Building Entrepreneurial Ecosystems Conducive to Student Entrepreneurship: New Challenges for Universities

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BUILDING ENTREPRENEURIAL ECOSYSTEMS CONDUCIVE TO STUDENT ENTREPRENEURSHIP: NEW CHALLENGES FOR UNIVERSITIES

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ABSTRACT
We explore the challenges universities face when contributing to the development of an entrepreneurial ecosystem. The lack of efficiency of policies inspired by the traditional entrepreneurial university model, and the fact that students are more active than academic researchers in creating start-ups, lead to student start-up creation being part of the issue of academic entrepreneurship. The higher the number of stakeholders the broader the ecosystem and the more the challenges for universities actively engaged in their development. Our research explores the mechanisms used by universities in triggering transformation of the entrepreneurial ecosystem when integrating student entrepreneurship. It is based on a longitudinal study of the University of Strasbourg. Our findings highlight the incremental nature of entrepreneurial ecosystem building, the internal changes operated by universities integrating students’ entrepreneurship activities in their technology transfer policies, and the evolution of policies oriented to the development of an entrepreneurial culture.

Keywords: Entrepreneurial Ecosystem, Academic Entrepreneurship, Student Entrepreneurship, University, Academic Start-Up

Codes JEL: M13, O32

Research on academic entrepreneurship evolved from a focus on spin-offs founded by university faculties based on the results of academic research, to a broader focus that includes the creation of start-ups by students (Siegel,
Wright, 2015). This development relies on perceptions of the possible contributions of universities to society, not limited to the economic exploitation of academic knowledge through licensing and spin-off creation by researchers, but achieved through consultancy, conferences, teaching, student placement and the creation of new ventures (Link et al., 2007; Stephan, 2009). Integrating student start-ups in academic entrepreneurship leads to a broader vision of entrepreneurship and the relevant stakeholders. These start-ups are not confined to high-tech sectors; they may emerge from social science, be non-technological, and promote values from the social and solidarity economy.

In the traditional model of the entrepreneurial university, based on the objective of maximizing the returns from intellectual property, the main stakeholders are researchers, technology transfer offices (TTOs), science parks, incubators, venture capitalists, and large companies. Including in the problem student start-ups increases the number of actors involved in the entrepreneurial ecosystem (Wright et al., 2017). Students are obvious stakeholders but alumni, university teachers, new generation incubators, accelerators and the companies supporting them, co-work spaces, institutional actors supporting entrepreneurship, and public authorities that implement strategies to develop local entrepreneurship are also relevant stakeholders. To be part of an ecosystem and to contribute to developing an entrepreneurial culture they have to be connected and coordinated (Isenberg, 2010; Spigel, 2015; Matt, Schaeffer, 2015).

In this paper, we explore the mechanisms used by one university in triggering the transformation of the entrepreneurial ecosystem when integrating student entrepreneurship in the academic entrepreneurship issue. Our research is based on a longitudinal study of the University of Strasbourg, which has had a technology transfer policy in place since the 1980s. It can be considered an exemplar of the evolution of the entrepreneurial university model over time, starting to develop academic entrepreneurship based on the traditional model and evolving recently to student entrepreneurship. Section 2 provides a review of the literature on the evolution of academic entrepreneurship and the effects it induces on the design of the entrepreneurial ecosystem. Section 3 describes the methodology adopted and the case studied to identify the mechanisms used by the university to contribute to building an entrepreneurial ecosystem. Section 4 presents the findings, which are discussed in Section 5.
LITERATURE REVIEW: ACADEMIC ENTREPRENEURSHIP AND ENTREPRENEURIAL ECOSYSTEMS

The literature review considers the evolution of the concept of academic entrepreneurship, which is accompanied by an evolution in the design of an entrepreneurial ecosystem.

The Evolution of Academic Entrepreneurship

Alongside the university’s traditional research and education missions, the entrepreneurial university is active in the commercialization of knowledge and the innovation dynamic in the economy (Etzkowitz et al., 2000). In this model, the university is particularly active in patenting, licensing, start-up creation, and university-industry partnerships. Influenced by the successful Route 128 and Silicon Valley models, academic entrepreneurship has been perceived by policy makers in many countries (Wright et al., 2006) as an essential mechanism to stimulate innovation and economic growth (Shane, 2004; Mustar et al., 2006; O’Shea 2007). Interest in academic entrepreneurship emerged in the mid-1990s and was focused mainly on the establishment of spin-off companies by university faculties (Shane, 2004).

The model of the entrepreneurial university has inspired science policy in many countries since the end of the 1980s. OECD country governments have adopted sets of similar measures to drive the development of academic spin-offs resulting from the creation of academic knowledge (Grimaldi et al., 2011). Universities have been encouraged to create technology transfer offices (TTOs) to develop complementary competences and resources to support patenting activities, to grant licenses to incumbent firms, and to support the creation of new ventures (Siegel et al., 2007). TTOs play central roles as boundary spanners between the academic and economic worlds. Since the 2000s, the number of university incubators has increased substantially. These incubators provide services to researchers engaged in the creation of new ventures and link them to actors in the entrepreneurial ecosystem (Hackett, Dilts 2004; Vohora et al., 2004). More recently, universities have begun to create proof of concept centres (PoCC) to stimulate the emergence of patentable inventions by supporting researchers in the lengthy process of the transformation of laboratory experiments to proofs of concept (Hayter, Link, 2015).

In addition to these structural evolutions, legislative changes have also been implemented. The US Bayh-Dole Act has been followed in many
countries by legislation favouring university patenting activities which are considered to be a first step towards the creation of academic spin-offs (Grimaldi et al., 2011). In this approach, the university behaves as a knowledge factory that commercializes the results of academic research (Youtie, Shapira, 2008). Academic research quality, the presence of star scientists (Colombo et al., 2010, Clarysse et al., 2011), research specialization in life sciences and chemistry are identified as necessary conditions for the development of academic entrepreneurial activities (Clarysse et al., 2005).

Not all universities correspond to this model of the entrepreneurial university; however, they adopt similar strategies focused on patenting, licensing, and the creation of academic spin-offs, encouraged and supported by their national governments. They do not lead to all of the intended effects, which shows the importance of coherence between the strategies adopted, the university’s specificities, and the context (Wright et al., 2008; Siegel, Wright, 2015). Universities need to formulate strategies that are adapted to their specific internal resources and local context (Etzkowitz, Dzisah, 2008).

Universities have an active role in regional development and the local innovation dynamic. The triple helix model of university (Etzkowitz, Leydesdorff, 2000) refers to a dynamic of knowledge creation and innovation based on recursive and cross-institutional relations among universities, industry, and government. This dynamic can be observed at the national and global level and relies partly also on regional conditions, because spatial proximity among the actors involved in knowledge creation and innovation matters (Asheim, Gertler, 2005; Breschi, Malerba, 2001). While the triple helix model describes a structural-level force, Cooke (2005) proposes a more contextualized approach. Regional knowledge capabilities are key in the local effects emerging from specific regional systems of innovation that contribute to national and global dynamics (Cooke, 2001). Etzkowitz (2008) investigates the regional dimension of the triple helix model, and describes regional consensus spaces as emerging from collaboration among the regional stakeholders involved in knowledge creation and innovation, leading to the definition of common regional strategies aimed at promoting regional development. An important challenge in this context is the development of a collective vision integrating regional specificities to promote the transfer of knowledge between institutions, and especially from scientific research to firms (Morgan, 2007).

The elaboration of alternative strategies based on an analysis of regional weaknesses and opportunities assumes a contribution of the entrepreneurial university to society that is broader than patenting, licensing, and start-up creation. Its contribution relies on many aspects of academic engagement (Salter, Martin, 2001; Perkman et al., 2013; Filipetti, Savona, 2017)
including contractual relations such as collaborative research, contractual research, and consulting, and non-contractual relations such as conferences, networking with practitioners, ad hoc advice, participation in industry expert groups, teaching activities, supervision of PhD students, and student placements (Landry et al., 2007; Link et al., 2007). These activities are complementary and contribute to the economic and societal impacts of university activities (Grimpe, Hussinger, 2013). They benefit from academics’ prior experience in the non-academic world (Gulbrandsen, Thune, 2017).

The Entrepreneurial Ecosystem in a Larger Vision of Academic Entrepreneurship

The role of teaching activities as a way to transfer academic knowledge from the university to society through the placement or creation of new ventures by students has been largely neglected (Stephan, 2009; Shah, Pahnke, 2014; Siegel, Wright, 2015). Some remarkable examples, such as Google or Facebook created by Stanford and Harvard students, shed light on the potential contribution of students to entrepreneurship. Since the 1980s, the interest of governments in new venture creation to stimulate economic activity, and the increasing interest of students in entrepreneurship have led to the introduction of entrepreneurship programs in many universities (Hayter et al., 2016). The notion of student entrepreneurship for a long time was confined to the education field, and student entrepreneurship was seen as different from academic entrepreneurship. In a study of the role of graduate students in university spin-off companies, Hayter et al. (2016) provide evidence that student entrepreneurship is linked closely to faculty entrepreneurship. The authors show that graduate students play a major role in the initial establishment of academic spin-off companies and the development, growth, and reconfiguration of spin-offs over time. This evidence and the adoption of a broader vision of the contribution of universities to society has led to an enhanced vision of academic entrepreneurship including the issue of student entrepreneurship (Shah, Pahnke, 2014; Wright et al., 2017).

Much research analysing the influence of the local context on academic entrepreneurship focus on faculty entrepreneurship (Wright et al., 2008, Harrison, Leitch, 2010, Fini et al., 2011; Matt, Schaeffer, 2015). Universities belong to the local ecosystem which is characterized by economic, institutional, legal, cultural, social and political factors. The latter influence the local dynamics of new venture creation (Cohen, 2005; Spigel, 2015). An entrepreneurial ecosystem involves many actors and relies on mechanisms that influence the emergence of entrepreneurial opportunities, the individual ability to identify them, their willingness to create a new venture,
and their ability to develop a project (Isenberg, 2010). The presence of large firms, start-ups, qualified human resources, venture capital, world-class universities, a local entrepreneurial culture, and government support for entrepreneurial activities have been identified as success factors for the development of academic entrepreneurship (Lee et al., 2000; O’Shea et al., 2007). According to Spigel (2015), an entrepreneurial system can be characterized along three interacting dimensions: (i) the material dimension, which relies on the presence of local actors and the institutional context; (ii) the social dimension, which is based on links between the actors in the ecosystem (see Figure 1), and (iii) the cultural dimension determining local demand for entrepreneurial activities.

The local context is important for student entrepreneurship. Hayter et al. (2016) show that the links between graduate students and individuals outside the university, and access to external resources are required for new venture success. An ecosystem conducive to student entrepreneurship includes entrepreneurship courses for students, business plan competition, grants, accelerators, co-work places (Wright et al., 2017) that are not necessarily elements of an entrepreneurial ecosystem conducive to faculty entrepreneurship (Schaeffer, Matt, 2016). Investors such as venture capitalists, business angels, grants, managers of business plan competition or of start-up contests are central actors of entrepreneurial ecosystems for students. The dynamic of new venture creation is more important in an ecosystem in which networks develop, actors are coordinated, and the complementarities among stakeholders are exploited (Neck et al., 2004; Isenberg, 2010). In this paper, we investigate the mechanisms used by the university to build over time an entrepreneurial ecosystem conducive to faculty and student entrepreneurship.

**METHODOLOGY**

This section describes the methodology used to identify the mechanisms developed by the university in the design of an entrepreneurial ecosystem, and the main features of the university and the local context studied.

**A Longitudinal Case Study**

The aim of this study is to analyse how the enlargement of academic entrepreneurship has affected universities strategies and the evolution of the entrepreneurial ecosystem. To understand the logic of these actors and the evolution of the micro mechanisms supporting their strategies, we chose a
single case study (Eisenhardt, 1989) and a processual approach (Pettigrew, 1997). The selected case can be considered an exemplar (Yin, 1994), and is representative of those universities that have been heavily involved in the development of academic entrepreneurship since the early 2000s in France.

The case we analyse is the University of Strasbourg. We conducted a longitudinal study to highlight the links between the evolution of national policy tools supporting the commercialization of academic research, and the evolution of university academic entrepreneurship development strategies. The University of Strasbourg is multidisciplinary, is ranked third in France based on its size (47,000 students in 2016), and is a pioneer university in terms of commercialisation activities in France.

We collected data about the evolutions of the ecosystem, their political and strategic foundations and the development of new links between the different actors over a period of 16 years. These evolutions were not observable, but revealed through interviews of the different actors actively involved in the triggering of mechanisms leading to the evolution of the entrepreneurial ecosystem. We asked them to describe the evolutions of the system and the mechanisms triggering them. Table 1 summarizes the number and types of semi-structured interviews conducted. Interviews with a variety of stakeholders (TTOs, university leaders, students, researchers, start-up creators, innovation intermediaries) present at different steps of the venture creation process provided rich and reliable data. The timing of our interviews corresponded to critical changes at the national and regional political level, which induced changes at the university and local levels. We also consulted the archives, financial documents, and websites of the various actors to crosscheck the information gleaned from the interviews.

Table 1 – Number and types of semi-structured interviewees

<table>
<thead>
<tr>
<th>Players Interviewed</th>
<th>Number of Interviews</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>National director of PEPITE¹</td>
<td>1</td>
<td>2016</td>
</tr>
<tr>
<td>Incubator director</td>
<td>2</td>
<td>2006, 2012</td>
</tr>
<tr>
<td>PEPITE director and employee</td>
<td>2</td>
<td>2016</td>
</tr>
<tr>
<td>Innovation intermediaries (cluster, venture capital)</td>
<td>3</td>
<td>2012</td>
</tr>
<tr>
<td>Development agencies</td>
<td>2</td>
<td>2012</td>
</tr>
</tbody>
</table>

¹. PEPITE stands for Pôle Etudiants Pour l’Innovation, le Transfert et l’Entrepreneuriat, which are centres for student entrepreneurship, transfer and innovation
Based on our longitudinal data, we built an events timeline around the main national policy tools. We noted how the University of Strasbourg translated each national support policy into specific activities, decisions, and/or organizational changes. We analysed the elements of the timeline, the interview transcripts, and all additional relevant data. Going back and forth between the theoretical models developed in the literature review and our empirical findings allowed us to characterize the new entrepreneurial university model. We highlighted how the university modified the features of its entrepreneurial ecosystem by implementing new activities and resources to promote student entrepreneurship. Our case reveals the dynamics of an entrepreneurial ecosystem and the university’s strategy.

**The case study**

We chose the case of the University of Strasbourg—a multidisciplinary university that presents many features characterizing the entrepreneurial university. The University of Strasbourg is an important French academic research institution, engaging traditionally in basic research. Some of its researchers have been awarded national and international scientific prizes including four Nobel Prizes. In 2016, its student enrolment was around 47,000 students accompanied by 2,700 faculty members, and an overall budget of some €516 million.

Since August 2007, French universities have had more autonomy which has allowed them to define their own strategies. University presidents have greater power and are overseen by the university board of directors. Universities can create foundations to increase their financial autonomy. In 2010, the French government launched a huge investment project (Investment for the Future) which included €22 billion dedicated to research and higher education. This led in particular to the creation of SATTs (Sociétés for Accelerating Technology Transfer), which are TTOs aimed at increasing the efficiency of licensing, start-up creation and researcher mobility. SATTs benefit from public funding to support the development of academic project from the proof of laboratory to the proof of concept stage.

Alsace is a small territory but is one of the wealthiest in France. It encompasses strengths that have a positive impact on start-up creation: a complete operational system of knowledge transfer and diffusion (SATT, regional incubator, technical centres, and platforms) and internationally recognized universities, and public research organizations specialized in chemistry and life sciences, and new materials. However, Alsace has certain weaknesses such as a low share of private R&D concentrated in the larger companies,

...
and a shortage of venture capital and high-tech services. The University of Strasbourg is a key player in the regional innovation system.

FINDINGS

The case studied shows how the ecosystem evolved from the “traditional” model focused on academic research-based start-ups to a model that includes student entrepreneurship.

The Entrepreneurial Ecosystem Under the Traditional Entrepreneurial University Model

The case of the University of Strasbourg exemplifies the incremental building of an entrepreneurial ecosystem that began many years before the integration of student entrepreneurship. In 1987, the University of Strasbourg, on its own initiative established one of the first TTO in France. Its mission was to manage intellectual property and to provide administrative support for the management of contractual relations between university researchers and external partners. The TTO integrated the goal of developing academic entrepreneurship in the early 2000s. At the same time, France had begun adopting similar policies to many other countries (Mustar, Wright, 2010; Grimaldi et al., 2011), and implementing a series of policy tools to support the development of academic entrepreneurship (cf. Table 2). Motivated by various national initiatives, the University of Strasbourg created a range of intermediaries (incubator, PoCC, TTO services) and played an active role in the construction of the local entrepreneurial ecosystem (Schaeffer, Matt, 2016).

In 1999, an innovation law created favourable national conditions for academic researchers to create their own companies based on their research results, and pushed universities to create regional incubators. In 2000, the University of Strasbourg together with active regional stakeholders (other Alsatian universities, public research organizations, engineering schools, regional agencies, local representatives of national level, investors, and companies) responded and was successful in a national call for tenders for the creation of a regional incubator. This can be identified as the start of an active entrepreneurial policy in the University of Strasbourg.
Table 2 – Implementation of national policy tools based on the “traditional” entrepreneurial model

<table>
<thead>
<tr>
<th>Year</th>
<th>Policy tools</th>
<th>Role—objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Regional Incubator</td>
<td>Creating an intermediary between the research sphere and the economic world. Fostering start-up creation</td>
</tr>
<tr>
<td>2001</td>
<td>Creation of TTOs (SAIC²)</td>
<td>Creating an internal TTO competent and flexible for the development of valorization activities</td>
</tr>
<tr>
<td>2005</td>
<td>Network of TTOs (Conectus)</td>
<td>Coordinating local actors of valorization: from profit maximization to a local economic approach</td>
</tr>
<tr>
<td>2005</td>
<td>Creation of a maturation fund</td>
<td>Financial support answering to needs specific to academic entrepreneurship of researchers</td>
</tr>
<tr>
<td>2012</td>
<td>Creation of the SATT</td>
<td>Supporting regional economic development based on high-tech innovations</td>
</tr>
</tbody>
</table>

Figure 1 – An entrepreneurial ecosystem supporting academic researchers

In 2005, Strasbourg and Haute Alsace universities, two engineering schools, the University Hospital of Strasbourg, the local branch of the National Centre for Scientific Research—CNRS—, and the National Institute for Medical Research—INSERM—adopted a cooperative strategy and created Conectus, a structure aimed at pooling the resources of their

2. SAIC stands for Service des Activités Industrielles et Commerciales, which are internal TTOs
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respective TTOs (Matt, Schaeffer, 2012). The primary objective was to establish a common development fund which became the precursor to the PoCCs. The PoCC was created in 2012 by the founders of Conectus in the form of a SATT. As a PoCC, the SATT gathers large amounts of development funding which provides support for spin-off projects. Its aim is to support the economic development of the region through a relevant licensing and start-up creation strategy.

Since 2012, the University of Strasbourg is involved at the regional political level as a member of the Regional Innovation Steering Committee which defines the strategic direction of regional innovation. The University acquired increased political power at the regional level (Schaeffer, Matt, 2016) and is an active contributor to the entrepreneurial ecosystem by creating links with several local actors (see Figure 1).

**Student Entrepreneurship and the Entrepreneurial Ecosystem Expansion**

Support for student entrepreneurship as an explicit objective of the University of Strasbourg was motived by several national political initiatives. Since 2009, the French government, and especially the Ministry of Higher Education and Research launched several policy tools (Table 3) to foster student entrepreneurship.

**Table 3 – The new policy tools oriented towards student entrepreneurship**

<table>
<thead>
<tr>
<th>National Policy Tools</th>
<th>Implementation at the University of Strasbourg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Centre for Student Entrepreneurship (PEE)</td>
<td>Creation of ETENA (Entrepreneur Student in Alsace): structuring entrepreneurship education at the University</td>
</tr>
<tr>
<td>2014 Student Centre for Innovation, Transfer and Entrepreneurship (PEPITE)</td>
<td>Adaptation of ETENA: Pool innovation, research and education issues at the regional level</td>
</tr>
<tr>
<td></td>
<td>Creation of an entrepreneurial spirit and culture</td>
</tr>
<tr>
<td>2015 Innovation and Entrepreneurial Culture (IEC) (Investment for the Future Program)</td>
<td><strong>Entrepreneurship Beyond Borders (EBB):</strong> Support of international entrepreneurial projects</td>
</tr>
<tr>
<td></td>
<td>Diversified institutional partnership</td>
</tr>
</tbody>
</table>

3. PEE stands for Pôle Entrepreneuriat Etudiant or center for student entrepreneurship

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Student Entrepreneurship Centres (PEE): A Focus On Education to Entrepreneurship

In 2009, a first call for tender was published resulting in 20 Student Entrepreneurship Centres (Pôles de l’Entrepreneuriat Etudiant or PEE) being created in France with the aim of developing a culture of entrepreneurship among students (Boissin, Schieb-Bienfait, 2011). One of these PEE was in Strasbourg. The objectives were to provide training and interest in entrepreneurship as part of the university undergraduate experience for as many students as possible. Universities were invited to design courses, conferences and events focused on and fostering entrepreneurship, innovation and occupational integration. The PEEs were born with the idea of bringing together, at the local level, incubators, chambers of commerce and chambers of industry, universities, and engineering and business schools which would be committed to developing collective common actions. The Alsatian entrepreneurial ecosystem was sufficiently mature and many of these actors had been cooperating for at least 10 years. Therefore, convincing them to work together was not a problem. It was generally acknowledged that collective working provided important added value.

Student Centres for Innovation, Transfer and Entrepreneurship (PEPITE)

In 2014, a new call for proposals was published by the Ministry of Higher Education and Research resulting in 29 Student Centres for Innovation, Transfer and Entrepreneurship (Pôles Etudiants Pour l’Innovation, le Transfert et l’Entrepreneuriat or PEPITE). They were aimed at increasing and extending awareness of and training in entrepreneurship and innovation at all levels of university and engineering and business school degree courses. These entrepreneurship courses, regardless of type of degree or discipline, would allow the students to gain a certain number of European Credits Transfer System (ECTS). The Ministry created a PEPITE grant (€5,000 to €20,000) available to students who created start-ups. The novelty of the PEPITE programme was that it created the status of entrepreneur student, which would be available to students registered at university and graduates for up to one year after graduation. The entrepreneur student would benefit from several advantages including the following:

- mentoring from an academic and an external professional
- support from various ecosystem actors
- access to co-work spaces, information on funding possibilities and legal aspects of firm start-up
- award of the degree University Diploma of Student Entrepreneur
ability to replace a student placement with a start-up project
receipt of student social security benefits up to the age of 28
keep scholarship based on social criteria
access to student mutual funds.

The strengths of PEPITE are that it is open to the local entrepreneurial system, is region-based, and is associated to economic actors and associations. The implementation of PEPITE led to a new structure—ETENA—created and supported by the universities of Strasbourg and Haute Alsace, engineering schools, the incubator, the chambers of commerce and industry, the region, and the urban communities of Strasbourg and Mulhouse. These actors were already active in the entrepreneurial ecosystem and facilitated implementation of the programme, which required coordination among actors.

The entrepreneurial dynamic includes besides researchers and students registered at the university, primary and secondary school students, students from other universities, dropouts from university and underprivileged youth. The diversity of this population has led to the development of links with numerous stakeholders responsible for education and unemployment problems at the local level, and with the group of actors supporting entrepreneurial activities at the city level, such as co-work spaces, fab-labs, big firms with recent involvement in the local incubator, accelerators organizing start-up competitions (e.g. “24 hours to create your company”), start-up week-ends, and events for PhD students.

An Innovation and Entrepreneurship Culture
In 2015, a national call for proposals was published within the “Programme d’Investissement d’Avenir” (Investment for the Future). This call for proposals in the area “Culture of Innovation and Entrepreneurship” was funded with the sum of €20million. The underlying policy rationale was that an entrepreneurial culture and R&D are the main drivers of innovation. The aim is to increase the scale of the entrepreneurial culture by increasing the number of young people benefiting from an entrepreneurial education. The projects eligible for this call needed to be based on existing infrastructures, and involve private (associations, foundations and companies) and public (PEPITE, higher education institutions, colleges, high schools, and local administrations) actors. The projects should be designed to foster the dissemination of informatics skills in young people and promote an entrepreneurial spirit and innovative activity. In 2015, the University of Strasbourg, in collaboration with eight partners (University of Haute Alsace, Start Hop, Association for the development of entrepreneurs and
competences, Incubator, the network of Alsatian engineering schools, local administrations) submitted a successful joint proposal for a project entitled “Entrepreneurship Beyond Borders” (EBB).

The aim of EBB is to promote, among students and younger people, the emergence of an intercultural and cross-border entrepreneurial society throughout the Upper Rhine region (France, Germany and Switzerland). The project has four axes: to capitalize on existing good practices in France, Germany and Europe; to create a cross-border co-work space enabling students to share, learn and engage in entrepreneurial activities; to coordinate cross-border entrepreneurial ecosystems (related to business start-ups and business acquisitions); and to attract international talents to create start-ups.

*Figure 2 –* An entrepreneurial ecosystem supporting researchers and students (formal links)

The entrepreneurial ecosystem (Figure 2) is characterized by a diversified institutional partnership involving collaboration among actors (high schools, higher education institutions, associations, companies, local administrations). The new actors created by the higher education institutions (ETENA and EBB), focused on student entrepreneurship, are linked (formally or informally) to existing institutional actors specialized
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in research-based start-ups (incubators, innovation intermediaries, venture capitalists, other funding partners, etc.). Their activities and resources have an international, cross-border dimension with all the above-mentioned actions undertaken by EBB. The academic and professional mentoring and other types of coaching activities developed by ETENA and the EBB programmes, are enriching these links and the sharing of good practices and experiences among the actors at the local level.

Creation and Involvement of New Players Within Universities

PEE and PEPITE have not led to the introduction of new ecosystem actors. It involves universities, business and engineering schools, incubators and investors which were already linked within the local ecosystem. However, within universities and various schools, new players (teaching and occupational integration departments) are getting involved in the development of student entrepreneurship education. PEE relies on the creation of new courses and conference series, and involvement of teachers and professionals to supervise the student projects. The PEPITE programme led to the creation within the University of Strasbourg of ETENA, a new structure attached to the department responsible for student placements, occupational integration and employment, and which is a new player—not involved in faculty entrepreneurship. The population of students targeted by PEPITE and EBB is very broad at the local level and includes students from various universities, business schools, engineering schools, and primary and secondary schools. The result is that at least one and often several individuals in each of these institutions is involved in the entrepreneurial ecosystem. In the largest institutions, such as universities, which have a formal structure and complex decision making process, it has required the setting up of new structures (ETENA, EBB), internal collaboration between departments (teaching, occupational integration, ETENA, EBB—see Figure 2) and political willingness to promote changes to work patterns.

Increased Interest in an Entrepreneurial Culture: Internal and External Challenges

The various programmes that have been created (PEE, PEPITE, EBB) have increased the diffusion of the entrepreneurial culture and entrepreneurship education. The first initiatives were focused mainly on creating awareness, promoting entrepreneurship skills and encouraging learning about entrepreneurship. PEPITE and EBB are aimed explicitly at developing students’
innovative and entrepreneurial behaviour rather than only the development of entrepreneurship skills. The idea behind these activities is not that every student should create his or her own job or company, but that they should acquire some entrepreneurial skills and adopt entrepreneurial behaviour that will promote innovation more broadly. Innovation involves more than high-tech start-ups based on academic research results. It should contribute to society and the economy through the promotion of personalized services, shared economic platforms, creative activities and an entrepreneurial attitude in existing firms.

The position of ETENA, attached to the department responsible for student placements, occupational integration and employment in the university, illustrates the aim of producing highly employable graduates. The development of student entrepreneurial activities has led many to question ETENA’s position in the university’s organization, the role of the TTO in student entrepreneurship (it currently is not involved in student new venture projects), and the location of a co-work space (within or outside the university). The different actors are involved in a learning process to develop internal and external cooperation along the project of developing an entrepreneurial culture at the local level. The point of departure is a common vision of the challenges associated to the development of student entrepreneurship.

**DISCUSSION AND IMPLICATIONS**

The case study shows how the university, seizing opportunities offered by national policies, became a strategic player influencing progressive building of the entrepreneurial ecosystem. The starting point of the building of an entrepreneurial ecosystem depends on local assets that can be exploited to support an entrepreneurial dynamic (Spigel, 2015). In Strasbourg, the starting point was the university's strong scientific potential especially in life sciences and chemistry and its international reputation. These assets led to the early creation of a TTO and an incubator and the coordination of actors based on a collective regional development strategy which set the institutional base for the development of the entrepreneurial ecosystem. The University of Strasbourg occupied a strategic position in the process due to the major investments made by the French Government in the form of poles of excellence and the increased autonomy of universities at the national level. Not all universities have the same local assets. An entrepreneurial ecosystem can emerge from the involvement of big companies in entrepreneurial activities. However, this did not apply to the case of Strasbourg.
where private investment in R&D is much smaller than public investment. Young universities established in medium-sized cities do not have the same scientific potential, and the development of entrepreneurial ecosystems may be rooted in the entrepreneurial culture among current students or recent graduate. In Strasbourg, student entrepreneurship in part is associated to the involvement of academic researchers in start-up creation. The development of an entrepreneurial ecosystem depends on a leading actor which may or may not be a university.

Our discussion will underline four important points which were stressed in the literature review and derived by our case study. First, building an entrepreneurial ecosystem conducive to faculty and student entrepreneurship is a dynamic, long term and adaptive process. Second, even if we conceptualize the two entrepreneurial models (faculty-based vs student-based) by distinct rationales, we believe that the two models should be interconnected and should not develop in parallel. Third, universities aiming at developing student entrepreneurship need to operate internal changes. Finally, student entrepreneurship is more about behavioral transformation than firm creation.

**Incremental Building of the Entrepreneurial Ecosystem**

The ecosystem related to the University of Strasbourg was built to support academic entrepreneurship and aimed at maximizing the economic returns for the university and the local context. The connections built among the different actors over time supported the development of an entrepreneurial ecosystem. Wright et al. (2017) suggest that it is not possible to build such an expanded ecosystem from scratch. In our case study, it developed over a period of 30 years based on the entrepreneurial activity, scientific potential and world-class research at the University of Strasbourg. Spigel’s (2015) model of the micro-foundations of ecosystem development, which distinguishes among the material, the social and the cultural dimensions, is useful to characterize the different mutually reinforcing steps in the development of an entrepreneurial ecosystem. In the University of Strasbourg case, the first step was the progressive creation and transformation of the different actors promoted by national policies: TTO, incubator, PoCC, investors, accelerators. The second step was the development of the ecosystem’s social dimension, based on continuous coordination and collaboration among the actors underpinning concrete actions to promote and support academic entrepreneurship. The third step, which constitutes the cultural dimension of the ecosystem, resulted from the progressive evolution of the entrepreneurial dynamic, the diffusion of an entrepreneurial culture and stories of
successes that encouraged other faculty and students to launch new ventures. The programmes launched in 2014 and 2015 were focused mainly on this cultural dimension. The development of student entrepreneurship was the result of diversification of entrepreneurial activities.

The definition of strategies adapted to different kinds of contexts leads to consideration of how student entrepreneurship develops in regions lacking a mature ecosystem. In universities with no scientific potential based on specialization in life sciences and chemistry, the development of student entrepreneurship might trigger the development of academic entrepreneurship. As Spigel (2015) describes in the case of Waterloo, the cultural dimension can be the starting point. In a region with an entrepreneurial culture, a critical mass of new ventures justifies the emergence of new actors such as incubators, investors and big firms supporting this dynamic and constituting the material dimension of the ecosystem. The social dimension emerges from the actors’ interactions over time. Some actors, such as incubators, play an important role in stimulating the social dimension. The university’s strategy then could be to reinforce the student entrepreneurial culture and stimulate entrepreneurial activity that responds to local needs, in existing companies, in new ventures or in professional activities. In this case, the point of departure for building the ecosystem will be different, but the process will be equally long.

**Connecting the “Student-Based” and “Traditional” Entrepreneurial Models**

We highlighted in the literature review the theoretical foundations of the “classical” and the “new” or student-oriented entrepreneurial university models. We showed that in the new model, an eco-systemic approach is important for universities to develop relevant strategies. The empirical part of the paper revealed the main determinants of the two university entrepreneurial models and underlined the evolution of the entrepreneurial ecosystem.

The two models are based on rather different rationales. The “traditional” entrepreneurial system has been built to maximize the economic benefits to the university and the local economy. The student-based entrepreneurial model is conceived as generating broader impacts (environmental, health, social, cultural, political) on society. In our case study, we highlighted that although the new model entails the creation of new structures and new links with local and cross-border actors, these new networks have links to central elements in the traditional network. There is a greater diversity of the local actors involved in the new entrepreneurial model. The cultural and
social dimensions (Spigel, 2015) of the new entrepreneurial ecosystem are developed in various ways including: increased informal relations among the actors; dissemination of success stories related to earlier generations of start-ups; and the building of cross-network alignments in which relevant ideas, links and practices are transposed from the older to the newer network. The two models need not evolve in parallel, but should be interconnected to increase cross-fertilization. Future researchers with a culture of and education in entrepreneurship could become founders of start-ups with high growth potential. Local universities acting as anchor tenants would ensure the interconnection of those two logics and their underlying networks (Clarysse et al., 2014). Anchor tenants are usually large, local R&D oriented organizations (Agrawal and Cockburn, 2003), which help local actors to connect, induce knowledge transfer between actors, favour spillovers and spur economic growth.

**Internal Challenges for Universities**

Student entrepreneurship implies the development of relations among a wide range of individuals within institutions. Development of the entrepreneurial ecosystem does not require only institutional ability to develop external links and to cooperate to develop a sustainable ecosystem. It also requires the building of cooperation within institutions. Within the university, the TTO plays an important role in supporting researchers and post-doctoral students in their new ventures projects but generally do not consider support for student entrepreneurship to be one of their responsibilities. The inclusion of student entrepreneurship in academic entrepreneurship is changing this separation.

In universities, entrepreneurship programmes or structures have traditionally been connected to the educational and occupational integration missions rather than to research activities as in the case of TTOs and incubators. Many of the actors involved in teaching, research and technology transfer activities within the university became involved in the entrepreneurial ecosystem. They may have had different objectives and norms and were not necessarily known to each other. They had to develop internal collaboration to contribute to the development of academic entrepreneurship. This evolution is not spontaneous. It requires political willingness within institutions, a strategic vision and a strategy adapted to the internal potential and the contextual characteristics of the university. A deep analysis of the coordination mechanisms and changes in routine within the university is out of the scope of this paper but would constitute an interesting research perspective in organization studies.
Political and Cultural Implication: Inspiring Young People with an Entrepreneurial Spirit and Behaviour

The new French entrepreneurial policy focused on students is aimed not only at fostering the creation of new innovative companies but also (and even predominantly) at diffusing an entrepreneurial culture. The idea is to educate French schoolchildren and university students to adopt entrepreneurial behaviours or develop some of the personality traits of entrepreneurs. The entrepreneurship literature recognizes the existence of recurrent entrepreneurial traits and behaviours (Smith et al., 2014). The need for achievement corresponds to the individual’s desire to accomplish something difficult and significant, to master skills and to meet high standards. In general, entrepreneurs are determined and have sufficient confidence to overcome the obstacles related to firm creation and development. They are characterized by an aptitude for innovation, are creative, risk takers and prefer to work autonomously (Burns, 2012). Instilling creativity, risk taking and autonomous working could increase overall innovative behaviour in companies and in society in general. Such profound cultural change could lead, in the long run, to a major societal transformation and could help to mitigate some of the societal challenges linked to an aging population, and environmental and health issues. The societal impact of this type of policy initiative will have to be evaluated in the future. This evaluation exercise will require the development of evaluation tools able to assess qualitative policy objectives (diffusing an entrepreneurial culture) instead of quantitative ones (number of firms created).

CONCLUSION

The inclusion of student entrepreneurship in academic entrepreneurship provides strategic opportunities for universities that do not fit the traditional model of the entrepreneurial university. It is allowing them to define their own entrepreneurial models, based on relevant objectives and strategies regarding their internal resources and their regional context. Academic entrepreneurship is no longer limited to the creation of high-tech firms by faculty, but includes various types of entrepreneurial activity, leading or not to the creation of new firms. This broader approach includes many stakeholders and enlarges the entrepreneurial ecosystems of large universities and dynamic regions. This expansion means that some actors have to become leaders to orchestrate the system (Matt, Schaeffer, 2016). In addition to this institutional coordination, new coordination mechanisms need to be developed within universities to integrate the education activities traditionally
managed separately from research and knowledge transfer activities. The vision of the team managing the universities is a determinant of the ability of universities to contribute to the redesign of the entrepreneurial ecosystem because it relies on the willingness to develop new coordination mechanisms within the ecosystem and the university.

The case of the University of Strasbourg is representative of situations in which a world-class university builds an entrepreneurial ecosystem incrementally. It reveals the challenges associated to the diversification of the academic entrepreneurial activities. The emergence of a new entrepreneurial university model is accompanied by different objectives and strategies related to the development of academic entrepreneurship. To show how diverse strategies can lead to different patterns of development of the entrepreneurial ecosystem it would be interesting to compare the case investigated in this paper with the case of universities that have no scientific specialisation and developed their entrepreneurial ecosystem based on the development of student entrepreneurship.

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