SPIN-UP – Creating an Entrepreneurship Coaching and Training Program for University Spin-Offs

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Abstract: This SPIN-UP project has been funded with support from the European Commission and is a study involving research performed in 4 countries: Finland, the Netherlands, Poland, and Portugal. The SPIN-UP research question is: What sort of entrepreneurship training and coaching program will contribute to the development of key entrepreneurial skills, both technical and behavioural, essential to enable and leverage university spin-off (USO) growth? The aim of the SPIN-UP study was to picture key entrepreneurial skills and their contribution to the performance of university spin-off firms, as well as missing skills, in order to develop an effective training and coaching program. USO, entrepreneurial firms that bring university knowledge to market, do not traditionally grow very much and we sought to contribute to a countering of this trend. To avoid a large differentiation in firm age, firm age limits were set at 2 years (lower limit) and 10 years (higher limit). 10 years was however used flexibly, particularly in those sectors where development and bringing products to market goes relatively slowly, like in the medical life sciences and material (nano) science (15 years used as the maximum in these cases). The research to date has involved a total of 64 interviews and questionnaires in the four countries mentioned above. The preliminary comparative analysis revealed that the four countries studied show somewhat different skill sets, meaning that we may still be in a World where differences still matter (Ghemawat, 2007). For example, spinoffs in Finland tend to be strong in skills dealing with intellectual property, which is the opposite of Poland, the Netherlands and Portugal. Portugal on the other hand appears to be quite strong in operations management skills as compared to the rest of the sample. The skill set of the Netherlands emphasized strength in skills related to the building of social and business networks, a theme which is very in vogue in the current business and management literature. However, spinoffs in the four countries did show some similarities, tending all to be strong in innovation skills. As concerns future training for USO our research indicates that this should focus on: gaining financial capital, internationalization and sales (top 3 missing skills hampering growth). More practical “hands-on” type entrepreneurship training, such as that using role-playing enriched by the sharing of entrepreneurial participant experiences, may be seen as being appropriate for USO. Work by Ghemawat (2001) (CAGE Model for internationalization) and Cialdini (2007) (principles of persuasion to be used in sales) may serve as a theoretical basis for such training.

Key words: Entrepreneurship, innovation, coaching, training, university spin-off

Introduction – Entrepreneurship and USO defined

The entrepreneurial process involves "all the functions, activities, and actions that are part of perceiving opportunities and creating organizations to pursue them" (Bygrave and Zacharakis, 2008, p.49). Thus, entrepreneurs are individuals that have perceived an opportunity and consequently have created an organization to pursue this opportunity they have perceived (Bygrave and Zacharakis, 2008). Entrepreneurial leaders (or company founders) are seen to create a favourable team culture atmosphere where people love to work due to the enthusiasm, energy and tangible visions created in order to make dreams come true (Timmons and Spinelli Jr., 2009). Our research was into a very specific topic – University spin-off firms (USO). University spin-off firms are a specific type of small and medium-sized enterprise (SME). University spin-off firms (USO) are defined as newly established firms that bring university knowledge to market (Pirney, Surlemont, and Nlemvo, 2003). USO do not traditionally grow very much and we sought to contribute to a countering of this trend with our research which had as its objective the development of a coaching and training program to contribute to the growth of USO Worldwide.

Research objective: USO-based research

The project is called SPIN-UP and has the objective of enabling university spin-offs (USO) to grow as this type of firm is seen to have difficulty in particular concerning growth.

SPIN-UP Research question

What sort of entrepreneurship training and coaching program will contribute to the development of key entrepreneurial skills, both technical and behavioural, essential to enable and leverage university spin-off growth?

SPIN-UP project management

The SPIN-UP research project is being undertaken in Portugal, the Netherlands, Finland and Poland and posed important management challenges. The fact that partners had different backgrounds – cultural and organizational – required a strong management effort to guarantee adequate knowledge sharing (Jashapara, 2004) and that project goals, expected results, current work plan status, and a shared vision were known to all partners.

Furthermore, management was exercised by way of a management structure as follows: a *Strategy Management Group* – assigned with strategic decision-making; a *Project Manager* – who dealt with day-to-day management at the project level; and *Work Package Leaders* – who dealt with day-to-day management at work package levels. To ensure the realization of the management functions, a set of management tools and mechanisms were put in place, including a work plan, a budget, internal reports, EACEA (The Education, Audiovisual and Culture Executive Agency) reports to this funding entity, face-to-face partnership meetings, web-based meetings, and an extranet, among others. Face-to-face meetings, especially at the project kick-off stage, were of the utmost importance. These meetings, however, were few and far apart, due to the costs involved (for the project meetings team members had to fly in from four different countries) – a total of five project meetings were thus projected to occur over two project-duration years. Additional communication channels include complementary web meetings, email exchanges and telephone calls between members.

SPIN-UP – A closer look at aims and context

The aim of the SPIN-UP study was to picture key entrepreneurial skills and their contribution to the performance of USO, as well as missing skills, in order to develop an effective training and coaching program. An USO entrepreneur may be a university staff member, a university graduate, or an entrepreneur from outside that commercializes university knowledge, e.g. based on a license. Just having an entrepreneur with an academic education is not sufficient to qualify as a USO. Bringing somehow knowledge from the university to market (part of a project, a particular new process learnt at university etc.) is necessary.

Due to their young age and smallness, USOs typically face a shortage in resources. A lack of skills and understanding tend to be the most important ones aside from a lack of financial means (Van Geenhuizen and Soetanto, 2009). The missing skills mainly refer to knowledge of the market and skills in marketing, as well as to management and planning.

There are many ideas concerning what skills and experience make these enterprises successful. For example, managers of rapidly growing SMEs possess the following balanced skills: open-mindedness, market-oriented and -experienced, and a preference to delegate responsibilities (NJM, 2000). Other research (on innovative entrepreneurs) indicates that the entrepreneurs concerned rely

on the building and maintaining of an extensive and diverse set of network relationships, mainly to supplement internal resources. Advantages of 'soft skills' are also forwarded in the context of entrepreneurship, like entrepreneurial thinking and the building of socio-economic networks (Byrne and Fayoll, 2010).

However, performance and growth are not straightforward phenomena, and they have a heterogeneous nature. With regard to growth, firms can expand along different dimensions and show many different growth patterns over time (Davidsson, Achtenhagen, and Naldi, 2005). Generally, the most often used measures of firm growth include relative and absolute sales growth, relative and absolute employee growth, and a distinction between organic growth and acquisition growth (Delmar, Davidsson, and Gartner, 2003). There is a marked difference in growth mechanisms between young and small versus large and mature firms: the former mainly grow organically while the latter achieve the bulk of their growth through acquisitions (Davidsson, Achtenhagen, and Naldi, 2005; Davidsson and Delmar, 1998). Specifically, young spin-off firm growth is measured by sales and employment, the most widely used indicators in empirical growth research (Delmar, 1997). In our study we follow mainstream research by measuring growth using average annual job growth and size of turnover.

When considering the growth of small firms, it is important to remember that most of them don't grow or grow only very slowly (Davidsson, Achtenhagen, and Naldi, 2005). Also, firm growth is a result of a mix of different factors, both internal and external. We mention available resources, including skills and competences, as internal factors, and dynamics of the sector including rapid technology changes, competition and regulation as examples of external factors. Among others, due to this complexity, progress in finding effective ways to support the growth of spin-offs has been relatively slow and there are few success stories. As for Europe, Mustar, Wright and Clarysse (2008) observe that university spin-offs do not show high job growth, even with more than 75% of spin-offs in European countries still extant six years after their establishment. There is not only a challenge for universities, regional planners, and governments to identify the best support mechanisms, but also for academic entrepreneurs to find a more advantageous growth trajectory than starting small, living small and dying small.

SPIN-UP methodology – Selection of spin-off firms

To avoid a large differentiation in firm age, firm age limits were set at 2 years (lower limit) and 10 years (higher limit). 10 years was however used flexibly, particularly in those sectors where development and bringing to market goes relatively slowly, like in the medical life sciences and material (nano) science (15 years used as the maximum in these cases).

Spin-off firms were selected such that they represented small as well as larger firms, and growing firms and firms that were stable; this was to enable the assessment of a 'causal' relation between absence/presence of particular skills (experience) and different growth patterns. In terms of growth, the selection was aimed at 30% growing well, while 70% had to be a mix of stable, slow-growing and declining spin-off firms.

Considerations on Entrepreneurial leadership

Yukl (2010) defined leadership within the specific context of organizations as influence processes that: a) Interpret events for followers; b) Choose objectives for the group or organization; c) Organize work to accomplish objectives; d) Motivate followers to achieve objectives proposed; e) Maintain cooperative relationships and teamwork; as well as f) Enlisting outsiders to support and cooperate with the group or organization. There are many different theories on leadership styles, representing different ways of putting in practice the processes described above. For the scope of this research, the transformational leadership model proposed by Bass and Avolio (1994) was used. This leadership style puts an emphasis on growth and transformation of both the individual and the organization, and is based on four key elements: individualized consideration, intellectual stimulation, inspirational motivation and idealized influence. For its specific focus on transformation, this style was considered as an appropriate model to incorporate many of the behaviors one would expect to stimulate entrepreneurial growth.

Questionnaires and response rate

We designed a full questionnaire for use in face-to-face interviews and a condensed questionnaire for use in web-based or e-mail surveys. The purpose of the full questionnaire (interview) was to measure (a) current entrepreneurial skills of the management team and dynamics herein (courses/training); entrepreneurial skills and experience at the start in the founding team, (b) firm demography and growth, and (c) strategy and business environment. In addition, (d) leadership and team integration were assessed. Accordingly, the interview questions are divided into four sections. The main goal was

to design a skills map per firm (entrepreneurial skills) for the present situation, including a special map on leadership skills.

It is necessary to mention that in the current economic climate (scarcity of investment capital and shrinking markets) entrepreneurs tend to hesitate to participate in research such as our study involved. Therefore, the *content* of the interview questionnaire had a simple structure (parts 1-4) and the internet/post questionnaire was limited in size. We now will discuss the content of the *full* questionnaire.

1. *Entrepreneurial skills. Presence of important entrepreneurial skills in the management team (2011):* 17 skills, e.g. concerning technology, management, finance, market and marketing, the establishing or maintaining of networks, strategy and planning etc. (all measured on a five-point scale). With scores on these skills and relevance of these skills for growth, a general skills map can be constructed. In addition, we identified missing skills as those skills given low scores (1 or 2) concerning their presence in the team, and we focused explicitly on missing skills that slow down growth of the firm according to the entrepreneurs' opinion.
2. *Founding team's skills background (at start):* Size of founding team; education of team members (discipline and level); pre-start experience (experience of starting a firm, work experience).
3. *Background of current management team skills (2011)* (if different from the founding team): size of the team; education of team members (discipline and level); pre-start experience (starting a firm, various work experiences).
4. *Firm demography and growth:* Year of establishment (start of project activities; legal registration); status in 2011 (fully independent / part of a holding etc.). Employment size (full time equivalents - fte) at start including founding team members as well as employment size in 2011 (fte); size of turnover in 2011 (size classes); indication of profitability in 2011; level of internationalization of activities. Important missing resources other than skills and experience and years of occurrence. Education/training taken and effectiveness of these courses.
5. *Strategy and business environment.* What the firm actually sells: e.g. patented knowledge, systems, end-products, advice, etc.; type and scope of technology; type of customer market (e.g. energy, health care, transport, city planning, construction, etc.); newness of the product / process in the sector; type of intellectual ownership (IO) protection (patents, trademarks, etc.). In addition, importance of different business activities, like research, development, pilot experiments, marketing and sales. Also, competition level in the customer market and the influence of regulation.
6. *Assessment of leadership skills and team integration:* Leadership behavior assessed through the agreement with various statements related to the interaction with the people being worked with. In addition, management team performance / behavioral integration: level of collective behavior, quality of information exchange and effectiveness of shared decision making. With these items it should be possible to construct a specific *leadership skills* map.

Evaluation bias (self or team): self-assessment tools are used in the questionnaire, meaning that bias may enter answering the questions. Bias may work into two different directions: for example, the respondent gives socially acceptable answers (because he / she makes use of subsidized facilities, and / or likes to establish / maintain a positive image) or the respondent gives negative answers with the idea that more policy support should be gained. This situation is the reason why both self-assessment as well as more objective data are being collected in the interview questionnaire.

Two questions with self-assessment bias are Question 1 (entrepreneurial skills) and Question 4 (leadership behavior). Testing and discussion of the questionnaire brought to light a positive bias. Therefore a question was added *on recent changes (strong increase*), which may reveal a less positive pattern in the recent past. Responses in the current stage of analysis were as follows, per country: Finland - 11 responses; the Netherlands - 18 responses; Poland - 14 responses; and Portugal - 21 responses (a total of 64 valid interview and e-mail / web questionnaire responses).

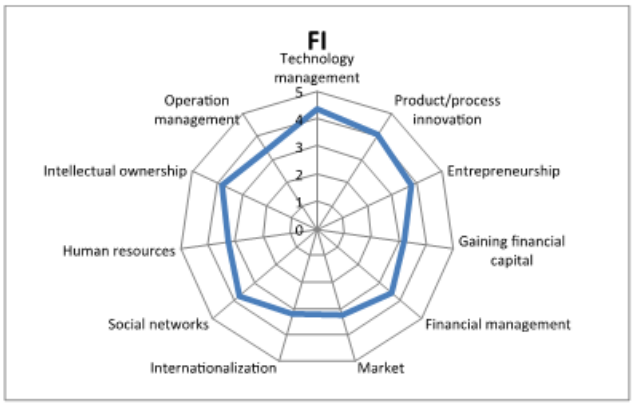
Results: skills maps and relation with growth

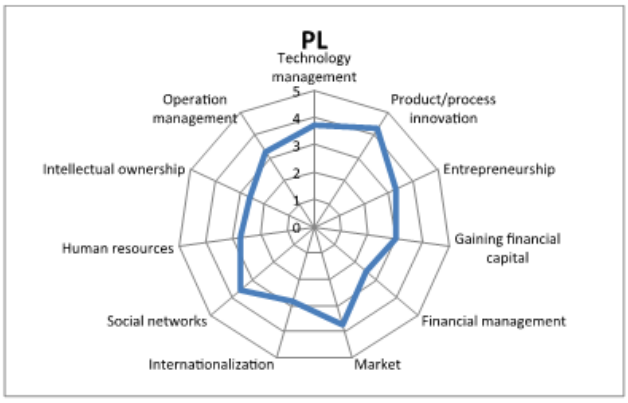
We discuss in this section both skills maps and the relation between missing skills and growth of spin-off firms. Skills maps were created only for entrepreneurial skills in this stage of the research. The following steps were followed. First, we grouped 15 entrepreneurial skills in homogeneous groups according to conceptual lines (Annex A). Next we checked internal homogeneity using Cronbach's alpha. Those groups with a low value were decomposed such that the remaining groups of items yielded the highest values of Cronbach's alpha. This resulted in 11 different groups of items, including mostly single items and two multi-item groups. Finally, we calculated the scores, while using factor loadings (of confirmatory factor analysis) for the two multi-item groups. The outcomes constituted the

axes of the maps of entrepreneurial skills per country (Figure 1a-d): Finland, The Netherlands, Poland and Portugal.

A preliminary comparative analysis revealed the following:

- Spinoffs in Finland tend to be relatively strong in technology and innovation skills, entrepreneurship skills and skills dealing with intellectual property and with social and business networks. Skills in gaining financial capital, market-related skills, and skills in internationalization tend to lag slightly behind.
- Spinoffs in the Netherlands tend also to be strong in technology and innovation skills, but also concerning skills in building social and business networks. However, all other skills lag somewhat behind.
- Polish spin-offs tend to be strong in innovation and technology skills and market-related and social network skills, with lower levels for all other skills, in particular financial management and intellectual property.
- Portuguese spin-offs tend to be very strong in technology and innovation skills, and slightly less strong in entrepreneurship skills, market-related skills and operations management skills. Skills that tend to be missing are concerned with gaining financial capital, financial management, internationalization and intellectual property.





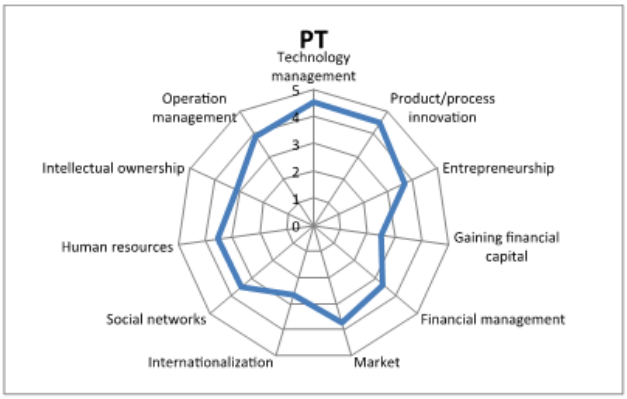


Figure 1a-d: Preliminary entrepreneurial skills map of spin-off firms in four countries

In the next section we report in a preliminary way on size and growth characteristics of the spin-offs included in the sample to date. Job growth for each spin-off firm was measured as average annual growth of full time equivalents (fte's) since the start as a firm. Table 1 shows preliminary results on [very modest] growth per country and overall. We need to mention that these outcomes are not the final results of our analysis but reflect a still incomplete selection of spin-offs. The aim as concerns future data collection is to satisfy the overall rule of a picture per country of 30% well-growing firms and 70% of stable, declined or failed spin-offs. For example, in Delft (The Netherlands) the sample needs to be extended with well-growing spin-offs.
Considerations on size and growth:

- So far, *employment size* of the spin-off firms is largest in Portugal (Portugal has the highest average company size, maybe due to lower local labour costs), and smallest in the Netherlands and Finland. Poland is in-between.
- *Employment growth per firm* is however largest in Poland and smallest in the Netherlands and Finland. Portugal is in-between as concerns this area.
- *Turnover size* tends to be balanced between the two selected turnover classes in each country: very small (less than 100.000 Euros per year) and larger (all other classes).

Table 1: Size and job growth per country

	Average nº of jobs (fte) (s.d.)	**Average job growth per yr (s.d.)**	**Turnover class, absolute frequency**	
			<100.000	**Higher**
Finland (11)	5.7 (4.95)	1.1 (1.61)	5	6
NL (18)	5.6 (4.85)	1.0 (1.30)	8	10
Poland (14)	7.7 (6.18)	2.0 (3.12)	7	7
Portugal (21)	10.9 (13.03)	1.3 (2.09)	11	10
Totals (64)	7.8 (8.80)	1.3 (2.10)	31	33

We now continue our discussion with preliminary results of the relationship between entrepreneurial skills and job growth. We followed two steps: exploring a statistical relation (table 2) and exploring a causal relation between lack of skills and hampering growth, as assessed by the entrepreneurs themselves (table 3). Missing, or absent, skills are those skills that scored 1 or 2 points as evaluated by the entrepreneurs in the questionnaire. With regard to a statistical relation, table 2 indicates that spin-offs facing one (or more) of the most often missing skills have a larger propensity for low job growth. This is evidenced by 67% of the firms facing one of the most often missing skills, compared to 58% among other firms (significant at the 95% level). This result tends to underpin the rationale behind the Spin-Up project: certain missing skills systematically hamper growth of spin-off firms calling for a customized training program to improve these skills.

Table 2: Spin-off firms according to missing skills and growth

	Low job growth (<1.33)	**High job growth (>=1.33)**	**Total**	**Chi^2 (a)**
Faced at least one of 'most often missing skills'	30 (67%)	15 (33%)	45 (100%)	3.873**
Other spin-offs	11 (58%)	8 (42%)	19 (100%)	1.061
Total	**41 (63%)**	**23 (37%)**	**64 (100%)**	**16.125**

(a) Goodness of fit, * p<0.1; ** p<0.05

We continue our discussion with the specific class of missing skills that slow down growth. Table 3 shows the most often mentioned missing skills of USOs which have a hampering influence on firm growth (scores of 1 or 2 on a scale of 1-5 and confirmed by the entrepreneur as hampering his firm's growth). The overall picture is very important for our training purposes. So far, this particular class of missing skills has been mentioned 69 times. Skills in gaining financial capital were mentioned most often (13 times), while skills in internationalization and sales came in 2nd and 3rd place respectively. It is difficult to assess how many spin-offs suffer from lack of growth due to such missing skills, because one spin-off may experience more than one of them simultaneously.

Table 3: Most frequently mentioned missing skills which hamper growth of the firm

Rank	**Missing skills hampering growth**	**Frequency**
1st	Gaining financial capital	13
2nd	Internationalization	11
3rd	Sales	10
4th	Financial literacy and management	9
5th	Human resources	6
6th / 7th	Economic principles of high-tech entrepreneurship Intellectual ownership protection	4 4
8th	Marketing management	3
-	Other skills (mix)	9
Totals		69

We close this section with a first impression of differences in missing entrepreneurial skills per country (table 4). For example, skills in gaining financial capital were missing most often in the overall sample (ranked 1st – table 3); this situation was also true in Portugal (table 4), while Finland ranked this 2nd and the Netherlands and Poland both ranked this missing entrepreneurial skill 4th (table 4). Similarly, missing internationalization skills were ranked as 2nd highest in the overall sample (table 3); this ranking also held for Finland and Portugal (table 4), while the Netherlands and Poland both ranked this missing entrepreneurial skill in 3rd place. Furthermore, Finland is somewhat different because skills in financial management and skills in human resources were not amongst the most frequently missing skills in this country.

Table 4: Most frequently missing skills (scored 1 or 2 by entrepreneurs on a scale of 1-5) per country

Rank	**Overall**	**NL**	**FI**	**PL**	**PT**
1st	Gaining financial capital (24x)	4th	2nd	4th	1st
2nd	Internationalization (23x)	3rd	2nd	3rd	2nd
3rd	Intellectual ownership (20x)	2nd	3rd	3rd	4th
4th-5th	Financial management (19x)	3rd	-	1st	4th
4th-5th	Human resources (19x)	3rd	-	2nd	3rd

Conclusion

A look at the research results so far suggests that maybe the World is only semi-globalized after all and that frontiers do still matter (Ghemawat, 2007). The preliminary comparative analysis revealed that the four countries studied show somewhat different skill sets. For example, spinoffs in Finland tend to be strong in skills dealing with intellectual property, which is the opposite of Poland, the Netherlands and Portugal. Portugal on the other hand appears to be quite strong in operations

management skills as compared to the rest of the sample. Finland, the Netherlands and Portugal are all strong in technology management skills, with Poland lagging behind in this particular area. The skill set of the Netherlands showed strength also in skills related to the building of social and business networks, a theme which is very much in vogue in the current business and management literature. However, spinoffs in the four countries did show some similarities, each tending to be strong in innovation skills. As concerns future training for USO our research indicates that this should focus on missing skills hampering growth (table 3): gaining financial capital (20% are missing this skill), internationalization (17% are missing this skill) and sales (16% are missing this skill). Given the current global crisis it might not come as a surprise that USO are having difficulty gaining financial capital. Furthermore, as domestic markets in the sample countries tend to be small (not as large as, for example, Germany, France, or Spain; or, on another scale, not as large as Brazil or the USA) having internationalization skills may well be an important step towards growth for USO (Finnish firms looking for example towards Russia, with the Netherlands looking for example towards Germany). Our research results also show that sales skills are naturally an important skill set which needs to be developed, whether for domestic or international markets. In view of changes towards more practical "hands-on" type entrepreneurship training (Oliveira, 2008; Oliveira, Ferreira and Barandas, 2008), the SPIN-UP coaching and training program will seek to incorporate role-playing as well as the sharing of entrepreneurial participant experiences in its program, while showing context-specific videos as well as web-based and tablet-based content, developed especially for SPIN-UP, as such are seen as being appropriate for USO. Work by Ghemawat (2001) (CAGE Model for internationalization) and Cialdini (2007) (principles of persuasion to be used in sales) may serve as a theoretical basis for such training.

Concluding remarks about Portuguese entrepreneurs and the fight for survival and growth

We see it as being appropriate that as the conference is being held in Portugal that a few words be dedicated in particular to the Portuguese sample which took part in our study. First of all, and especially with the eleven face-to-face interviews with USO CEOS, their openness and desire to share their experiences, not only with the project team but also so that other young entrepreneurs may learn from them, we found to be very touching, in line with a certain feminism that Hofstede (1980, 2001) describes as being a characteristic of Portuguese culture. Above all, however, the comments from these CEOs left us no doubt that Page (2002, p.25) was right in so far as "the Portuguese [have] the energy, ingenuity and determination to re-create the nation, for the twenty-first century" – an appreciation with which we agree entirely, after speaking to the leaders of the USO companies that opened their doors and minds to our research team.

Without exception the CEOs we have visited and interviewed in Portugal each have the same priority: to increase annual sales of their products and services. Any training should thus focus on this essential area, much as the results discussed above pointed out also – there being a need to further develop market-related skills in the Portuguese USO which participated in the study. This is true of enterprises which have annual sales still less than 100,000 Euros (due to the newness of the company and of its product and service offering) as it is also for cases where sales are in the 1 million Euro to 5 million Euro interval as well as with Portuguese USO where annual sales were in excess of 5 million Euros (2011). There may indeed be a cultural problem, as some interviewees pointed out, the Portuguese lacking an aggressive sales background, which is not generally promoted in Portugal.

As concerns the discussion of why USO tend not to grow, one university professor acting as a CEO of a USO commented that USO may tend not to grow as individuals coming from academia may see themselves as, and indeed enjoy being, creative inventors, thus lacking a commercial inclination. However, a shortcoming in the commercial approach of Portuguese USO may very well be linked to the current economic crisis Portugal is going through. Selling technology-intensive products in international markets means that Portuguese companies come up against German companies, for example. International customers find it hard to believe that Portuguese engineers can build better products than German engineers. The "Made in Portugal" factor is seen to hinder sales as much as a lack of sales expertise if not more. How to internationalize, as pointed out above, is thus another major area in need of development. A major concern also made evident in the comments above is how Portuguese USO have been unable to gain financial capital. Given the current much publicized domestic crisis that Portugal is in this may not be surprising.

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Annex A

Table 1: Conceptual groups of 15 entrepreneurial skills

#	Name	Skills included (numbers)	Cronbach's alpha
1	Technology/innovation	1, 2	0.47
2	Entrepreneurship	3, 4, 5	0.75
3	Financial	6, 7	0.31
4	Market related	8, 9, 10, 14	0.68
5	Operations management	11	-
6	'Social' factors	12, 13	0.37
7	Intellectual ownership	15	-

Table 2: Adjusted groups, regarding internal consistency measured by alpha

#	Name	Skills included (numbers)	Cronbach's alpha
1	Technology management	1	-
2	Product/process innovation	2	-
3	Entrepreneurship	3, 4, 5	0.75
4	Gaining financial capital	6	-
5	Financial management	7	-
6	Market	8, 9, 10	0.75
7	Internationalization	14	-
8	Social networks	12	-
9	Human resources	13	-
10	Intellectual ownership	15	-
11	Operation management	11	-

Table 3: A confirmatory factor analysis was conducted to check if these factors are indeed reliable, and instead of taking the average the factor loadings were adopted as the weights

Skill number	Entrepreneurship		Skill number	Market-related
3	0.65		8	0.66
4	0.73		9	0.74
5	0.77		10	0.71