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Title	European-wide ICT entrepreneurship education in action
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Publication date	2020-09-01
Original Citation	O'Flaherty, B., Caceres, D. A., Palma, P. S. and Pramatari, K. (2020) 'European-wide ICT entrepreneurship education in action', European Conference on Innovation and Entrepreneurship, Rome, Italy, 17-18 September, pp. 933-941. doi: 10.34190/EIE.20.154
Type of publication	Conference item
Link to publisher's version	https://www.proquest.com/docview/2453908877/abstract/F3D8E6FD0D9D47B6PQ/1?accountid=14504 - 10.34190/EIE.20.154
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Download date	2026-11-07 00:27:05
Item downloaded from	https://hdl.handle.net/10468/11404



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European-Wide ICT Entrepreneurship Education in Action

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DOI: 10.34190/EIE.20.154

Abstract: EUXCEL, a Trans-European technology entrepreneurship education initiative funded by the European Union, has demonstrated that creating cross-border collaboration between Europe's young ICT entrepreneurs is an achievable policy objective. The literature in this paper explores the importance of Entrepreneurship Education, the concept of European Nationalism and Born Global firms. This paper then outlines the context of EUXCEL, an international entrepreneurship programme, describing the key outcomes and education process, highlighting lessons learned and suggests key policy features that can make borderless entrepreneurship the norm rather than the exception. The research question is 'How can trans-regional entrepreneurship, with multi-nationality founders, be enabled and supported?' The findings of the paper identifies internationalisation and Pan-European collaboration as key outcomes of participants. This paper demonstrates that European-wide cross-border entrepreneurship education is an achievable outcome that has the potential to revolutionise the European entrepreneurial culture and push the boundaries of what is possible. Sharing the first-hand experiences of this project will be of interest to entrepreneurship educationalist, practitioners and policy makers.

Keywords: European wide ICT entrepreneurship education

1. Introduction

This paper explores the emergence of international entrepreneurship in the ICT field and the key empirical focus on this paper is an international case study of ICT entrepreneurship. The justification for this case stems from findings of a survey of start-up profiles in European incubators. The single nationality of a large number of companies in incubators across Europe is problematic and the case describes a European wide ICT entrepreneurship initiative that attempts to address this issue. The paper outlines the outcome of a multi-national European wide entrepreneurship, which is a Horizon 2020 project, funded by the European Commission. The implications of single nationalities of European start-ups is explored in the context of the tension between nationalism and a European wide identity. The paper concludes with a summary of the lessons learned for the ICT community from a European wide ICT entrepreneurship initiative.

2. Entrepreneurial ecosystems

Spilling, (1996) characterises the entrepreneurial system as "a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality". There seems to be a tendency to think of entrepreneurship as an individual activity (Pennings, 1982, as cited by Spilling, 1996). However, effective entrepreneurship requires a great deal more than a single individual. Van de Ven (1993) argues that the study of entrepreneurship is lacking if it focuses solely on the individual entrepreneur and if it treats social, economic and political factors as external demographic statistics.

Entrepreneurial systems (Spilling, 1996) consists of all economic actors and environmental factors existing in a geographical area and that the quality of this system are determined by the amount of actors who have both entrepreneurial experience and potential. The author also highlights the importance of the elements that interact within this system and argues that the development of an entrepreneurial community requires infrastructure and public institutions in addition to the development of a number of businesses. Entrepreneurial processes take place within the existing sociocultural and economic structures and entrepreneurial activity grows from the knowledge, competence and role models that are ingrained in these cultures (Spilling, 1996).

Entrepreneurial ecosystems evolve through a set of inter-dependant components which seek to generate new venture creation over time (Van de Ven, 1993). The relationship between components is complex and their interaction can have an impact on a region's overall economic development (Neck et al., 2004). Neck et al. (2004)

examined the interaction of these components by conducting semi-structured interviews and qualitative analysis to identify the elements of the entrepreneurial ecosystem in Boulder, Colorado, USA which led to the creation of an area of dense high-technology entrepreneurial activity. The findings indicated that these elements consisted of incubator organizations, spin-offs, informal and formal networks, the physical infrastructure, and the culture of the region. One key component of any potential entrepreneurial eco-system is entrepreneurship education. This study considers how the facilitation of a European wide ecosystem can support start-ups.

2.1 The need for entrepreneurship education

The World Economic Forum (2009) report on Entrepreneurship Education called "Educating the Next Wave of Entrepreneurs" consolidates existing knowledge of entrepreneurship education so that it may be shared and new approaches can be developed. Specifically, it identifies opportunities and challenges in entrepreneurship in higher education. It was found that education plays a significant role in whether students will become entrepreneurial in that the greater the exposure to entrepreneurship and innovation, the higher the likelihood that the student will become entrepreneurial. The need for embedding Entrepreneurship in schools is highlighted by Eurydice (2016). In 2014 a taskforce was set up by the Irish government to review initiatives aimed at cultivating an entrepreneurial ecosystem in Ireland. Specifically, the report outlines an initiative to create a national education strategy for entrepreneurship at all levels of the education system, thus supporting the potential of entrepreneurship education to encourage students to develop an entrepreneurial mind-set (DJEI, 2014). Such thinking is supported by studies confirming entrepreneurship education raises the entrepreneurial intentions of students (Rasmussen and Sorheim, 2006). Furthermore, Souitaris et al (2007) argue entrepreneurship programmes raise student entrepreneurial intention, citing inspiration as the programmes' most influential benefit.

Wennberg et al., (2011) propose that there are two paths to knowledge intensive entrepreneurship based on university knowledge. These are the direct path 'where individuals first study, then work at universities and subsequently spin off their business directly from the university' and the second path is represented by 'university graduates who pursue careers in private industry and spin off their companies from that context'. For this paper we distinguish between 1) direct as staff and researcher within the university and 2) indirect as student involvement, in academic entrepreneurship activities. This distinction is also used in this paper to structure a broad discussion on the applicability of academic entrepreneurship to a broad range of stakeholders in the ICT community.

2.2 Nationalism and a European identity

The large proportion of single nationality start-ups in European incubators is an interesting finding and this may be indication of a broader issue, namely the tensions or general interplay between being nationalistic and expression a broader European identity. Are they mutually exclusive or can they co-exist? The European Union is undergoing a number of major crises at the moment, which includes the refugee situation, scenarios where national agendas are in conflict with the European one and a perceived failure of European governance and the outcome of the UK referendum, and more recently reopening businesses after the COVID pandeminc (Striessnig, and Lutz, 2016). A European Identity is related to 'a shared consciousness of belonging to an economic and political space defined by capitalism, social welfare, liberal democracy, respect for human rights, freedom and the rule of law, prosperity and progress' (Guibernau, 201).

Empirical studies indicate that European population continues to become more European minded despite continuing economic and political challenges (Striessnig, and Lutz, 2016). A sense of European Identity is related to age, as older Europeans tend to have a single national identity, but younger cohorts are socialised in a way that decreases their association with solely national identities and increases their association with multiple identities (Striessnig, and Lutz, 2016). In future, as younger more European minded cohorts take the place of older nationalistic citizen, could lead to a significant change in the prevalence of a European Identity (Striessnig, and Lutz, 2016). A 'European identity' is also presented as a 'non-emotional identity', which is in sharp contrast with traditional forms of national identity associated with intense nationalistic feelings (Guibernau, 2011). The ultimate goal of this engagement is to produce truly European enterprises that are internationalised and grow quickly from a very early stage. The next section discusses such enterprises.

2.3 From born global to born European

The distinguishing characteristic of International New Ventures/Born Globals (INVs/BGs) is that they have foreign sales from the outset, or very quickly afterwards (Hennart 2013). Hennart (2013) describes Born Global enterprises as Accidental Internationalists. Born Globals were categorised by Rennie (1993) as one of two types of exporting enterprises. The first was domestic based. These enterprises focused on building a sustainable base in their home markets before turning to exportation as a means of growth. However, they retained their focus on the domestic market with exports averaging only 20% of their total sales. The average age of these enterprises was 27 years. Rennie (1993) categorised the second type of exporting enterprise as the born global enterprise. These enterprises began exporting on average 2 years after foundation and achieved 76% of total sales through exports.

Born Global Enterprises developed as a result of a number of changes. Firstly, consumer preferences changed significantly in the 1970s and 1980s, moving towards demand for increasingly specialised products, providing niche opportunities for small enterprises. Secondly, the advent of electronic process technology allowed SME's to compete with larger enterprises on cost and quality. Thirdly, smaller enterprises were better equipped to make changes reflecting consumer tastes and finally, updates in communication technology enabled enterprises of any size to manage their business systems even when they extend beyond their own boundaries (Rennie, 1993).

This case study reflects on the concept of a European-wide Ecosystem. Having outlined the challenges of a European identity and the emergence of highly internationalised companies called 'Born Globals', the next section explores the experiences of an international ICT entrepreneurship initiative.

3. International entrepreneurship case study

This paper highlights the outcomes of a survey of start-ups in incubators across Europe, the findings of which was used to shape a European Entrepreneurship project. This European-wide entrepreneurship education initiative involved 6 summer schools per year over a two-year period. EUXCEL was extended by 6 months, in order to support the start-ups that were formed in the previous two years. The survey findings highlight the single nationality nature of start-up in incubators across Europe. This fact undermines the potential of developing a European entrepreneurship culture and making 'Born European' start-ups the norm. The tension between nationalism and a European Identity, and 'Born-European' start-ups is also explored. Key outcomes of the case includes findings relating to the development of individual entrepreneurial networks, international impact and Pan-European collaboration.

3.1 Survey of current practice

The EUXCEL consortium circulated a brief survey to the enterprises in European Incubators, associated with the project consortium, with 54 enterprises responses. The survey set out to establish the following: the number of ICT enterprises in incubators, how long ICT enterprises developed their technology before entering the incubator, the nationalities of the founders and the international orientation of the enterprises. Specifically, what is currently happening in EU incubators and how can the EUXCEL proposal make a profound difference to ICT entrepreneurship in Europe.

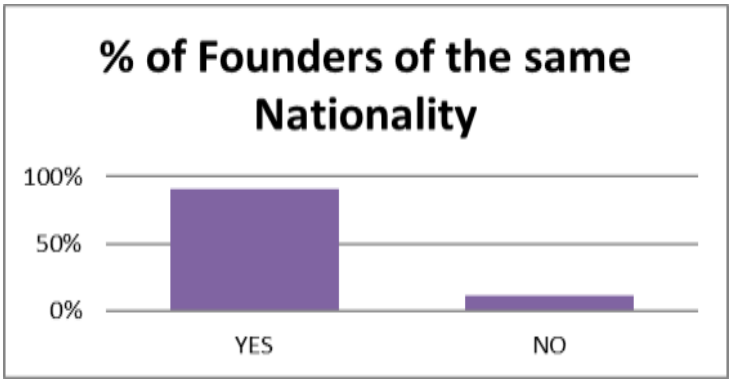


Figure 1: % of founders of the same nationality in the sample of EU incubators

These results revealed that there was on average two founders in each responding enterprise. Two respondents had five founders, the highest, and ten enterprises had one founder only. The average enterprise size was between 2-3 founders. Forty-four percent of enterprises surveyed were incubating in Germany, 11% in Ireland, 24% in Spain, 2% in Belgium, 13% in Poland and 4% in Greece. One enterprise listed three locations as the incubation country, Finland, Russia and Spain. Ninety-one percent (see figure 1) of respondents stated that all enterprise founders were of the same nationality.

Of those enterprises with founders of a single nationality, 41% were German, 11% were Irish, 22% were Spanish, 4% were Greek, 11% were Polish and 2% were French. Nine percent of enterprises had founders of different nationalities which included British, Turkish, Italian, Russian, Baltic, Belgium and Greek. Eighty-three percent 3% of enterprises surveyed operated within the ICT sector. The other non-ICT industry sectors included automotive, health care, education and food. Enterprises developed their technology for an average of 15 months prior to incubation and six enterprises developed the technology while in incubation. Twenty-two percent 22% of enterprises focussed on a city-wide market, 20% on state/regional market, 39% on a country wide market, 33% on a European market and 52% on the global market. Enterprises offered their product in two languages on average. However, three enterprises offered their products in five languages.

From the sample size, the status quo in incubators across Europe was that the majority of enterprises had 2 to 3 founders, who were, in general, all of the same nationality. Over 85% of enterprises in incubators were in the ICT sector, which has significant implications for the IS discipline, as many of the graduates from IS programmes progress to found start-ups. The average development time of ICT technology before teams enter an incubator is on average 15 months. The EUXCEL consortium sets out to differentiate the grant proposal by focusing on higher quality enterprise development, adopting a European wide training and collaborative focus, while recognising the characteristics of existing enterprises in incubators, such as the time required to build an ICT product. Many organisations in the ecosystem focus on brief entrepreneurial experiences, such as, a start-up weekend, which do not produce many high-performance start-ups and cannot possibly develop an actual product. They do inspire participants to start an entrepreneurial journey. The initiative described in this case study will addresses the single nationality challenge and considers the high-quality support required to produce Born European enterprises and how European ICT entrepreneurship can be enhanced. The fact that start-ups across Europe are being founding by single nationality teams raises an important issue, regarding nationalism and a European entrepreneurship identity. The next section will explore background concepts concerning nationalism and the relationship with European identity. How can these concepts enhance a European-wide entrepreneurship initiative?

3.2 Cultivating born European enterprises

The authors of this paper have successfully secured a funding for a Horizon 2020 funded Project, called EUXCEL, which set out to establish ICT entrepreneurship education initiatives and spaces across Europe. The consortium consists of Universities and incubators in Germany, Denmark, Poland, Spain, Greece and Ireland and the focus of the project is to develop more ICT entrepreneurs.

Europe does have a challenge as a growing gap has emerged between the needs of employers and the skills of employees. Europe is not fostering an entrepreneurial spirit. 'Many aspiring entrepreneurs simply leave Europe to seek their fortunes elsewhere. There are an estimated 50,000 Germans in Silicon Valley, and an estimated 500 start-ups in the San Francisco Bay area with French founders' (http://start-upmanifesto.eu/).

This entrepreneurship programme sets out to train ICT entrepreneurs to be 'incubator ready' and this is informed by research into current practice in incubators across Europe. This entrepreneurship programme developed a network of ICT entrepreneurship creative physical and virtual spaces and coordinate European-wide intensive entrepreneurial action training events called 'Start-up Summer schools' between consortia members with multi-nationality teams. EUXCEL attempted to cultivate internationalised companies from the beginning, which has parallels with 'born global' ventures.

The programme cultivated a European entrepreneurial mind-set and piloted a 'Born European Enterprise' annual event. It engaged with nearly 250 ICT students per annum using an intensive training package over 4 months, starting with the 'start-up Summer schools', continuing with virtual support via an EU Virtual Incubator and culminating with the best teams competing in a 'Born European Enterprise Challenge'. A key element of the

programme is student exchange as well as staff exchange, which will enable cross-fertilisation. The ICT teams have opportunities to pursue their new ventures in a number of European incubators, within the consortia.



Figure 2: The EUXCEL incubator readiness roadmap

Six five-day start-up summer schools were hosted in each of the partner countries between June and July in 2015 and 2016, with 42 applicants per start-up summer school To ensure as diverse, expansive and inclusive a range of European countries as possible, it was agreed that each of the six summer schools would include 5 participants from each of the 5 visiting (i.e. non-hosting) partner countries (5x5), 8 candidates from the host country and 9 'other' participants to be selected from EU countries outside of the 6 partner countries. The incubator readiness road map adopted is outlined in Figure 2 and the initial step involved forming international teams with at least 3 nationalities in each team.

In total, once selections and applicant availability details finalised, 239 aspiring young entrepreneurs from across 25 European countries participated in the summer schools as scheduled. To maximise the internationalisation element and to ensure as much cross-border learning as possible, all EUXCEL partners had at least one representative present at each of the six summer schools and where feasible incorporated the inclusion of wider institutional staff from across technology and entrepreneurship domains to maximise institutional learning and the development and strengthening of cross European entrepreneurship networks.

The interactive EU Virtual Incubator (software) was made available online from May 2015 in advance of start-up summer schools commencement in June 2015. The platform provided a range of resources and support tools to guide and assist teams during their start-up summer school and in the succeeding virtual incubation phase as they further develop, test and validate the initially conceptualized idea (end-point of the start-up scrum) in several cycles of iteration, by applying prototyping and business modelling techniques, taking into account the inter-regional nature of the entrepreneurs within start-up teams. The platform was based on Moodle and provided a repository for all EUXCEL related resources. It also enabled mass communication with all participants in the summer schools and the whole project.

The 2015 Challenge Final was held in November 2015. Following a thorough short-listing process, the 12 highest ranked teams using the incubator-readiness score card from across the six summer schools and the 56 participants on these teams were selected to pitch to the Challenge Final Judging Panel which included four partner nominated investors from across the European tech start-up scouting and investment space, two nominated representatives leading global technology companies. A 150+ audience from across the investor, tech industries, start-up/entrepreneurial agencies landscape in addition to media and fellow tech entrepreneurs attended the Challenge Final event facilitating excellent networking and relationship development opportunities

for the start-up finalists presenting at the showcase exhibition and awards ceremony and for the EUXCEL consortium itself.

Through the work carried out to date, EUXCEL has demonstrated that creating cross-border entrepreneurial collaboration is an achievable policy objective. In year two of the project, 187 participants were chosen from 436 applications, drawn from 18 countries. Of the selected participants, 29.1% were female, significantly higher than the EU37 average of 19% female entrepreneurial representation in ICT, while 70.9% were male. For 133 participants, this programme represented the first occasion on which they had created a start-up. For 104 participants it was the first time that they had developed a business plan. For 88 participants this programme was the first occasion on which they had pitched a business idea. Participants were assigned to each of the six start-up summer schools on the basis of skillset and interest complementarity, and 36 multinational start-up teams were created at the summer schools. Task completion rate for the virtual phase of the programme was 95.1%, indicating a very high level of engagement with the virtual incubation platform and mentorship programme. An assessment of EUXCEL impact with respect to 7 core entrepreneurial skills was conducted. The skills assessed included start-up management skills relevant to this setting (e.g. developing a start-up with a European-wide team), market research (e.g. end user analysis), and product testing (e.g. user validation). Measured against a baseline taken at the outset of the programme, the analysis found that participation had a highly significant positive impact on each of the 7 practical skills assessed. Across the overall skillset measured, we observed improvement in 86% of participants. This compares well with the impact of programmes such as Erasmus for Young Entrepreneurs which has had a skills development impact on 60% of participating new entrepreneurs' management skills and on 40% of participants' marketing skills. Of particular relevance to the programme is the finding that 79% of its participants indicated greater confidence in their knowledge of start-up development with a European-wide team, which is a promising outcome.

3.3 Development of the entrepreneurial individual networks

During applicant pre-screening, potential participants were asked to indicate their "willingness to locate to another European country to start a business". Responses indicated that for a large majority **(77%)** of both the applicant (613) and participant pool (245), moving to another member state for entrepreneurial purposes was either favourable (24% of participants) or very favourable (53%). However, the actual experience of working in an entrepreneurial initiative in a different country held by the participants, or the experience of working with other nationalities, was minimal. This is consistent with the survey carried about the EUXCEL consortium in developing the initial proposal, which found that 91% of its respondent incubated enterprises had a management team compose of just one nationality.

The EUXCEL consortium addressed this absence of European-wide entrepreneurial networks in a number of ways. Firstly, 100% of participants founded a new start up with entrepreneurs from at least two different countries. A number of teams had as many as four different nationalities represented. Secondly, 80% of participants travelled to a different EU member state for the summer school phase of the programme, establishing contacts with both the resident staff of the consortium partner hosting each scrum, as well as with the international mentoring team assembled for each event.

In analysing individual network growth, 72.7% of respondents to a post-programme survey issued in February 2016 identified international entrepreneurial teamwork as a key learning outcome of their participation in the programme and 70.5% of respondents felt that their entrepreneurial network had been improved as a result of their participation in the programme.

3.4 International impact

In order to test the international impact, a measure for the international entrepreneurial social capital (IESC) held by participants was issued at the beginning and end of the programme. For this purpose, the resource generator instrument, a measure of the social resources available to individuals, was adapted (Van Der Gaag and Snijders 2005). Participants were asked to consider their access to a range of entrepreneurial resources, and then to indicate whether they first had access, whether they had access to such resources in their own country only, or if they also had access to those resources in another country. The full list of resources participants were asked to consider are provided in Table 1.

Having gathered responses from participants at both the beginning and the end of the programme, statistical analysis using a t-test was employed to test for the impact of the programme on the internationality of participant entrepreneurial networks. A statistically significant difference in the scores at the outset (M=1.31, SD=.44) and at the end (M=1.45, SD=.40) of the programme (t=3.775, p<.001). These results indicate that the programme did in fact have a statistically significant impact on the international entrepreneurial network of its participants, a central aim of the programme. These findings are reinforced by the testimonies of the participants themselves.

> *"All of a sudden I have people in all these countries I can turn to…It makes you feel so much more confident about what you can do" (Jonathan, Germany)*

> *"I know not that if I need a back-end architect in Greece, I can go to Stathis. If I need a front-end guy in Germany I can go to Rui. Having those options changes what's possible for you as an entrepreneur." (Tom, United Kingdom).*

Table 1: Social resources available to participants

Entrepreneurial Resource	Question
Financing Expertise	Someone who knows about the different sources of finance available for start-ups
Financing Expertise	Knows how to manage a company's finances
Financial Expertise	Can give advice on approaching venture capitalists
Legal Expertise	Can give advice on the legal requirements you would face as a business owner
Legal Expertise	Knows about the legal process of setting up a company
Management Expertise	Has run their own business
Management Expertise	Can give advice on how to organise a new business
Product Development Expertise	Knows how to match technologies to people's needs
Product Development Expertise	Can give advice on how to design a technical product for the marketplace

3.5 Pan-European collaboration

A number of further measures were taken several months after the conclusion of the programme in order to assess the impact of the programme on the Pan-European collaborative networks of participants. The results of these measures are presented in the table 2.

Table 2 During the EUXCEL programme, I learned most about

Identifying a New Business Idea	21.6%
Evaluating Business Ideas	30.7%
Validating an Idea in the Market	13.6%
Building a Business Model	11.4%
International Entrepreneurial Teamwork	72.7%
Pitching/Self-Presentation	22.7%
Other	6.8%

Firstly, participants were asked to report their key areas of learning during the programme. Respondents were asked to indicate the two areas within which they had learned most. Responses indicated that 72.7% of participants identified international entrepreneurial teamwork as one of the areas where they experienced their greatest learning, the largest area of learning by a margin of over 40%.

4. Discussion

At the conclusion of the 2016 cycle, 19 multi-nationality teams aspired to develop their start-ups to market readiness and commence commercial activity. This indicates that opportunity, and not a single nationality mind-set is the primary barrier to co-founder matchmaking across regional borders. The programme's virtual support structure has provided the opportunity for its participants to develop their multi-nationality projects to this point. However, these teams faced a new set of challenges in transitioning from the pre-incubation educational context of this programme, to physical incubation and commercial activity. Withdrawal of support at this crucial point in their lifecycle greatly heightens the risks of collaboration breakdown, due to the challenges of cross-regional entrepreneurial development in this difficult next step. Based on learnings from this project, the consortium has identified five specific pitfalls which may lead to the termination of cross-national start-up projects at this point:

- 1. Lack of a structured roadmap to market readiness in an international setting
- 2. Lack of dedicated mentorship support and structured feedback at a critical phase in the start-up lifecycle
- 3. Due to their geographical distribution, the teams must re-orientate from the educational setting to commercial operating structure in the absence of close incubation support.
- 4. Lack of a network which will connect the teams to new business partners
- 5. Lack of technical support in the development of their minimum viable product (MVP).

The dynamic entrepreneurship culture envisioned in EUXCEL is best represented in Pan-European founding teams that integrate young entrepreneurs from different cultures, countries, and disciplines. Within this programme, such teams were brought into existence. However, the absence of structures that will sustain their existence reflect the shortcomings in the connectivity of the European entrepreneurial ecosystem. Based on the potential to contribute to policy in this space, to build upon expert reviewer recommendations, and to fully capitalise on EUXCEL outcomes, the consortium proposed a 6-month extension to support the transition of its multi-nationality start-ups to market readiness. The consortium believe that this step is critical in consolidating the impact and long-term legacy of this project.

5. Conclusion

What are the major lessons one can draw from our analysis and case example presented regarding the encouragement of European-wide ICT entrepreneurship education. In posing this question of the relationship between IS and academic entrepreneurship, the presumption is that the case example and discussion presented are at least somewhat emblematic of the variety of IS academic entrepreneurship initiatives at other universities and capture the diversity of practices. This case demonstrates that teams of multi-national ICT professionals can come together and create 'Born-European' start-ups with the right support and mentoring. Distributed teams once socialised, can advance a start-up in a virtual manner.

We propose future research should be conducted to extend our research agenda to other countries in order to reflect on the frequency of such academic entrepreneurship practices emerging from IS disciplines. We shed light on the nature of IS entrepreneurship education and outline how there is a natural synergy between the discipline of IS and Entrepreneurship. We outlined a European-wide case that implemented an entrepreneurship teaching strategies and supports to encourage student entrepreneurship. We argue the significance of student entrepreneurship for the creation of world-changing ideas to be created and implemented. Thus, we argue IS and Entrepreneurship deserves future research and debate as our research agenda presented in the paper showcases an area which is ripe to discover.

Finally, the European entrepreneurship initiative demonstrates that a systematic educational programme can produce strong start-ups that continue long after the programme completion. A support ecosystem is required to facilitate the continuation of the early stage companies. There are clear policy implications for Europe, as this initiative demonstrated that 'Born European' companies can be created and mechanism that facilitate multi-national co-founders to come together are required to enhance an 'openness to Europe' mentality and ultimately create a European entrepreneurship identity.

Acknowledgements

EUXCEL was funded from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 644801. Details are available at http://www.euxcel.eu

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