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Taking technological opportunities to the market: the role of university-based business plan competitions in supporting high technology commercialisation

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Abstract

Encouraging technology-based entrepreneurship is central to the policy agendas of governmental and non-governmental economic development agencies in many industrialised and newly-industrialising countries. Entrepreneurs are central to venture creation and evidence indicates that, following secondary and, typically, tertiary education, most work for one or more employers prior to establishing a technology-based venture on their own or with others. As a result of this “entrepreneurial apprenticeship” many technology entrepreneurs establish businesses in their mid- to late thirties. Developing a thorough understanding of product/service markets and devising strategies to access, serve and support customers are major challenges for founders of technology-based businesses. Ventures established by individuals or groups with relevant commercial experience benefit from the know-how and networks of their founders. This paper explores the role of university business plan competitions in stimulating entrepreneurial activity and technology transfer from two universities in Northern Ireland by focusing on entrants in the 2007 £25k Enterprise Award Scheme business planning competition. Such initiatives tend to attract students/recent graduates and members of university staff which raises the question as to how such teams develop commercially-robust ventures, given that, on the face of it, most have little or no commercial experience. Based upon analysis of the business plans of the top ten ventures from the 2007 competition this paper explores characteristics of the entrepreneurial teams, their choice of product/service offerings and aspects of the markets they target.

Introduction

Increasing levels of technology-based entrepreneurship is central to policy agendas of economic development agencies in many industrialised and newly-industrialising countries (Oakey, 1995; Cooper, 1998). Entrepreneurs are central to venture creation and evidence indicates that, following secondary and, typically, tertiary education, most work for one or more employers prior to establishing a technology-based venture on their own/with others (Cooper, 2006; Harrison et al., 2004). As a result of this “entrepreneurial apprenticeship”, during which they develop knowledge, skills, networks and confidence to identify and exploit commercial opportunities, many technology entrepreneurs establish businesses in their mid- to late thirties (Cooper 2006; Harrison et al., 2004; Majid, 2006). Developing a thorough understanding of

product/service markets and devising suitable strategies to access, serve and support their customers are major challenges for founders of technology-based businesses; ventures which are established by individuals or groups with relevant commercial experience benefit from the know-how and networks of their founders (Aldrich and Zimmer, 1986; Chandler and Jansen, 1992; Cooper, 2006; Harrison et al., 2004).

Universities have been identified as having a role to play in providing students and staff with knowledge regarding the commercialisation process and support to help them pursue viable opportunities (Cooper, 2001; Galloway and Brown, 2002). One activity which is viewed as having the effect of priming the formation of potential new venture teams are university-centred, business plan competitions. Little research has been conducted into the impact of such competitions and beyond anecdotal reports of new venture teams which have won such competitions and used the money or other prizes to help build their business, there is a paucity of data about the types of businesses which are formed, the characteristics of the teams behind the ventures and the markets which they target. On-going, exploratory research, early findings of which are reported here, is investigating the impact of a university-based, business plan competition in Northern Ireland. The £25k Enterprise Awards Scheme (EAS) is co-run by the Northern Ireland Centre for Entrepreneurship (NICENT) and involves students and staff from the University of Ulster and Queen's University, Belfast. Given comments above regarding technology markets and strategy the paper focuses on the product/service marketing strategy adopted by the most successful entrants to the competition.

Following a brief discussion of technology-based entrepreneurship and the objectives behind university business plan competitions, the paper explores NICENT's £25k EAS which culminates in the selection of ten teams for the final round. The empirical section of the paper draws upon findings of systematic, text-based analysis undertaken on the full business plans submitted by the top ten teams from the 2007 competition. Content regarding the entrepreneurial teams and product/service market issues is analysed and discussed. Discussion focuses upon exploration of the expertise and commercial background of team members and how this relates to the business opportunity and marketing strategy.

The aim is to develop a better understanding of some of the short- and longer-term contributions of enterprise competitions within a university setting. Discussion, therefore, focuses on the potential for competitions to facilitate venture start-up and technology transfer, pointing to the types of venture likely to be generated and their potential to contribute to local economic development. It also considers their potential impact on those who will not engage in venturing directly after university, where experience gained of new venture planning may encourage participants to seek employment in small enterprises and seed longer-term entrepreneurial aspirations. Implications of the research for theory, policy and practice are explored in the conclusion to the paper.

Technology-based venture creation

If numbers of technology-based businesses are to rise, it is necessary to increase the flow of entrepreneurial talent from within science, engineering and technology (SET) seeking to commercialise technological opportunities through venturing (Cooper et al., 2007). The formation of a new venture is the most visible evidence of entrepreneurial action and in the majority of cases the entrepreneur spins-off from the organisation where they worked previously to establish the new business (Cooper,

1973; Cooper, 1996; Cooper and Park, 2008; Harrison et al., 2004; Oakey and Cooper, 1991; Oakey, 2005). There is evidence that propensity to spin-off can be influenced by the peers with whom individuals work; peers who have past experience of venture creation act as sources of vicarious learning for would-be entrepreneurs (Nanada and Sorensen 2007). More generally, firms which are located in environments where high levels of spin-off activity occurs will tend to see higher numbers of spin-offs (Cooper 1973), as would-be entrepreneurs are encouraged to take the entrepreneurial step themselves as a result of observing role models who demonstrate the feasibility of pursuing an entrepreneurial career pathway. In the case of technology entrepreneurship, the employer which the individual leaves to start his/her own venture is typically a commercial, private sector business, although research has shown that public sector research establishments and universities act as the “incubator” for around 10% of electronics and software start-up and 20% of biotechnology new starts (Cooper, 1998; Cooper and Park, 2008; Harrison et al., 2004; Oakey et al., 1990).

Studies of entrepreneurial activity in technology-based sectors also suggest that the majority of ventures are founded by entrepreneurs in their mid- to late thirties (Cooper, 2006; Harrison et al., 2004) although work based upon inter-sectoral comparisons suggest that start-ups by younger entrepreneurs are more common in some sectors than others (Cooper, 2006). For example, start-ups by younger entrepreneurs are more common in the software sector than they are in the electronics industry. Arguably, it is easier for people in the software sector to become entrepreneurs at an earlier stage as it is a relatively new and rapidly developing sector where maturity does not offer significant benefits over youth. Those with appropriate knowledge and skills are able to identify opportunities which require relatively modest levels of financial resource to enter the market. Maturity is a double-edged sword in terms of its influence on entrepreneurship; mature people may benefit from a greater wealth of knowledge, experience and networks but may be less flexible in their thinking as a result of being more fixed in their ways. Younger people, with fewer preconceptions may be better-placed to identify new opportunities. When a person decides to take that entrepreneurial step they can be influenced by a range of factors. The technological sector may facilitate start-up or impose constraints, such as the level of experience and skills required to establish a venture and length of time required to gain it. Credibility and track record may also prove important in establishing a new venture; brokering relationships with various agents which include suppliers, customers and financiers may be easier the greater the level of experience, which is often a function of age.

Team-based entrepreneurship is the typical technology start-up mode as around only one in four or five technology firms is established by a lone entrepreneur (Cooper, 2006; Oakey, 1995; Roberts, 1991). Team-based venturing provides the opportunity to pool complementary knowledge, experience, skills and resources, so that firms benefit from the collective weight of their individual team members' contributions. Most technology entrepreneurs are educated to degree level and for many this means a degree in a technical domain (Cooper 2006; Harrison et al., 2004). Following their education, most work for other employers for a number of years, in some cases fifteen to twenty, before they set up their own venture. During this period of employment many would-be entrepreneurs meet those with whom they subsequently start new ventures; they also have the opportunity to enhance market awareness and knowledge, and establish relationships with customers, suppliers and other agents (Chandler and

Jansen 1992). Vitaly, this period, which can be thought of as an entrepreneurial apprenticeship, also provides the chance to identify opportunities which frequently form the basis of the new venture (Harrison et al., 2004). It is not surprising, therefore, that many technology entrepreneurs establish ventures in sectors in which they have worked before (Chandler 1996; Cooper 2006; Harrison et al., 2004).

Thus, the career path of many technology entrepreneurs is characterised by a journey which comprises several years at university and ten to fifteen years in employment before the step up to entrepreneurship; few make the transition to entrepreneurship before the age of thirty. The establishment of the National Council for Graduate Entrepreneurship in the United Kingdom has raised expectations that increasing numbers of students will start businesses whilst at university, on graduation or soon thereafter. If the present reality is that most entrepreneurs are not that young when they start, this raises the questions about what can be done to bring the entrepreneurial future forward. Entrepreneurship education and related enterprise activities, stimulated and supported via government programmes and other institutional initiatives, have the potential to influence the future entrepreneurial career path of many individuals (Cooper and Lucas, 2006).

Bringing the entrepreneurial future forward

Universities are recognised by policymakers and university managers as having the potential to play a multifaceted role in enhancing levels of entrepreneurial activity by stimulating and supporting the development of students and staff as entrepreneurs (Cooper, 2001; Cooper and Hetherington 2005). The focus of universities on technology-based enterprise has been fuelled by programmes such as Science Enterprise Challenge, the United Kingdom government-sponsored initiative targeted at promoting entrepreneurship within SET disciplines in higher education (Hartshorn and Hannon 2005). Such initiatives have led to the introduction of activities ranging from taught modules in enterprise to business plan competitions aimed at encouraging SET students and staff to engage in enterprising behaviour and commercialise university-generated know-how (McGowan and Cooper 2008). Students entering business plan competitions need to understand a range of functional areas and resource requirements, some of which can be developed through taught modules or extracurricular workshops. Given earlier comments regarding the importance of markets/marketing strategy to technology ventures, a major issue for many students entering business plan competitions is that they have little/no direct experience of markets they seek to enter. Some students form teams with university staff, increasing numbers of whom have commercial awareness/direct experience, from working in industry before entering academia or through collaboration with companies on near-market research.

There has been a proliferation of business plan competitions, with anecdotal evidence of teams using their winnings to bootstrap their start-up; however, little research has explored the impact of competitions in terms of the entrepreneurial teams and businesses which emerge (McGowan and Cooper 2008). Hence, little is known about the backgrounds of those who found the ventures and how they overcome the apparent lack of experience which is important to the success of so many entrepreneurial ventures.

Research focus, method and empirical findings

Focus

In order to help address this knowledge gap the authors of this paper are undertaking exploratory research which focuses on the outcomes of a cross-institutional business plan competition in Northern Ireland. The data discussed in this paper were gathered through analysis of the business plans developed by the top ten ventures which won a place to compete in the final of NICENT's £25k EAS in 2007. NICENT has managed the EAS across two higher education institutions in Northern Ireland, the University of Ulster and Queen's University of Belfast, since 2000 when the competition was initiated. The competition, based upon MIT's \$50k Enterprise Award Competition, is designed to encourage student engagement in enterprise through the exploitation of technology-based opportunities and the stimulation of technology transfer within universities in Northern Ireland. The EAS is open to undergraduates, postgraduates and staff from any discipline at all the University of Ulster campuses and at Queen's University, Belfast. Entrants are required to develop a business plan for commercialisation of a specific piece of technology.

As a result of the extent to which academic staff were becoming involved in the competition the rules regarding team composition were amended in 2003 to require teams to be made up of students or a mix of students and academic staff, as long as the number of staff did not exceed that of the students. This rule was introduced in order to encourage greater involvement of members of the student body, to encourage increased levels of collaboration between research active staff and their research students and to avoid the emergence of venture teams which were comprised of exclusively university staff seeking a commercial outlet for outcomes of their research activity. An impact of this change, reflected here, has been the emergence of teams directly involved with the development of the business plans, and likely to develop the new ventures, which are made up largely or exclusively of students. What is also evident is the innovative and strategically sound development and use of secondary, informal teams of advisors. These bodies while engaged indirectly, are viewed by the founding teams as a crucial resource for the emerging ventures, acting as an advisory board, or informal adjunct to the management board, providing guidance, occasionally resources and access to key networks. In five of the ten cases there was evidence of a wider supporting team; further consideration is given to this wider team in the discussion which follows.

The competition is run over two stages which extend over a six-month period. All entrants are required to submit a short business plan for their technology-based opportunity which is evaluated by a team of experts (made up of entrepreneurial practitioners, business angels and business professionals): based on the short business proposition the top ten ventures are selected to compete in the final. Those proposing ventures which win through to the final have access to specialist workshops and are matched with a mentor who provides supports to shape the opportunity/proposition. Individual or teams of entrepreneurs then develop a full business plan and present to a panel of external experts. Success of the competition has enabled significant private-sector support to be attracted as well as that of the development agency Invest Northern Ireland. In total 40 plans were submitted to the 2007 competition sizeable numbers of teams coming from business and from engineering; cross disciplinary teams were very rare. The empirical section of this paper explores the top ten teams and their technology-based opportunities.

Methodology and sample

Nearly 100 individuals/teams registered their interest in participating in the 2007 EAS competition. The eventual number of entrants in the first round of the competition totalled 40, from across the two institutions. From this group the top ten business propositions were selected to participate in the final round. In the 2007 competition five ventures from each university were represented in the final ten, all of which had been developed by teams. The business plans of these top ten teams provide the data which are analysed and discussed in this paper. Given the current lack of evidence regarding the outcomes of business plan competitions this exploratory and case-based research seeks to help address this gap. The ten plans varied in length from 26 to 59 pages. Analysis of the plans was undertaken by the two members of the research team. A framework of topics to guide analysis was drawn up and agreed by the research team, based upon literature on entrepreneurial teams, the background of entrepreneurs and aspects of market development, so that the plans could be analysed and relevant information extracted. The researchers jointly coded up the data from three of the plans before dividing the remaining plans for individual coding. The researchers then exchanged their findings for verification and corroboration to ensure that the analysis was systematic and rigorous.

Findings

The company location and its “product”: The product ideas of the top ten ventures were described, variously, as “innovative”, or “revolutionary”, meeting definite and clearly identified and defined customers needs. They comprised a computer security software product (Company A, Belfast), a bespoke insurance claim service (Company B, Londonderry), a media resource and education service (Company C, Londonderry), a sports accessory good (Company D, Belfast), an on-line stress management resource (Company E, Belfast), a school transition software product for post-primary school children (Company F, Belfast), a toileting product for older and infirm people (Company G, Belfast), an innovative refrigeration technology and service (Company H, Antrim), an innovative bed management product for use in hospital wards (Company I, Belfast), and a new search and query technology for internet searches (Company J, Belfast). Notwithstanding the claim of “innovativeness”, only two of the ten teams had Intellectual Property (IP) protection in place for their ideas and two others were in the process of applying for protection of their innovations.

The actual or proposed locations of the businesses was in some cases influenced by the desire to maintain links with academics or research groups within the students’ or staff members’ university. A number of the plans made explicit mention of the desire to be located in close proximity; other firms were more footloose and less tied to specific locations. There was evidence of some of these young start-ups using university incubator facilities which offered low-cost, flexible terms.

The team - size, gender, age and “status”: The average number of members of the venture teams was four; this number comprised those who were directly involved in development of the business plan and would be responsible for the initial development of the venture. The teams, however, varied markedly in size; one had just two members while the two largest teams comprised six and seven members. For this cohort entrepreneurial new venturing appeared to be an activity attracting men, primarily, since of the 42 individuals involved in these top ten teams, 36 were male and only six were female. This finding reflects those in research on the gender

balance evident in technology sectors (Cooper et al., 2007; Hampton et al., 2007), but contrasts with findings of research which focused on earlier years of this competition, which showed that it attracted large numbers of female participants (McGowan and Cooper 2008).

The age of team members directly involved in the development of the ventures ranged from early-twenties to mid-fifties. Some teams combined youth and maturity as students had teamed up with staff or others from outside the university, so that students were able to draw upon the expertise of those with commercial or greater technical experience. The average age of venture team members was mid-twenties, which is significantly different from that observed in non-business plan ventures discussed earlier.

As alluded to earlier, all but eight of the participants are categorised as current “students”, reflecting the degree to which students dominated the make-up of team membership in this cohort; of the others, four were identified as academic staff members. The lead entrepreneur in nine of the ten cases was a student. Those “staff” team members on venture teams brought specific technical expertise and experience to their respective teams, in computer technology, organisational behaviour, education and technology transfer.

Education, knowledge and experience: Team members came from varied educational backgrounds. All of those engaged directly with the development of the enterprise had completed or were completing a university degree programme, undergraduate or postgraduate taught/research degree. The majority of these team members (36 out of a total of 42) were about to be awarded or held a Masters degree obtained through taught enhanced undergraduate or postgraduate programmes, and a minority, 8, held or were working to complete postgraduate research qualifications or PhDs. The academic disciplines of team members varied widely, and, as is discussed below, were significant in informing the types of businesses developed by their respective teams. Subjects ranged from English, Creative Writing, Sociology, Mathematics, Sports Studies, Education, Business, Law and Social Science to Engineering, Construction, Electrical, and Mechanical, Product Design, Graphic and Web Design, and Computer Science. More than half of those involved in the teams were from an Engineering, Design or Computer Science background.

Those directly involved in the enterprise drew upon their education, technical knowledge and business experience as sources for their business ideas. For example, in developing its computer security software product Company A reflected the technical expertise and experience of two of its four team members, one of whom had an undergraduate degree in Computer Science whilst the other held a PhD in the subject, was highly experienced in computer security and had an extensive network of industry contacts. Company D had developed a sports-related product; one of Company D’s four team members had an undergraduate degree in Sports Science, a taught postgraduate Masters degree in Marketing and was undertaking research for a PhD. The other team members had undergraduate degrees in Mathematics, Sociology and English and Creative Writing, with this last team member also having a Masters degree in Fine Art. All were accomplished sports people, with extensive professional experience, and two were involved in sports on a professional basis.

A good example of how diverse skills and knowledge were brought together to support venture development is seen in Company F. The four members of this team,

which developed transition software for children moving to post-primary school level, brought a balanced mix of software development knowledge and educational qualifications, as well as substantial experience, of and in the education sector. Three members of the team held undergraduate and taught Masters degrees in Computer Science, while the final team member was a qualified teacher with nearly thirty years of experience within the education sector and specialist knowledge of special needs education. A final example is that of Company J, which offers a new internet search and query technology based upon a particular and highly innovative technology. The four members in this team held undergraduate and postgraduate degrees in Computer Science and Computer Engineering. One holds a PhD in artificial intelligent systems and another was about to complete his PhD in this area. All had substantial experience in the field and had developed significant networks within the sector, both nationally and internationally.

The number of years of relevant experience amongst the new venture team members ranged from zero to, in one case, over thirty years. Leaving these extreme examples aside, the average number of years of experience was five, with some teams bringing together individuals with widely divergent levels of experience, which was the case where teams comprised both staff and students or students and others not connected to the university. The majority of undergraduate engineering students within the new venture teams had spent a period of up to one year in industry as part of their degree programme and so much of their experience was derived from this placement. All of those who had completed or were about to complete taught postgraduate programmes had gained relevant, full-time experience either between their undergraduate and postgraduate studies or following completion of their masters degree. For those whose experience was very limited, it raises questions as to the depth and breadth of that experience, and the extent to which it provides adequate preparation for venture start-up.

Beyond the team - extended networks: Notwithstanding levels of education and high levels of technical knowledge and qualifications, in light of the limited experience and access to key networks of many team members, half of the teams saw the need to enhance their team's capability and access to resources. In developing their business plans five of the ten teams saw the need to report upon an extensive network of contacts on whom they would draw to support them in the launch and development of their venture.

Those indirectly involved in the development of the new ventures, who were key members of networks of those directly involved, appeared highly qualified and with significant experience in the sectors within which the new ventures were situated; thus, they would be able to provide guidance and access to resources, including to other networks. They clearly demonstrated specific technical as well as business experience, supportive of the idea being developed. For example, members of Company B drew heavily upon the parents of one of the team, who were experienced business people with their own company, and the services of a qualified accountant. Similarly, Company D listed an extensive network of quality contacts, including a professor of business, a qualified attorney and IP specialist, all with over 25 years of highly relevant experience, and a venture capitalist with over twenty years of experience. Also included were several others with varying expertise and experience in the sports industry, both nationally and internationally. A further example is Company E which listed an "indirect" team comprising five individuals who brought

extensive experience of the management development sector in which the new venture was positioned, and who made available to the core team, access to their extensive network of contacts.

The remaining five teams did not specifically cite a wider network of contacts as a key entrepreneurial resource. Three of them did, however, reflect the breadth and depth of their experience as well as their level of qualifications. Company F, for example, presented team experience of, on average fifteen years, with one member having almost thirty years of relevant business expertise. Another example is Company J, whose members had, on average, eight years of experience, with one member having 28 years of pertinent business experience.

Markets and customers: The extent to which the different venture teams identified the value of their project and defined a strategy to exploit that value was a key part of the business plans. All appeared to be clear who their different customers were and to be able to define appropriate segments to target. Company A, for example, in seeking to provide a computer security product, identified the commercial banking sector and its customers as its key target group. Its potential market was global and it appeared to have identified one key United States (US)-based competitor to its plans. It was clear about the growth potential of its market, worldwide and how much it estimated it would need to invest in order to establish the venture. The team was also clear about how it would approach the market, utilising licence deals and augmenting its marketing promotions efforts by personal contacts, professional endorsements and the development of its web-site. Interestingly, all ten companies had established a website as a part of their promotions programme, and eight appeared to be particularly sophisticated, facilitating feedback from customers as well as providing information on the venture, the venture team and its products. Company C offered a particularly good example, given the venture's focus on providing access to media education and resources. This venture team had a clear vision of who its customers were, individuals who wanted to be able to manipulate film media. Competitors were identified in the US but none was seen to pose a direct challenge, particularly given the new venture's focus on the UK and Ireland markets. However, detail as to the size of the level and sustainability of demand in these markets for the venture's product offering appeared limited. The web was identified as the route to market, hence the emphasis on the development of the company's website.

A further example of how the individual venture teams identified the value of its project and defined a strategy to exploit that value as a key part of the business plans is Company G. This team of engineering students developed a toileting assistance product that resolved many of the difficulties experienced by the elderly and infirm in using the toilet, whilst retaining personal dignity. A further benefit of the product was to reduce the risk of back injury by carers seeking to assist those who need help. The team had identified its target customers, defined its market place as being the UK and Ireland, had researched its likely competitors but was convinced that its product offered greater benefits than products available in the market. While short on detail it had identified the potential of the market in terms of its size and who the key players were as far as those likely to adopt the company's product, largely hospital trusts. Although with little by way of a profile in the market, Company C had decided that its best approach to the market should be through personal selling. One final example in this regard was Company H. This team was made up of seven students, all with undergraduate Masters degrees in Mechanical and Manufacturing Engineering.

Reflecting the academic background of its members the venture focused on developing a market for a refrigeration technology based upon the use of air rather than chemical refrigerants. Seeking to exploit current trends in terms of the green agenda the team set out to target industrial refrigeration and had identified the growth potential of its market. Only one direct competitor, from Japan, was identified by the team, although other competitors using traditional chemical methods were identified. The basic product appeared to exist already but the team had developed enhancements to this which it was taking steps to protect through IP channels. Despite little or no profile in the market the team planned to promote its product through demonstrations and personal selling. The island of Ireland was identified as the first key target market, with the UK next, after a period of three years.

Probably the most sophisticated example out of the ten for identifying the value of its product and defining a strategy to exploit its value was that of Company J. The customer group for this venture's, IP-protected, new search and query technology had already identified themselves as large companies within the media sector. Another new emerging sector was companies within the international pharmaceutical sector which have a need for on-line search technology. Eight competitors were identified and the markets which they served, and research suggested a substantial global market for the venture's product. The team had, however, decided to establish its position within the UK and Ireland before seeking, within three years, to gain entry into the US market. Along with the company website, attendances at conferences and personal selling were identified as key approaches to promote the company and its products, assisted by the team members' extensive network of contacts and high profile in the venture's target market.

Discussion and conclusions

A number of valuable insights emerge from the research discussed in this paper. The NICENT £25k EAS seeks to encourage a greater engagement of students and staff, from within higher education institutions, in practical aspects of entrepreneurial venturing. From the earliest stages of the competition, the Centre puts the emphasis on the concept of "near-to-market" projects and, as entrants develop their business plans, they are encouraged to think seriously about the commercial potential of their ideas as the basis for a new venture, and as possible alternative career choices for themselves. This strategy is in contrast with other business planning competitions managed by the Centre, targeting largely undergraduate students, where the emphasis is much more on learning about the entrepreneurial process and any expectation of venture start-up is significantly lower. The types of opportunities discussed here suggest that the competition is stimulating and helping to drive forward ventures which are identifying technologies with real market potential.

The Centre's strategy to emphasise the expectation that new ventures may well emerge from engagement with the £25k competition has clearly had an impact on the composition of the entrepreneurial teams which it has attracted. The teams have really focused on how their technical knowledge has influenced the identification of business opportunities which capitalise upon their know-how and commercial experience, their access to relevant expertise beyond the immediate venturing team, and the development of robust marketing strategies for their products. That these ten finalists have all started-up in business is an interesting and valuable outcome.

What appears clearly from the analysis of the top ten ventures is that team members draw upon their own specialist knowledge and expertise in their chosen subject area,

mostly research-based, to identify the product idea around which they propose to develop an entrepreneurial venture. An important driver in the development of a venture proposal is a key individual within the team who is particularly knowledgeable about the area, largely as a consequence of research undertaken, and is aware of an opportunity that s/he considers is ripe for exploitation. A second key driver appears to be that individual's personal and professional experience within the area, which, combined with specialist knowledge, helps them to identify a specific problem or gap in the market which they perceive that they can address. Furthermore, for at least five of the teams the professional expertise and experience of significant others was especially crucial in identifying and seeking to establish the potential of the opportunity for which they saw the "window of opportunity" opening, and upon which they considered that they could build a sustainable commercial enterprise. Issues of personal confidence and self-belief are evident amongst team members in each of the companies, but particularly within teams where some members bring to the venture a record of long and varied business experience and have, or at the very least, access to such people through their network of personal contacts, often generated during previous employment. Even for Company H, with its seven student team members, who had each spent just a year in industry during their degrees, it could be seen how it pulled upon that experience and for one member it had provided the opportunity to identify a commercial problem which Company H was seeking to address.

Analysis of these top ten companies indicates how all of the teams, the members of which came from non-business backgrounds as far as their primary subject areas of research were concerned, responded to the opportunity that engagement in the £25k EAS afforded. It clearly provided an opportunity to explore the commercial potential lodged within their research activity and to develop appropriate competencies in venture management which they might not otherwise have gained. This raises the question as to how many of them would have become as deeply involved in entrepreneurial venturing at this stage in their careers had it not been for the competition; the most likely answer is very few, if levels of new venturing activity by similar students prior to inception of the competition is an appropriate measure by which to judge. What is evident is that most of the 42 individuals who are involved in the ten teams come from a university environment where they are studying or are undertaking cutting-edge research in a technology-based discipline which has provided the technological basis for their new venture to exploit diverse opportunities.

From an institutional and disciplinary point, all student and staff venture team members came from Science, Engineering, Technology and/or the Creative Media, (SET/CM), and none were from Business and Management. Most of the engineering students had gained industry experience during their degree; this had helped them to develop commercial awareness and, in some cases, had helped them to identify an opportunity. The competition is open to staff and students from all faculties which raises questions about the type of ventures that are likely to be generated from enterprise competitions within a university setting; the evidence presented here suggests that they are most likely to come from within the SET/CM constituency. This raises further interesting questions about the rationale for lodging the entrepreneurship agenda within Business and Management faculties which are the traditional "home" for "entrepreneurship", the value of migrating the agenda out of Business and Management and into SET/CM faculties, and the need to nurture much

greater cross-disciplinary activity. Future research will give consideration to these issues.

At this point it is not possible to judge the long-term economic contribution of these ten ventures. If all of the individuals are ultimately engaged in the new ventures this will amount to 42 direct “jobs”, before any employment of others, which is the short- or long- objective of most teams. All the ventures are located in Northern Ireland which represents a small but valuable contribution to the stock of local businesses, and while most teams are focusing, initially, on domestic markets, more than half are planning to build their presence in international markets, which will bring longer-term export trade benefits to the wider economy. Retaining technical talent within Northern Ireland is important. Many students leave Northern Ireland to attend university across the Irish Sea, and secure employment on the mainland when they graduate; many never return, or at least not until later in their career. Finding ways to retain technical talent in the shape of students educated in Northern Ireland’s universities and staff who are working within Northern Ireland’s higher education institutions is vital if the economy is to remain vibrant and dynamic. University technology transfer, along the lines discussed here, may represent another string to Northern Ireland’s bow in terms of ways in which to retain entrepreneurial talent, supported by more experienced entrepreneurs, university technology transfer offices and the university research community, which was identified as an important continuing resource for a number of the businesses.

A little less than one year on from the competition all of the companies have a web presence and are operating, some more actively than others. Only time will tell which of the ventures will thrive and which will perish; the aim is to track the development of the ten ventures over the next three years to develop a greater understanding of the evolution of ventures with a university origin. Even if not all of the ventures continue, experience gained by their founders will enable individuals to become valuable employees working for other organisations, and at some future juncture some might be stimulated to pursue other entrepreneurial opportunities, alone or with others, perhaps fellow work colleagues.

Taking a wider perspective on business plan competitions, most participants will not engage in venturing directly after university, however, as has been observed here, some will. Experience gained of new venture planning may encourage some participants to think positively about employment within small enterprises, and seed longer-term entrepreneurial aspirations. Those who never start a venture should be better-placed to contribute to innovation as an employee, whatever type of organisation they join.

References

- Aldrich, H and Zimmer, C (1986) ‘Entrepreneurship through social networks’, 3-23 in D Sexton, and R Smilor (eds) *The Art and Science of Entrepreneurship*, Cambridge MA: Ballinger.
- Chandler, G (1996) ‘Business similarity as a moderator of the relationship between pre-ownership experience and venture performance’, *Entrepreneurship: Theory and Practice*, **20**, 3, 51-65
- Chandler, GN and Jansen, E (1992) ‘The founder’s self-assessed competence and venture performance’, *Journal of Business Venturing*, **7**, 223-236.

- Cooper, SY (1998) 'Entrepreneurship and the location of high technology small firms; implications for regional development', 247-267 in RP Oakey and W During (eds) *New Technology-Based Firms in the 1990s*, London, Paul Chapman.
- Cooper, SY (2001) 'Commercialisation and regional economic development: universities and their role in the emergence of new technologies', 191-205 in W During, RP Oakey and S Kauser (eds), *New Technology-Based Firms in the New Millennium*, London, Pergamon.
- Cooper, S (2006) 'Exploring the pre-entrepreneurial careers of high-technology entrepreneurs', *International Journal of Continuing Engineering Education and Life-Long Learning*, **16**, 5, 341-354.
- Cooper, SY and Hetherington, L (2005) 'Developing entrepreneurial capability to facilitate academic entrepreneurship and technology commercialisation', 23-40 in R Oakey, W During and S Kauser (eds) *New Technology-Based Firms in the New Millennium*, Vol. IV, London, Elsevier.
- Cooper, SY and Lucas, WA (2006) 'Developing self-efficacy for innovation and entrepreneurship: an educational approach', *International Journal of Entrepreneurship Education*, 4 (electronic journal no page numbers).
- Cooper, SY and Park, JS (2008) 'The impact of "incubator" organisations on opportunity recognition and technology innovation in new, entrepreneurial high-technology ventures', *International Small Business Journal*, **26**, 1, 39-63.
- Cooper, S, Daly, I and Good, D (2007) 'Developing female entrepreneurial capital for technology entrepreneurship: the case of MEETS', paper to the 15th International High Technology Small Firms Conference, Manchester Business School, Manchester, June.
- Cooper, AC (1973) 'Technical entrepreneurship: what do we know?', *R&D Management*, **3**, 2, 59-64.
- Cooper, SY (1996) *Small High Technology Firms: A Theoretical and Empirical Study of Location Issues*, unpublished PhD thesis, Edinburgh, Heriot-Watt University, Department of Business Organisation.
- Galloway, L and Brown, W (2002) 'Entrepreneurship education at university: a driver in the creation of high growth firms', *Education + Training*, **44**, 8/9, 398-405.
- Hampton, A, Cooper, S and McGowan, P (2007) 'Female entrepreneurial networks and networking in technology-based sectors', paper to the ISBE Policy and Research Conference, Glasgow, November.
- Harrison, R, Cooper, S and Mason C (2004) 'Entrepreneurial activity and the dynamics of cluster development: The case of Ottawa', *Urban Studies*, **41**, 4/5, 1045-1070.
- Hartshorn, C and Hannon, P (2005), 'Paradoxes in entrepreneurship education: chalk and talk or chalk and cheese?', *Education + Training*, **47**, 8/9, 616-627.
- McGowan, P and Cooper, SY (2008) 'Promoting technology-based enterprise in higher education: the role of business plan competitions', *Industry & Higher Education*, **22**, 1, February, 29-36.
- Nanda, R and Sorensen, JB (2007) 'Peer effects and entrepreneurship', HBS Working Paper 08-051, Harvard Business School, Boston, MA.
- Oakey, RP (1995) *High-Technology New Firms: Variable Barriers to Growth*, London: Paul Chapman.

- Oakey, RP and Cooper, SY (1991) 'The Relationship between product technology and innovation in high technology small firms', *Technovation*, **11**, 2, 79-92.
- Oakey, RP, Faulkner, W, Cooper SY and Walsh, V (1990) *New Firms in the Biotechnology Industry: Their Contribution to Innovation and Growth*, London, Pinter Publishers.
- Roberts, E.B. (1991) *Entrepreneurs in High Technology*, Oxford: Oxford University Press.