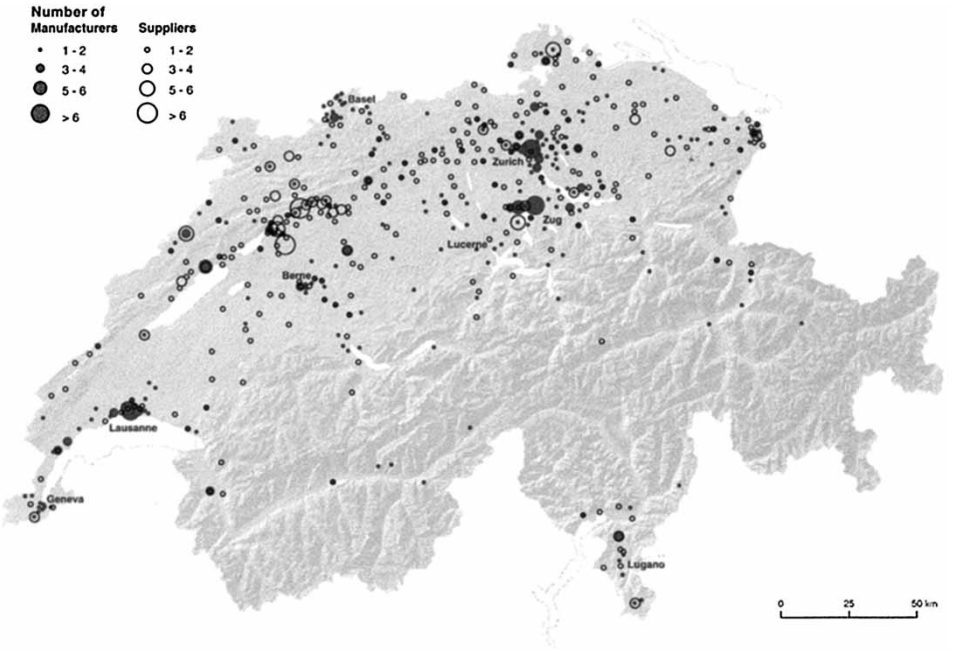


**Figure 2.** Number and localization of Medtech manufacturers and suppliers in Switzerland. *Source:* Medtech Switzerland, 2012, p. 31.

term is inherently ambiguous. It can effectively be seen as both a service industry and a goods industry, as it represents not only those industries which produce medical devices but also those actors supplying services which are not identifiable with a specific product or technology. Henceforth, despite being implied by the term, "medtech" cannot be defined as a technology or by a clearly identifiable product type. For this reason, numerous actors in this field prefer to view medtech activities not as a specific technology or sector, but rather as a "market".

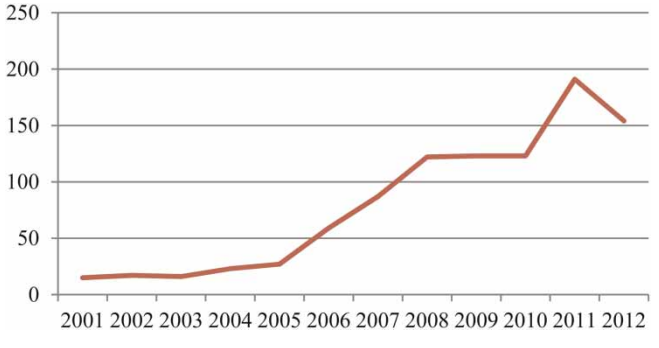


**Figure 3.** Medtech start-ups founded in Western Switzerland between 2001 and 2012. *Source:* www.startup.ch, as per 12.12.2013.

These considerations raise several questions: how do we define current medtech activities? Would it be appropriate to speak of the emergence of a new medical cluster in Western Switzerland? How should we interpret and understand the emergence and development of these activities through the medtech start-ups that have recently sprung up in this region? What kind of critical reflections might the case of Western Switzerland's medtech industries bring to bear on the traditional cluster life cycle approach?

## Method of Inquiry

These questions were examined in a case-study research (Merriam, 1998; Stake, 2005; Gerring, 2007; Yin, 2009) carried out between October 2012 and March 2013 as part of a project financed by the Fond National Suisse de Recherche Scientifique.[2] According to Merriam (1998), the case-study method provides insides into social phenomena in order to demonstrate their complexity and the context within which they were drafted. Therefore, it emerges from a process of interaction between information gathering, interpretations, literature and reporting (Yin, 2009). Searching to analyse the industrial evolution, socio-economic dynamics and territorial impacts of the medtech sector in Western Switzerland, our qualitative study was principally based on a mix method mobilizing semi-structured interviews, participant observation, panel of experts and an in-depth document analysis.

Five categories of actors were particularly identified (Table 1). The first type was the start-ups (a total of 16) developing new medical devices. According to Lebret (2007, p. 24), we considered "start-ups" as nascent firms, born from an entrepreneur's idea linked, or not, to an institutional actor (e.g. a university or a firm incubator) and having the possibility to become a larger enterprise. The second and the third types of actors were multinational enterprises (MNEs) and medium-sized enterprises (a total of 15) producing and selling medical devices in international markets. Fourthly, particular investors (a total of 5) were also interviewed to address the financial issues and rationales underlying the creation and the development of new firms. Finally, the fifth category is represented by professional associations and exhibition organizers, which provide a network creation between medical actors.

A total of 30 semi-directive interviews lasting one to two hours have been conducted in the Western Switzerland region with entrepreneurs, and representatives of small and medium enterprises (SMEs), of MNEs, of investors and of professional associations. The interviewees were selected according to a theoretical sampling (Guillemette & Luckerhoff, 2009), seeking to explore the general characteristics of medtech entrepreneurs, their networks, their enterprises and their regional involvement. The particular history of the firms, of their products and of their funding was examined. An in-depth web and document analysis was also realized to gather information about innovative projects, initiatives and experts' views related to medtech activities in Western Switzerland and abroad.

Once a saturation of results was achieved,[3] all interviews were transcribed and subjected to qualitative data analysis[4] (Corbin & Strauss, 2008; Silverman, 2010; Grbich, 2012). Our qualitative data were analysed through a conceptual coding (Nagy Hesse-Biber & Leavy, 2011). A descriptive coding of the textual and contents data generated by interviews and documents allowed us to build analytical categories to interpret three main issues: (1) the main changes in the medtech sector over the last years in Western Switzerland, (2) the

**Table 1.** Field actors and their principal functions[a]

| Categories of actors | Semi-structured interviews and document analysis | Document analysis and participant observations | Function of actors | Examples |
|---|---|---|---|---|
| Start-ups | Aleva Neutherapeutics, Sensimed, Melebi, Medos, Odus Technologies, Perfusal and other 5 medtech start-ups | 5 local medtech start-ups | Develop a new application trying to solve some medical problems | Development of a new soft medical device able to treat diabetes diseases |
| MNEs | Medtronic, Phonak and other 3 MNEs | 1 MNEs | Develop and sell products at a global scale | Worldwide production and sale of medical devices or application (e.g. hearing aid) |
| SMEs | Symbios, Valtronic, BienAir, Oscimed and other 3 SMEs | 2 local SMEs | Develop, produce and sell product at a more regional/ multinational scale | Development and production of a new sort of prosthesis to sell in the region and in some other occidental countries |
| Investors | Capital proximité, and other 3 investors | 1 investors | Support start-ups creation and development in order to have a capital gain | Monetary support during an early stage of new medtech firms |
| Associations and expositions | Medi SIAMS, and other 2 associations/ expositions | NEODE, Forum Medtech Luzern, LausanneTec, SMT Genève, Platinn, BioAlps | Support the creation of networks between actors and the development of a medical market | Networking support between medical local actors legitimizing global and technical opinion |

*Source:* Author's own work.

[a]To provide some degree of anonymity for the respondents, only the names of actors that agreed to be cited are used in this paper.

reasons of the actual evolution of local medtech start-ups and (3) the socio-economic and spatial relations of actors involved in this evolution (e.g. MNEs, investors and associations).

As our inquiry is based on qualitative methods, our aim was not to consider it as representative, but to allow us to propose a description of a different logic characterizing the

cluster. Following Flyvbjerg (2006), the main objective was not to generalize from our case study on medical technologies but to propose a key to understand firm creation from the actors' perspective. In fact, this case-study research enabled us to better understand the processes at play within local innovative businesses, to comprehend the way in which these businesses have evolved, to uncover the relationships forged between these businesses and the multinationals and to gain a better insight into the impact that intermediary actors have on these processes.

## From Regional Incubation to Multinational Buyout

While technical skills are straightforward enough to come by through local research institutes, in the case of medtech in Western Switzerland it is clear that start-ups struggle to find the local financial backing required for their research and development needs. According to Crevoisier (1997), new firms are often initially supported through local finance. However, with copious red tape and high production costs, medtech start-ups are increasingly dependent upon multi-local financing for their development. Innovative businesses' development is, therefore, no longer solely linked to the region's capacity to provide local investment (bank loans, public authority support, etc.), but to their capacity to attract the interest and support of the major groups organized at the global level. This model is overturning the way local innovation systems work, as most start-ups are generally founded by entrepreneurs looking for the business to be sold on the market at a profit.

On the basis of our case study, we have identified three typical phases in the development of a medtech start-up (Figure 4).

Characterized primarily by a general lack of their own resources and by a great deal of uncertainty, the first phase of a medtech start-up's life cycle is all about ideation. In an uncertain environment, securing financial capital for innovation often becomes extremely difficult and requires the mobilization of external resources using alternative network-based strategies. In Western Switzerland, the creation of these specific start-ups and the

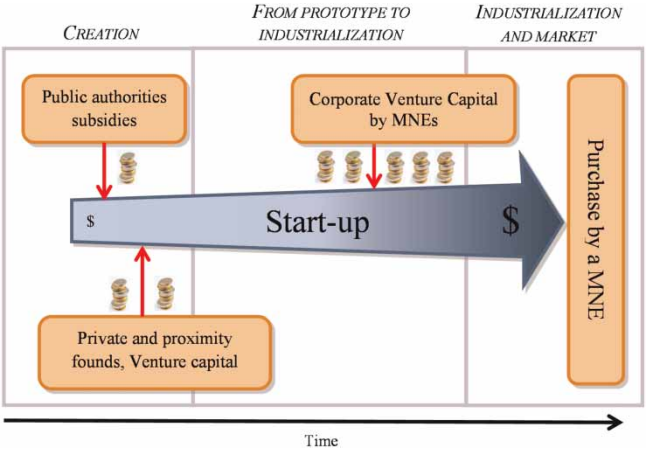


**Figure 4.** The three phases of Medtech start-up financing.
*Source:* Author's own work.

design of the first prototypes are modestly financed and supported by government subsidies (Thierstein & Wilhelm, 2001) as well as through local capital (Crevoisier, 1997) often obtained from the entrepreneurs' own social network (e.g. family, friends and contacts). Often the start-up process for innovative businesses involves the financial support of private investors, primarily venture capitalists.

Rarely falling within the ambit of the entrepreneur's social network, their financing of development prototypes is done with a view to eventually making a profit. A great example of this kind of local investment refers to a local start-up that created a special glaucoma-detection contact lens. In fact, the statement of its entrepreneur exposes: "At the beginning, we found our principal investments locally, thanks to friends and family, especially for the creation of a prototype of our contact lens."[5] This statement illustrates that the financial resources necessary to develop the first product prototype came principally through the business owner's own social network and certain public financing initiatives aimed at the incubation and start-up of so-called pre-competitive projects.

The second phase of the start-up's life cycle covers the transition from prototype to industrial production. In contrast to the start-up's initial phase, the phase covering the transition from prototyping to industrial production of products requires much greater sums of money, which are harder to source locally from small or medium-sized investors. The production costs and the cost of the various requisite medical device certifications often necessitate considerable investments, that is, in the region of 20–30 million Swiss Francs.[6] Only multinationals are able to provide this kind of liquidity for producing and certifying new devices. These investments are very often based on corporate venture capital (Chesbrough, 2002; Garel & Jumel, 2005), whereby multinationals take a shareholding in promising companies (Ben Hadj Youssef, 2006). The diabetes treatment device made by a local start-up is a good case in point as the statement of a chief development officer confirms: "The certification process and first phase of industrial production were supported by an American multinational based in the region which now plays a decision-making role in our firm."

The third phase primarily involves the market launch of the medical device and the buyout of the start-up by a multinational. According to Narula and Santangelo's thesis (2009), medical multinationals based in the region achieve innovation not only through the skills within their organization but also through outsourcing and the skills of their external partners, be they research laboratories or businesses. They maintain ongoing relationships, both financial and technological, with local entrepreneurial networks and start-ups in order to benefit from their output and with a view to possibly buying out the start-up, internalizing its product, its production and its specialist workforce. For example, a young business based in Western Switzerland, specializing in the development, production and marketing of implantable medical devices and accessories, was bought out by a big American group in 1994 and was incorporated as a new business within the family of this large group. The statement of a collaborator of this medical company exemplified this issue: "It was 1994, a big American Group, focused on the production of a similar product as ours, showed an interest for our company and we finally decided to sell it them." Similarly, the sale of medtech start-ups to quoted groups may also depend on the entrepreneur's willingness, as illustrated by the statement of a local entrepreneur:

> When I established my new enterprise and started conceptualizing a prototype of the product, I was sure that I would sell my start-up to a big group in the near future in order to have enough money to then start a new business.

Looking at these three stages of evolution, we note two main issues. Firstly, start-ups develop through both public and private local capital based on a relationship of trust between actors (Crevoisier, 1997). Unlike the Silicon Valley ideal-type (based on an influx of venture capital enabling the rapid creation of start-ups) (Comtesse, 2013, p. 14), venture capitalists play only a minor role in the setting up of new medical businesses in Western Switzerland. According to the Garel and Jumel approach (2005), despite their minimal involvement in the creation of medtech start-ups, more substantial investments come in the form of corporate venture capital bestowed by large stock-market-listed companies. Although these investments support start-ups through the process of certification and the initial manufacturing of products, they also enable the multinational to gain easy access to new technologies, to improve internal research and development through the applications developed by the start-up, to identify new markets and, indeed, to create a profit (Chesbrough, 2002; Ben Hadj Youssef, 2006).

Secondly, these processes indicate a radical change to the industry's traditional processes of innovation and development. The typical view of the innovative entrepreneur is that of a person setting up a business with the aim of creating endogenous growth through the sale of his or her product (Lebret, 2007). The product is the item to be commoditized and the start-up is the means by which it is invented and put on the market. Therefore, the case of the medical industry in Western Switzerland evidences not only the buyout of start-ups by multinationals but also a desire on the part of entrepreneurs to create a business with the aim of selling it on to a large group within the short to medium term. Although the buyout of start-ups by listed companies is hardly unusual, the commonly expressed desire of entrepreneurs to sell on their business is a more recent phenomenon. In such cases, the medical product becomes more a means of increasing a company's value in the start-up market. The proliferation over the last 10 years of prizes and quality kitemarks being awarded to start-ups rather than to specific products is a good illustration of this turnaround. For example, a local start-up received in 2013 a prize from public authorities considering it as the third best innovative start-up in Switzerland. According to its entrepreneur, this prize "allowed the start-up to find more easily new investors for the creation of the firm and new buyers".

## The Construction of the Medtech Start-up Market

Traditionally, start-ups are actors dedicated to creating new products for exploitation on the market which should enable them to develop into SMEs (Lebret, 2007). Our case study shows that start-ups do not concentrate solely on the creation of medical devices to be sold on the market. They also increase their intrinsic market value, thanks to the support of intermediary actors (e.g. opinion leaders) and the development of profitable products. On the one hand, this increase in value enables private investors (and particularly the initial venture capitalists) to make a profit at the first stage of the products' sale and at the final stage of the start-up's sale to the large stock-market-listed groups. On the other hand, this increase in value enables the entrepreneur to make more money, thanks to

the buyout of the start-up by a multinational, which often already has a stake in the company through corporate venture terms (Garel & Jumel, 2005).

Generally speaking, medtech start-ups are being less and less viewed as nascent productive companies and more and more as socio-technical devices designed to be marketed. In other words, the medical product developed by a start-up becomes just one of various identifying features of a marketing concept which is sold in the form of a complex entrepreneurial project.

In a process of perpetual reinvestment, money made on the sale of the start-up is often reinjected into the system by the entrepreneur to set up a new one. Developed through a regional business incubator, a local start-up is involved in the development of neurostimulation technologies enabling improved therapies for neurological diseases. This start-up is a good example of the described phenomenon, as the statement of the main contractor confirms: "During the creation phase of my start-ups, my objective was clearly defined; I wanted to create a new medical application and a new enterprise potentially attractive for investors and specific multinational enterprises interested in a firm purchase." This innovative business was recently bought out by an American multinational, wanting to apply the concept developed by the start-up to its own products. Consequently, the medical device is no longer just considered a panacea through which to develop the business and to expand to become leaders within their sector; rather, the product is seen as the medium through which the business's image is to be promulgated, to attract investors and ultimately sell the start-up.

In our particular case, the construction of the medtech start-up market in Western Switzerland occurs through the intermediation of "legitimating third parties" whose power is enacted in specific events and forums. While an entrepreneur's network of contacts and their friends and family may provide the necessary cognitive and financial resources to get a start-up going (Crevoisier, 1997; Grossetti, 2006), intermediary actors help boost the value and legitimacy of an innovative business in the eyes of investors and market product distributors. When seeking financing, a market for their products and the requisite certification for their devices, entrepreneurs call upon opinion leaders, key figures in the medtech sector. Crucial players in the dissemination of new products (Van Eck *et al*., 2011), they are capable of influencing the opinions, attitudes, motivations and behaviour of others, and define themselves as "people in a social network who, in the diffusion of product and technologies, have greatest influence on their acknowledgment or adoption by other people" (Cho *et al*., 2012, p. 97). Largely made up of specialist doctors within the medical field of the product in question, opinion leaders provide legitimacy and credibility for both the start-up and the medical device, firstly in the eyes of investors and secondly, of distributors and their customers (Figure 5). Without this specific support, entrepreneurs would be hard-pressed to mobilize the capital required to develop their products or to raise the interest of investors and distributors in their medical applications.

In opposition to Florida and Kenney's arguments (1988), investors' evaluations of start-ups and their products are not based purely on the criteria of originality, patents or the presence of competitive businesses on the market. On the other hand, investors' valuations are based primarily on quality considerations (in relation to ratings agency certifications) as well as the credibility afforded them by opinion leaders and a product's potential range of applications. Similarly, the legitimization of these products by opinion leaders occurs in specific locations, notably business platforms (Cooke *et al*., 2011; Gawer, 2011), represented by trade fairs, specialist shows or medical conferences. These privileged

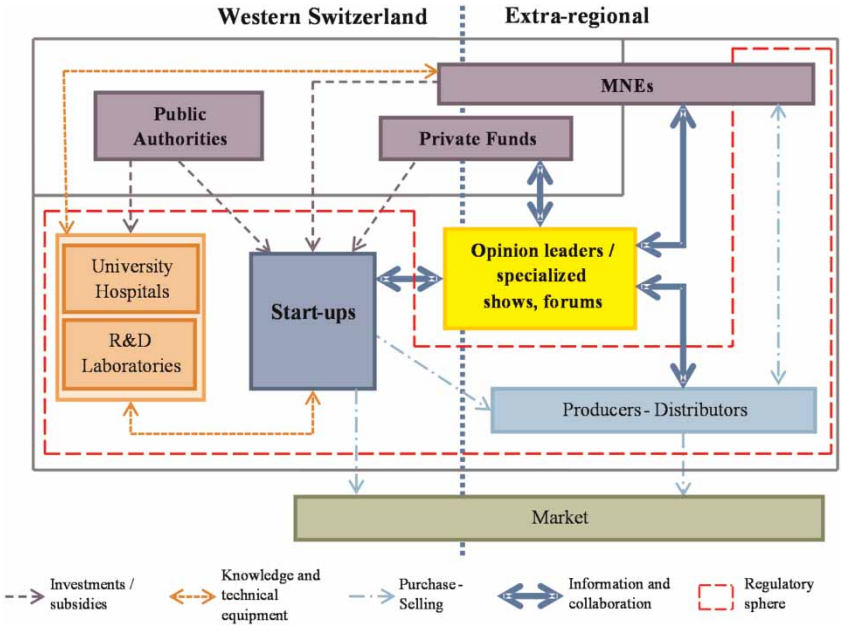


**Figure 5.** Medtech start-ups in the local environment and the role of legitimating third parties. *Source:* Author's own work.

meeting places shape relations between actors by, on the one hand, enabling entrepreneurs to present their own business to specialists within the field, and, on the other hand, conferring both technical and symbolic value upon the products through the support of opinion leaders.

## Discussion: Re-conceptualizing Start-ups in Regional Innovation

Based on the case of the medical industry in Western Switzerland, and more specifically start-ups in the region, we have discerned three key issues (Table 2): (1) the development trajectory of start-ups and the resources mobilized, (2) the modalities of their market evaluation and valorization and (3) the spatial organization underlying their evolution.

Firstly, medtech start-ups are primarily born of entrepreneurial instinct, which follows on from an entrepreneur's higher education. Unlike the traditional creation of innovative companies by the "intrapreneuriat" (Hulsink & Manuel, 2006; Hatchuel *et al.*, 2009), the creation of innovative medtech businesses is less dependent on the entrepreneur's having prior experience in a relevant business. In fact, it is often the result of an individual attempting to respond to real-life problems that he or she has encountered, and the desire to ultimately make a profit when it is sold to a large group. In this situation, the requisite technologies are often to be found in the region, thanks to its numerous research laboratories. By analogy with Crevoisier (1997), when creating start-ups, entrepreneurs primarily rely upon their own personal network of contacts for financial resources. However, in the product certification and manufacturing phase, it is corporate venture capital (Garel & Jumel, 2005) which is most often relied upon.

**Table 2.** Two contrasted start-up approaches

| | | Start-up as nascent enterprise/industry | Start-up as products |
|---|---|---|---|
| Entrepreneurship/ emergence | | Entrepreneurial project of a productive business | Market solution and entrepreneurial concept incubated after leaving higher education. |
| Technology | | To develop and exploit within production | Made available as a concrete prototype and entrepreneurial concept |
| Product | | Market commodity | Socio-technical component of an entrepreneurial concept |
| Objective of entrepreneur | | Development of a new product (exploitation over the long term) | Selling the start-up to a MNE during the emergence phase (added value on equity) |
| Investments | | Proximity capital and traditional bank loans | Public and private proximity capital and corporate venture investments |
| Start-up evaluation | | In the product market | Legitimacy of the entrepreneurial concept by intermediaries (credibility, trust of opinion leaders, etc.) and financing actors |
| Territoriality of relations (temporal evolution) | 1 | Local | Local and multi-local |
| | 2 | Supplements coming from elsewhere | Multi-local (selective anchoring) |

*Source:* Author's own work.

Secondly, the territorial aspects of the innovation processes studied and the medtech start-ups in Western Switzerland indicate that medical devices are now created and developed using resources from both local sources (local capital and technologies) and multi-local sources (venture capital and corporate venture capital). Interactions between regional actors are based on local relationships of trust, similar to those described in the approaches to territorial innovation models (Moulaert & Sekia, 2003). These actors develop networks which enable them to combine regional competencies and to create productive synergies (Scott, 2006). However, innovative businesses are increasingly part of networks which transcend regional boundaries. Medtech start-ups both need and benefit from multi-local networks in order to attract the requisite financial resources to develop their products and to interact with key market players such as distributors and opinion leaders. Thus, the local anchoring and subsequent development of the innovative business are quite weak following the start-up's acquisition by a multinational, which often relocates it outside of the region.

Thirdly, the ultimate aim of medtech start-ups and those who start them is no longer to develop a new business producing medical devices over the long term, but rather to create a socio-technical concept to sell on to a large group in the medical industry within the short to medium term. For innovative businesses to attract the attention of these large groups, start-ups require the support of key intermediary figures: opinion leaders. As highlighted by Van Eck *et al.* (2011), these actors confer legitimacy upon and create confidence around start-ups and their products, enabling them to attract the necessary resources to set up a business and create products. In this particular situation, the start-up's value is based

not only on technical factors but also on the legitimacy and symbolic value conferred upon it by intermediary actors.

## Conclusion: What Life Cycle Approach to Territorial Competitiveness?

Characterized by much diversified firms, technologies and products, medtech activities in Western Switzerland are primary related through their common market orientation. Highly regulated by international technical and safety norms and organized around large strategic players (e.g. hospitals or large medical equipment suppliers), entering such a market is particularly difficult for new comers. Building up their own production tools and distribution channels often requires unaffordable investments for start-ups.

In this context, strategic partnerships or mergers with established multinational companies are usually seen as the most pragmatic—if not the only—way to pursue their industrial development. Consequently, start-ups tend to be conceived from their creation as products commoditized and qualified by various socio-technical devices in market (e.g. certificates, awards or opinion leaders). If such a phenomenon is particularly enhanced in the context of medtech activities, more general considerations and concerns for territorial innovation can be drawn out of this specific case.

If the dual dimension of start-ups, either as "nascent enterprise/industry" or as "product", has always been recognized (Kenny & Von Burg, 1999), territorial innovation models and policy (best) practices traditionally tend to associate their emergence and growth with the development of local industries, either as industrial pioneers or as innovative spin-offs embedded in a regional production system. This vision reflects a spatial division of labour "pushed" by innovators and investors originating from developed countries. This also postulates a limited mobility of production factors (e.g. firms, technologies and workers) in the industrial growing phase of regional innovation.

Adopting such a traditional approach leads to interpreting the case of medtech activities in Western Switzerland as the emergence of a new cluster meant to develop and create new competitive enterprises and industrial boundaries, to provide new regional growth of revenue and employment in the region. In other words and by analogy to the canonical model, this could be viewed as the emergence of a Swiss "Medtech Valley".

However, such an interpretation could fall short of a pertinent analysis when considering future challenges for regional medtech activities. A greater emphasis on start-ups as "products" raises new avenues for research and policy approaches to territorial innovation and competitiveness. Three fundamental open questions seem to us crucial to be asked in this regard (Figure 6).

Firstly, "will regional innovation systems be confined to short-run project life cycles of emergence and reemergence?" In the medtech case examined in the article, entrepreneurial projects seem to consist more and more in combining existing knowledge (science, technology and culture based) in a business idea and advertising it through a start-up concept meant to generate itself a profit. Such projects mirror a knowledge-based economy marked by permanent innovation where the constant renewal of entrepreneurial projects becomes the key factor of competitiveness. In this view, more stable phases of industrialization tend to be shaded by perpetual sequences of emergence and reemergence. Beyond a life cycle approach, future research avenues and policy issues will have to be able to identify the industrial dynamics of growth induced, or not, by this "project

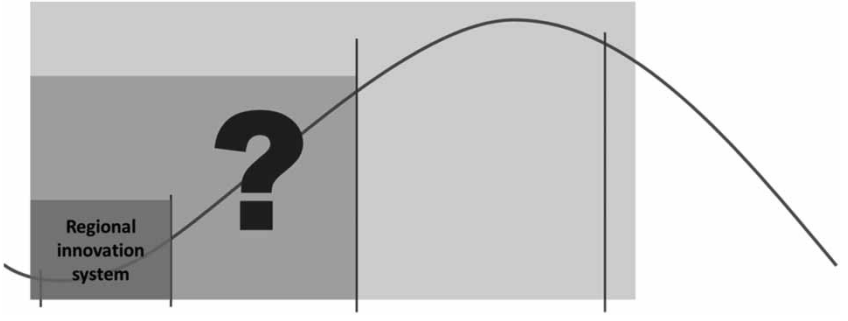


**Figure 6.** What new life cycles of territorial growth?
*Source:* Author's own work.

ecology" (Grabher, 2002b) and to understand how they contribute, or not, to broader regional innovation systems.

Pursuing a same line of reflection, a second provocative question arises: "will commoditized entrepreneurial projects become the new revenue model of lead innovative regions?" Regional competitiveness is usually conceived as the capacity to produce innovative goods or activities and to export them. Sold as products, entrepreneurial projects become themselves commoditized revenues for innovative regions. Within global production and financial networks, innovators and investors are, nowadays, not only situated in the traditionally called "developed countries". Highly mobile, knowledge and financial resources circulate and anchors across territories, pulled by foreign direct investments chasing most attractive innovations and entrepreneurial projects. Purchased in the early phase of emergence, innovations can be more easily relocated according to the corporate strategies of multinational companies. Depicting today's territorial revenue models should be at the core of future research and policies agenda to understand how regional wealth is actually generated. Traditional export-base models of growth will certainly have reconsidered in such enterprise.

Finally, these two fundamental questions underlie the general exploratory question: "how current regional innovation systems will be able to position themselves within global networks to attract and anchor knowledge and financial resources?" As pointed out by the case of Swiss medtech start-ups, being competitive today is not only being innovative. Policies of knowledge creation and transfer are for sure influent factors of regional innovation. However, as illustrated earlier, local innovation is also about being able to advertise local entrepreneurship to global players and investors. It is also about thinking how such projects and the revenue they generate will stimulate the renewal of future projects as well as develop within broader industrial growth.

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## Notes

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2. Research financed by the *Fond National Suisse de Recherche Scientifique* entitled "Cluster Emergence, Renewal and Transition in Switzerland: Evidence from Cleantech, Medtech and the Watch Industry."
3. According to Corbin and Strauss (2008), the saturation concerns reaching the point where "the new" does not necessarily add anything to the story, model, theory or framework.
4. MAXQDA was used as a Computer-Assisted Program to analyse our qualitative data.
5. All statements in this paper have been translated from French by the authors.
6. In the region of 16–24 million Euros.

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