

GOOD PRACTICE SERIES 2014

FOSTERING UNIVERSITY-INDUSTRY RELATIONSHIPS, ENTREPRENEURIAL UNIVERSITIES AND COLLABORATIVE INNOVATION

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This series is an initiative of the University Industry Innovation Network (UIIN) and part of the UIIN Good Practice Series. The case studies are developed to support, develop and strengthen the interaction between Higher Education Institutions (HEIs) and business.

The objective of the series is to highlight a wide variety of cases in different settings. As every environment is different (e.g. country, culture, stage of development, type of institution) UIIN collects good practices on various subjects and levels, including organisational, departmental and project level. Presenting cases with diverse stages of development, types of interaction (e.g. collaboration in R&D, entrepreneurship), and types of activity (e.g. operational activities, structures and approaches) allows readers to get new impetus on how to foster university-industry interaction in their own organisation.

All case studies are presented in the same structure, starting with General Information, followed by the Case Study Profile, Implementation & Funding, Outcomes & Impact, Lessons Learned and Further Information. We encourage you to review the cases, discuss them with your colleagues and further experts and get in contact with the respective authors in order to adapt the approaches to your own environments and exploit the full value of the presented cases.

Through this publication UIIN strives to support and stimulate the development of university-industry interaction, entrepreneurial universities and collaborative innovation.

UIIN Good Practice Series 2014 – Fostering University-Industry Relationships, Entrepreneurial Universities and Collaborative Innovation *Arno Meerman & Thorsten Kliewe (eds.)*

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By Sven De Cleyn, Jan Coppens and Frank Gielen



GENERAL INFORMATION

TITLE OF THE CASE	Activating Researchers for Entrepreneurship: Bridging the Gap Between Research and Transfer to Society
SALES PITCH	How to activate researchers to engage in transferring their knowledge from research to society through entrepreneurial behavior and activities
ORGANISATION	iMinds
COUNTRY	Belgium
DATE	February 2014
AUTHORS	Sven H. De Cleyn, Jan Coppens and Frank Gielen
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 Strategic instrument Structural instrument or approach Operational activity Framework condition



CASE STUDY PROFILE

1. SUMMARY

Europe has been shown to lag behind in terms of transfer of research to society when compared to the US (or even to other regions around the globe). Despite the less long-standing history when it comes to knowledge transfer, Europe is catching up in recent decades. This case study demonstrates the approach of one specific public research organisation (PRO) – iMinds, a Belgian PRO that conducts and stimulates demand-driven research in digital media and ICT – to activate researchers in entrepreneurial thinking and become more supportive (or even active) in knowledge transfer. The results of this case study are relevant to other PROs searching for methods to develop their researchers' entrepreneurial skills and foster knowledge transfer to society.

The case study reflects on iMinds' programs to develop researchers' entrepreneurial skills and behaviour. These programs don't require these researchers to become entrepreneurs. This case study describes various programs aspects (goals, challenges, content, teaching / coaching methodology and outcomes) and the overall vision and strategy behind. Currently, three core programs have been developed:

- Opportunity Recognition Workshop (ORW), an interactive, flipped-classroom format where researchers develop skills to evaluate how and where their technologies can be used in real-life settings to solve problems;
- iBoot, a bootcamp concept where researchers develop entrepreneurial skills to enable them to understand application areas for their technologies and build a feasible business case around it;
- iMinds Academy, an on-line learning platform where teaching material and expert courses using interactive videos and blended learning enable researchers to learn at their own pace.

2. BACKGROUND

iMinds has been established in 2004 by the government of the Flemish Region (Northern part of Belgium), under its original name of IBBT (Interdisciplinary Institute for Broadband Technology). The organisation, funded by the Flemish Region, was given the task to develop demand-driven research and solutions for the digital media and ICT sector and foster the business and societal application and adoption of newly developed technologies, knowledge, products and services. In this sense, iMinds tries to bundle relevant experience and knowledge in the digital media and ICT sector with the vision of creating new knowledge and technologies through cooperative demand-driven research and fostering the development of entrepreneurial skills and initiatives. Applying knowledge and newly created technologies to addressing societal and business challenges in this sense is part of iMinds' core mission.

iMinds as an organisation somehow acts as network integrator for research and entrepreneurship in digital media and ICT in Flanders. In this role, iMinds collaborates with



universities and university colleges and other actors in the ecosystem supporting entrepreneurship (including SMEs, large companies, technology transfer offices, incubators, pitching events, financers and others). From a research side, iMinds has strategic partnerships with all five universities in Flanders (Vrije Universiteit Brussel, Ghent University, Hasselt University, KU Leuven and University of Antwerp). Through these partnerships, iMinds has direct access to and involvement with the vast majority of (ICT-related) researchers in Flanders. In this sense, iMinds acts as lynchpin in a Triple Helix ecosystem for the Flemish digital media and ICT community, integrating various actors and stakeholders.

The activities of iMinds are centred on two pillars: [1] collaborative and demand-driven research, in close cooperation with Flemish, Belgian and international companies, government organisations and other societal actors, and [2] foster entrepreneurial behaviour amongst researchers and externals and supporting commercialisation and other entrepreneurial activities with various programs.

Through the former, iMinds gets relatively easy access to primarily researchers (professors, post-doc researchers, project researchers and doctoral students). However, in second order the partnerships with the universities grant indirect access to the students, especially in more science, technology or engineering orientations (given the links with these departments through joint research activities).

Warming up researchers for entrepreneurial behaviour and thinking has been recognised as a challenging task. The nature of conducting research and engaging in entrepreneurial activities (directly or indirectly) seem very different things at first sight. However, iMinds believes both activities reinforce one another and shouldn't be mutually exclusive. In this sense, prior research on the subject has shown that researchers demonstrating entrepreneurial behaviour tend to be more successful in their academic careers (see e.g. Van Looy et al., 2006). As part of its mission, iMinds is therefore developing strategies and tools to engage researchers in entrepreneurial thinking (not necessarily activities) and foster the development of their entrepreneurial competences.

3. OBJECTIVES

According to recent studies, the academic job market has been changing over the last decades. While a PhD used to be a runway to an academic career, nowadays in many Western countries the number of PhD students has been increasingly significantly. Therefore, typically over 80% of PhD student needs to pursue a career outside academia after graduating. In view of this setting, iMinds has decided to prepare its researchers for a career outside academia; a career in which an increasing number of organisations ask for entrepreneurial skills and attitudes.

A second major objective of the initiatives taken by iMinds relates to the process of getting knowledge and new technologies into concrete applications to address business and societal needs (knowledge and technology transfer). These knowledge and technology transfer activities have however been shown to be a challenging and difficult process, partly because researchers and business speak a different language. Part of the solution is closing the gap between researchers and entrepreneurs, by stimulating research to think about how and where their knowledge can be applied in real-life settings to address needs and problems encountered in society and industry. This also helps researchers in cooperating more easily



with third parties and attracting additional funding for joint research activities with these third parties or for grants by an enhanced implementation and application part in their proposals.

Summarising, iMinds' strategy and activities to foster the creation of entrepreneurial human capital and the stimulation of entrepreneurial thinking, attitude and behaviour has following objectives:

- > Prepare researchers for a career outside academia;
- Fostering the development of entrepreneurial skills and attitudes amongst researchers and students (not necessarily leading to the creation of more spin-offs);
- Enabling researchers to better spot opportunities for application of their knowledge and technologies in real-life settings to address business and societal challenges;
- Providing active learning opportunities for researchers through interaction with the businesses in iMinds' incubator program and other organisations in iMinds' network.

Obviously, in second order these programs additionally seek to support those entrepreneurs envisaging to take the next steps in an entrepreneurial journey, being the creation of their own start-up or spin-off venture. However, this is not the end goal of the entrepreneurship programs described in this case study.

4. **RESPONSIBILITY**

The responsibilities for iMinds' incubation and entrepreneurship program differ slightly according to the program. The coordinating role is played by iMinds' Incubation & Entrepreneurship team (I&E). However, in several programs a number of important stakeholders contribute.

Additionally, a main responsibility lies with iMinds top management, who actively support the strategy and underlying activities to foster and support the creation and stimulation of entrepreneurial talent and attitude amongst the iMinds' research community.



Program	Key partners	Partner responsibilities
Opportunity recognition workshops	(1) Doctoral schools of the Flemish universities	(1) Getting local support and interest from participants (1) Providing part of the funding
	(2) Technology transfer offices of the Flemish universities	(2) Providing additional coaching
Intensive bootcamps	(1) Business developers in the research groups	(1) Getting local support and interest from participants
	(2) Bootcamp coaches	(2) Bringing content and coach participants
iMinds Academy	(1) Research groups	(1) Support in the creation of content for the educational platform
	(2) Technology transfer offices of the Flemish universities	(2) Using the tools and content to broaden the scope and reach of the platform

Each of these programs is explained in more detail in Section 5 (Strategy & Activities undertaken).



5. STRATEGY & ACTIVITIES UNDERTAKEN

Activating researchers for entrepreneurship isn't a matter of trying to maximise the revenue generated by licenses or exits realised with spin-off ventures. The underlying strategy needs to go much deeper and further. PROs have a number of important missions, including conducting research, providing education (at least for universities and university colleges) and disseminating research results to provide a return for society. The latter aspect can take many forms, of which scientific publications and education have been the main mechanisms for centuries. However, in recent decades, the role of PROs in regional and national ecosystems has changed. Using tax payers' money, society increasingly requires PROs to generate a return for society beyond 'merely' providing education and conducting research. This changing role, sometimes referred to as the 'third mission', requires different processes, activities, competences and attitudes within these PROs.

In order for PROs to comply with this new demand from society, and in view of some additional evolutions, PROs need to develop a strategy and concrete tools and actions to foster entrepreneurial behaviour and thinking amongst its researchers. These additional evolutions mainly refer to two topics (cfr. earlier). Firstly, the academic job market has been changing over the last decades. Nowadays typically over 80% of PhD student needs to



pursue a career outside academia after finishing their PhD studies. PROs therefore need to prepare their researchers for a career outside academic research. Secondly, PROs are increasingly asked to create a more direct impact on society and business through the transfer of knowledge and new technologies to business and society. This requires researchers to better understand the needs and issues of companies, non-profit organisations and other potential adopters of their knowledge (and vice versa).

Therefore, PROs intending to take up the challenge created by this third mission and its subsequent additional evolutions could benefit from a strategy that creates more entrepreneurial human capital amongst its researchers. The potential benefits of such strategy (see also later in this case study for more details on impact and benefits) create a multitude of opportunities:

- Researchers will better be prepared for a career outside academia.
- The 'gap' between research and business/society may become smaller, which makes cooperation easier.
- An increasing number of researchers may actually consider an entrepreneurial career.
- Knowledge and new technologies may find faster adoption by business and society, enabling faster addressing of issues and needs.

Within this line of reasoning, and as part of its entrepreneurship activities, iMinds has developed a number of tools to foster the development of entrepreneurial skills and attitudes amongst researchers, however not (necessarily) targeting the creation of start-ups and spin-offs as end goal. These tools aim at supporting the creation of entrepreneurial human capital amongst researchers and developing an entrepreneurial mind-set. These tools try to address all stages of the entrepreneurial process, from early skills development and opportunity recognition onwards to hands-on coaching, pre-seed funding and facilities for the effective foundation of the new business and even the internationalisation of businesses. This case study however focuses on the more early stage aspects of iMinds' entrepreneurship programs.

The current toolbox that focuses on entrepreneurial skill development consists of following elements:

- Opportunity recognition workshops to develop basic entrepreneurial skills for researchers and help in recognising societal and business applications of their own academic or applied research
- Intensive bootcamps as focused coaching program to translate identified business opportunities into a first business plan, further develop entrepreneurial business sense and pay attention to team development
- iMinds Academy, an interactive learning platform that enables participants to gradually absorb knowledge snippets and increase their human capital on diverse entrepreneurial topics

The tools are complemented with follow-up programs to support the start-ups that emerge from the former tools and help them and other SMEs to accelerate and internationalise. Such follow-up programs are asked for by those researchers that actually aspire to pursue an



entrepreneurial career (which obviously is a minority of the entire population of researchers).

A. Opportunity recognition workshops

iMinds organises a series of opportunity recognition workshops, in close collaboration with the doctoral schools of several (Flemish) universities (more info can be found at http://orw.iminds.be). The goal of these workshops is to help researcher tackling the first important challenge in applying their knowledge, technologies and research outcomes into societal and business applications: identifying opportunities where their research can help in solving (latent or explicit) problems or customer needs. Generally speaking, researchers are great at developing new knowledge and technologies, but somewhat less proficient at identifying challenges for potential customers and matching these with the solutions they could provide. The opportunity recognition workshops aim at supporting researchers, whether doctoral students, post-doctoral researchers or project researchers in regional, national or European-funded projects, in the development of their human capital (mainly entrepreneurial skills, but also e.g. pitching and presentation skills).

Most often, researchers are used to a technology-push approach, where in valorisation efforts they try to identify applications where they technologies could be deployed (starting from their knowledge or technologies). The opportunity recognition workshops try to increase the researchers' consciousness and skills for the opposite approach: what problems do (potential) customers encounter and how could the researchers' knowledge and technologies be used to bring solutions (and value) to these customers (market-pull approach). This opposite approach requires a new set of skills, attitudes and thinking (outside orientation). For the development and training of these skills and attitudes, hands-on practice within an incubator may be more effective than university classes. Through cooperation, both organisations can benefit: the universities' employees and students develop a new set of skills and expertise, developed in more market-oriented ecosystems such as incubators, whereas incubators and their ecosystems get a knowledge-boost through the latest technologies developed at universities.

The opportunity recognition workshops are organised under a Creative Commons 3.0 license model, allowing any organisation to use and implement the format of they acknowledge iMinds for creating the concept and the content. The underlying logic follows a 'train the trainer' concept, where trainers should be able to run the workshops after having participated in one of the series. This should allow for maximal dissemination of the concept in PROs.

B. Bootcamps

Even in case researchers have been able to recognise and identify (a number of) opportunities, they usually need additional skills to become successful entrepreneurs (or intrapreneurs). In the process towards a first business plan and the real preparation for a (new) business (case), team dynamics and business planning skills come to the foreground. To a certain extent, the centre of gravity moves from human capital development towards a combination of human and social capital development. iMinds uses bootcamps to support researchers, students and (future) entrepreneurs in developing more in-depth skills and expertise in these domains.



During the bootcamp, attention is devoted to three core activities. In first instance, team formation is in the centre of attention. Especially technology start-ups (such as digital media and ICT-related start-ups which iMinds supports) are often started by entrepreneurs with a rather technological background. Furthermore, in case a start-up is prepared for or established by a team, these tend to be rather small homogenous teams. However, given the variety of tasks at hand, heterogeneous teams have been demonstrated to increase success rates. Therefore, the first part of the bootcamp (in fact the preparation for the actual bootcamp) is devoted to building complementary and heterogeneous teams.

Practice has learned that even though a heterogeneous team outperforms a homogenous one, team dynamics trump individual skills. Building an efficient and well-functioning team is a delicate balance between the necessary skills as a team and the inter-personal connection between the individuals. As the bootcamp is one of the first steps in starting a company, a well-functioning rather homogeneous founding team can still be complemented with additional skills in a later stage of development.

The second pillar receiving attention in the pre-bootcamp period and during the bootcamp concerns pitching and presentation skills. In order to be attractive to potential team members, customers, partners and investors, entrepreneurs need to be able to tell a compelling and consistent story about their idea or venture.

The third set of key activities concerns the transfer of more content-related entrepreneurial skills (opportunity recognition, business modelling, business planning, entrepreneurial marketing and sales and financial planning, intellectual property rights and legal topics) during an intensive bootcamp (typically a full-time week off-site in an entrepreneurial hot-spot). In this intensive period, bootcamp participants are coached on these aspects and encouraged to further develop their ideas using the input from experienced business coaches and to take advantage of the local ecosystem in which they are immersed. In this regard, collaboration with incubators provides substantial added value, given the business coaching and access to local ecosystems through the incubator. This change of environment, outside the classical academic environment, is a critical success factor for the effectiveness of the entrepreneurship 'education' through bootcamps. For that sake, iMinds has organised its latest bootcamps in London, in order to maximally benefit from the vibrant tech scene available in this entrepreneurial hotspot, but also to 'force' researchers to get out of the comfort zone of their home universities.

C. iMinds Academy

iMinds Academy is an educational platform built for continuous and interactive learning. It is intended and designed to serve as a 'flipped classroom', where participants can learn and absorb new knowledge at their own pace, before (or without) coming to a series of workshops or bootcamps. The platform has been designed to enable participants to absorb knowledge snippets at their own rhythm, in an interactive format using video content interwoven with interaction element (e.g. multiple choice questions, short quizzes ...). Additionally, the platform allows participants to raise questions when going through the content and to rate the quality of questions of other students (enabling teachers and coaches to prioritise answering these questions during offline sessions). Part of these questions or (in second order) Q&A and direct interactions with the teachers and coaches.



This allows teachers and coaches to spend more time in direct interactions with participants during the workshops and provide more in-depth content and examples on certain topics. For the participants, the platform allows them to learn at their own pace, plunge as deeply into the topic as they desire themselves and have background materials available at all time. Given the educational nature of the platform, participants' progress is tracked and education metrics returned to the organisers.

A typical classroom session during the physical meeting (workshop, bootcamp) then typically starts with a (concise) summary of the online content, preferably using a concrete example or case study to illustrate and apply the knowledge snippets of the online platform. During the session, the online interactivity elements and education metrics allow teachers and coaches to have a better view on which parts of the content have been somewhat more problematic, allowing them to focus their attention better on these areas and topics.

The platform is semi-open, meaning that the content can be used by any organisation (following the same 'train-the-trainer' principle as the opportunity recognition workshops).

From a pedagogical point of view, the iMinds Academy follows Bloom's taxonomy, which allows students and participants to evolve from lower order learning skills to higher order learning skills at his or her own pace (as depicted in Figure 1).





Figure 1 – Bloom's Digital Taxonomy Concept map

Source: Bloom, B. S. (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals, Handbook I, Cognitive Domain.* New York: Longmans.

A similar approach can be taken to transfer knowledge towards researchers within companies and SMEs. Through the iMinds Academy, companies can keep up to date with the latest iMinds know-how, which in turn can inspire them to improve their products and services with new technology innovations (see e.g. http://www.smartinnovator.be/). This can result in future cooperation in iMinds research projects.

6. MONITORING AND EVALUATION

Monitoring and evaluating the quality and outcomes of the various programs is a continuous effort, especially given the young age of most of the programs. For the main coaching parts of the program (Opportunity Recognition Workshops and bootcamp), a number of characteristics of the participants are monitored for each cycle:

- the number of applications;
- their origin (parent university / research group or externals);
- the number of selected individuals / projects;



• the regional distribution (from which province do they emerge).

For the **coaching programs**, intending at developing entrepreneurial skills and attitudes amongst researchers, measuring the outcome is somewhat harder. The aim of these programs is not per se the creation of new start-up ventures or spin-off companies, but rather the creation of an entrepreneurial mind-set and the transfer of knowledge and skills on these topics. Therefore, the quality of these programs is mainly monitored by the satisfaction of the participants and the number of participants in subsequent samples (word-of-mouth referrals can make – or break – these programs).

However, more mid- to long-term monitoring also happens in the form of researchers taking part in follow-up programs. We track the individual participation in all our programs, allowing us to detect which individual researcher – on one moment or another in his or her career – takes the next step in the entrepreneurial journey. Researchers may for example first participate in the Opportunity Recognition Workshops, typically during or soon after their PhD, and a couple of months or even years later join our bootcamp to get a view on the feasibility of doing an own spin-off ventures based on their research outcomes.

It may however take years before such impact really comes to the foreground. What is more important however is the susceptibility and openness of researchers to engage with externals (companies, non-profit organisations, start-ups) during their research. This is definitely one of the main sub-goals of our entrepreneurship programs: stimulating what could be described as a 'flipped technology and knowledge transfer model', where knowledge and technologies are not necessarily licensed or transferred to a spin-off venture, but where start-ups founded by external entrepreneurs start collaborating on a strategic and operational level with research groups to reinforce the start-up's technology base.

In the **iMinds Academy**, monitoring and follow-up is seen through a somewhat different lens. Overall, the participants' progress is tracked in terms of who completes with knowledge snippet and education metrics are returned to the organisers (how long do participants need to complete some knowledge snippets and to what extent do they complete the accompanying exercises (multiple choice questions, quizzes, ...). Based on these metrics, teachers and coaches can adapt the content both online and offline.

7. SUSTAINABILITY MEASURES

Even though fostering commercialisation and technology transfer has been a cornerstone activity ever since iMinds inception, the incubation and entrepreneurship program in its current form has only been created recently (starting 2011). Sustainability of the program's basic aim and principles (given the constant evolution and improvements to the toolbox) is however anchored through following principles:

- Fostering incubation and entrepreneurship is a cornerstone in iMinds mission and vision. This assures the allocation of substantial means for organising these programs. Since 2012, iMinds has the obligation to spend at least 10% of the funds it receive from the regional Flemish government on incubation and entrepreneurship activities.
- ▶ Including 'Key Performance Indicators' (KPIs) on participation in the entrepreneurship programs both in iMinds' corporate KPIs as well as in the KPIs of



the individual research groups. This fosters the active participation of researchers in these programs, as well as support from their superiors.

- Embedding the activities in local and regional ecosystems, through the active engagement of different stakeholders (doctoral school, technology transfer offices, local incubators and networks).
- Trying to adopt as much as possible the 'train-the-trainer' principle, allowing other stakeholders to adopt the concept themselves. This is for example already being realised with the Opportunity Recognition Workshops, where several doctoral schools (and even foreign organisations) adopt the concept and organise it on their own.

8. COSTS

The cost structure for each of the programs is different. For the more human-interaction driven programs, such as the Opportunity Recognition Workshops of the bootcamps), the main cost is related to staffing. Each of both programs requires rather intensive coaching (and a bit of teaching). As the coaching occurs mainly one-on-one (for the Opportunity Recognition Workshops with individual researchers) or per team (for the bootcamps), running such program mainly requires manpower. The other costs in terms of location, materials and catering depend on the ambition and choices made.

In our case, the Opportunity Recognition Workshops are organised on an off-site location, which requires us to rent a location. However, the other expenses in terms of facilities and catering are required irrespective of the location. For preparing and running one Opportunity Recognition Workshop cycle, we estimate the total cost (excl. man-hours of iMinds staff, but including bringing in external coaches) at 15,000 EUR. Running one cycle of the bootcamps is more expensive in the case of iMinds however, given the fact that we opt for a location in one of Europe most vibrant entrepreneurship hotspots (e.g. London in our 2013 and 2014 edition). This adds travel and accommodation costs to the entire project. In our case, for about 15-20 participants and 3-4 coaches per day (of which 2 internal iMinds coaches), the overall cost is estimated at 80,000 EUR per cycle.

For the iMinds Academy learning platform, cost estimations are much harder to make. Developing the platform is a serious investment of several ten thousands of euros. The overall cost however depends on how much content one wants to develop to offer through the platform and the quality of this content. In its simplest form, content can just be presentations developed by iMinds staff, where the additional cost (besides the man-hours) is very limited. On the other hand, content can also take the form of presentation with voice-over, animated videos or edited videos, all with our without interactive elements. The cost per content-item thus largely differs.

9. FUNDING

For the Opportunity Recognition Workshops, which have been set up together with the doctoral schools of some universities in Flanders and Brussels, funding comes from both sides (largest share from iMinds, part from the doctoral schools budgets).

The entire budget for the bootcamp and iMinds academy is currently sourced from iMinds dotation it receives from the regional Flemish government.





10. OUTCOMES

Four main results occur:

- Firstly, programs where researchers are pulled out of their 'comfort zone' and are stimulated to think from a (potential) customer's viewpoint, fill a gap compared to the traditional information sessions and training programs for researchers on entrepreneurship and technology transfer.
- Secondly, researchers' human capital is substantially increased, which enables them to better understand needs from industry or society. This in turn lowers the barriers for cooperative research (and better enables them to attract third party research funding) and fosters transfer towards third parties.
- Thirdly, training and coaching programs on entrepreneurial topics benefit largely from blended learning and flipped-classroom concepts to better acquaint researchers with the concepts and fasten internalisation of the knowledge presented.
- ➤ Fourthly, for a small share of the participating researchers, entrepreneurship has really become a viable career option, worth considering. Not all of them finally become entrepreneur, but at least they consider it (or realise even better becoming entrepreneur is not what they should be doing).

Through adapted training and learning concepts, it is feasible to stimulate researchers to increasingly in technology and knowledge transfer efforts, directly or indirectly, without turning them into entrepreneurs. This requires the development of tools and programs adapted to researchers. The case study of iMinds provides insights that can be extrapolated to other PROs worldwide.

11. IMPACTS

The impact of these programs should be split up in personal versus institutional and shortterm versus long-term aspects. The personal benefits mainly relate to the individual researchers:

- Both on the short and the long term, researchers participating in the entrepreneurship programs develop new skills, knowledge and attitudes, increasing their general level of human capital and more specifically their entrepreneurial human capital.
- This additional human capital should help researchers in the short term to better spot opportunities for 'real-life' applications of their technologies and knowledge and in the longer run to make it somewhat easier for them to attract third party funding for their research given their higher level of understanding of these third parties' needs and issues. This in turn could (should) lead to a higher reputation for the researchers in the long run.
- The potentially perceived downside of researchers engaging in entrepreneurship programs is the distraction of their core research. Participating in such programs is



sometimes time-consuming and it definitely requires a substantial amount of energy from the researchers, since they have to come out of their comfort zone.

At an institutional level, activating researchers for entrepreneurship seems to have more benefits that disadvantages:

- Perhaps more on the longer term than immediately, researchers may see entrepreneurship as a viable career opportunity after having participated in entrepreneurship program. Given the current situation in the labour market, about 80% of PhD students need to pursue a career outside academia. If these 80% at least consider an entrepreneurial career as viable option, the chances are much higher a number of them actually become entrepreneur. Their ventures then in turn become potential (research) partners for the research institutions.
- In relation to the individual benefit for researchers explained above, research institutions will better be able to attract third party funding for their research if the individual researchers have a better understanding of business needs and through the entrepreneurship programs developed a more common language to interact with third parties outside academia. At an institutional level, this (potentially) adds to the funding stream generated by third party research.
- Another more long term benefit at the institutional level relates to the 'flipped technology and knowledge transfer' realised if researchers interact more intensely with third parties (cfr. earlier under 'Monitoring and evaluation'). The classic technology transfer model adopted by most research institutions (licensing or sale of intellectual property or creating spin-off ventures) has been proven to be a challenging model. This classic model is more a 'technology-push' approach. However, when researchers are more inclined and better equipped to interact with third parties, it barrier to cooperate with externals lowers and knowledge and technologies may be brought to the market and society more easily. This flipped approach has more characteristics of a 'market-pull' approach, since the start-ups, SMEs and large companies become the entities asking for cooperation with researchers and adopting these knowledge and technologies more easily. This benefit at an institutional level however needs time to develop and come to fruition.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

This case study is by definition integrated into the regional innovation ecosystem, given the very nature of iMinds as an organisation (cfr. description of iMinds activities and organisation in the section on 'Background'). In this regards, many stakeholder (potentially) benefit from the entrepreneurship programs.

iMinds

iMinds as an organisation has direct and indirect benefits. First and foremost, its 'brand name' and societal impact increases. Training and coaching our own researchers helps in creating an image of an institution taking care of its employees and fostering their personal development. This in turn helps in attracting new talent. Secondly, through the creation of more human capital in the region, iMinds helps in creating a more skilled workforce, including for its own operations. In third instance, iMinds as an institution may benefit from the effect generated by the flipped technology and knowledge transfer model, in terms of reputation as well as in terms of (potential) financial benefit. Last but not least, which is especially important given the nature of iMinds as an organisation, the programs



(Opportunity Recognition Workshops and bootcamp) and the educational platform (iMinds Academy) create additional direct and indirect interaction and common interests with iMinds partners (in first instance the universities), which strengthen cohesion and joint initiatives.

Universities and their doctoral schools

The universities have similar benefits as iMinds. If researchers are better equipped to find application areas and potential partners adopting their technologies and knowledge, they should better be able to perform their jobs and create real-life impact based on their research. Additionally, these skills should enable them to attract more third party research funding, beneficial to both researchers and universities.

Furthermore, given the strong increase in number of doctoral students in recent decades, universities and their doctoral schools could offer more career opportunities to their researchers through entrepreneurship. Programs such as iMinds' could help in creating these opportunities.

In the longer run, universities may also benefit from the increase in number of start-up ventures, since the number of potential business partners also increases for them. This is even more true given their local anchoring, which increases the likelihood that the start-ups enter into collaboration with the universities.

Researchers

The main beneficiaries are obviously the researchers themselves. Their benefits primarily concern an improvement in their human capital, and more specifically their skills to detect opportunities where to apply their research outcomes and eventual start-up opportunities. This in turn could increase their academic reputation (through increased impact and collaborative research) or create additional career option (through the pursuit of their own start-up ideas).

Society

While the impact of iMinds' approach on society is not easy to measure, a higher integration of academia and business and the development of more 'entrepreneurial capital' can be seen engines to foster economic renewal, economic growth and increasing standards of living. This happens both directly (through the creation of new businesses and jobs), as well as indirectly, through the application and valorisation of knowledge and technologies in the region where they have been created. Especially through this 'flipped technology and knowledge transfer' model, new knowledge and technologies may find their ways to society and business more easily. Additionally, a more educated and highly-skilled workforce has been demonstrated to be beneficial at the level of a region or society as well.

13. AWARDS / RECOGNITION

The iMinds model has been recognised by a number of entities, including:

 The European Commission, which included two of iMinds' managers in different advisory boards to assist in developing new programs to foster commercialisation efforts and the development of entrepreneurial skills and attitudes throughout Europe;



- The European Institute of Technology (EIT), which adopted iMinds as affiliate member and where one of the strategic focus areas is entrepreneurship education for researchers and students. Furthermore, EIT now organises its own version of the Opportunity Recognition Workshop.
- Other European organisations (e.g. the Medien- und FilmGesellschaft (MFG) from Stuttgart in Germany) have started adopting the Opportunity Recognition Workshop in their own region. Additionally the other universities and research institutions in Flanders (Belgium) are using the same concept to broaden the scope beyond ICT and digital media applications (towards e.g. social sciences and humanities, biology, medicine, chemistry, cleantech and others).

LESSONS LEARNED

14. PRIMARY CHALLENGES

Since the introduction of both the opportunity recognition workshops and the bootcamps, both programs have gone through several iterations in which the lessons learned from previous editions were incorporated. The initial setup of both programs was based on several assumptions about the students, content as well as the format of the programs which were disproven in practice. During the course of the programs, following lessons were learned.

- Not all researchers are entrepreneurs aiming to start up their own company. While most researchers do see value in putting their research in a broader perspective, most of them are not aiming for a spin-off company and many spin-off companies proposed are in the consulting space. Therefore, the approach taken and value proposition towards researchers should also target these researchers that want to want to position their research within the activities of other companies or are just interested in the learning experience of the workshops and bootcamps
- Many researchers are not used to this kind of thinking. In fact, most topics addressed (opportunity assessment, value proposition, etc.) require a change of mind-set in the first few days of the program. Researchers are quite capable of explaining their research to peers in their domains; many lack the skill of communicating their concepts and value proposition in layman terms. Enough emphasise should be put on coaching and guiding the researchers to overcome their prejudice towards the value of this. A format that seems to work quite well is continuously engaging researchers to pitch their story in front of the class.
- This program is not the only priority for researchers. Even though all participants are quite engaged and committed towards the program, they do this on top of their daily work and other tasks are waiting for them. Instead of organizing the workshops spread over a longer period of time, a full week off-site gives them enough focus and dedication towards the tasks requested from the program. Alternatively, the concept of a flipped-classroom (on-line pre-work at their own pace followed by face-to-face coaching sessions) allows the necessary flexibly of scheduling the work according to their other priorities.



- Some research is more suited for this type of program than others. While the initial way of thinking was that all exercises could be applied on any type of research, practice showed that this does not hold for certain very basic research. Therefore, participants can team up with each other and work together on the same, more applicable ideas. This has the additional advantage that they have more capacity to push the idea forward and can challenge each other and give (peer) feedback.
- Motivation trumps complementary. In the initial bootcamps, a lot of emphasis was put on creating the perfect teams with a complementary skillset. While it is true that a great team is essential when starting up a company, it is of lesser importance when going through the learning experience of a bootcamp. In many cases, the team fell apart days after the bootcamp was finished. More important however is the motivation of the individual team members and their willingness to constructively work with each other. If a team is committed during the bootcamp and willing the push the idea forward once the program is finished, other people can be found to join the team.

Based on the lessons learned after each program, the format of the opportunity recognition workshops and bootcamps were adjusted to fit the needs of the participants.

15. SUCCESS FACTORS

Whether it is the opportunity recognition workshops, the boot camps or the iMinds Academy, 3 key factors have contributed to the successful adoption of the programs.

First, each program has a very low barrier to entry and accommodates the specific needs of the students. The opportunity recognition workshop for instance requires minimal registration effort, is part of the doctoral school program and so offers credits to the participating students. The boot camps are hosted during a single off-site week, which makes it easy for the researchers to block this time frame in their busy agenda's. The iMinds academy uses small on-line knowledge snippets that can be followed when researchers need it at a time when they are available.

Second, it is important to involve external entrepreneurs and experts in the programs. The pure academic way of teaching entrepreneurship might teach you the knowledge required to bring an idea to markets, it does very little about building the skills in order to do so. By involving entrepreneurs and experts, not only the researchers acquire the necessary knowledge, they are coached and challenged to implement the theory on their own research.

Third, these programs are embedded in a broader incubation and entrepreneurship track. Not only does iMinds offer programs to inspire, train and coach the next generation of digital entrepreneurs, it actively incubates start-ups (including coaching, training, financing) and offer programs to accelerate and internationalise SMEs. Because of this very broad approach, the opportunity recognition workshops, boot camps and iMinds Academy are only the beginning of a (possible) entrepreneurial journey supported by iMinds.



16. TRANSFERABILITY

Each of the 3 described programs can be transferred towards other organizations dealing with research and innovation with minimal effort. Taking the opportunity recognition workshops as an example, all the content of the courses is publicly available and can be used by others that facilitate the program. Organisations such as MFG Baden-Württemberg and EIT ICT Labs have successfully adopted the same methodology in opportunity recognition workshops organised in-house. An effective way of transferring the skills towards other organisations is allowing the facilitators of the organisations to attend an opportunity recognition workshop on the backbench (i.e., train-the-trainer concept).

Looking at the 3 success factors, the third one is most difficult to reproduce. It takes a significant amount of time and effort to build a complete incubation and acceleration programme. Without these follow-up initiatives, it is still possible to organize successful boot camps and opportunity recognition workshops; however, there is a higher risk that good projects discontinue once the program finishes. This can be handled by partnering with other organizations and initiatives that do offer startup incubation support and this way give a longer-term perspective towards the researchers entering the programs.



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18. LINKS

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19. KEYWORDS

Knowledge transfer, academic entrepreneurship, activating researchers, technology transfer, entrepreneurial thinking, human capital development

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ACADEMIC PROOF-OF-CONCEPT BEST PRACTICES: THE UNIVERSITY CITY SCIENCE CENTER'S MULTI-INSTITUTIONAL QED PROGRAM

By Peter Melley, Yatin Karpe, Mayuresh Kothare & Christopher Laing



ACADEMIC PROOF-OF-CONCEPT BEST PRACTICES – THE UNIVERSITY CITY SCIENCE CENTER'S MULTI-INSTITUTIONAL QED PROGRAM



TITLE OF THE CASE	Academic Proof-of-Concept Best Practices – The University City Science Center's Multi-Institutional QED Program
SALES PITCH	An example of a regional collaboration that aggregates and deploys resources for commercialization and industry transfer of early-stage life science technologies from multiple universities and research institutes.
ORGANISATIONS	University City Science Center, Philadelphia, PA, USA Lehigh University, Bethlehem, PA, USA
COUNTRY	United States of America
DATE	March 2014
AUTHORS	Peter Melley Yatin Karpe Mayuresh Kothare Christopher Laing
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 □ Strategic instrument ☑ Structural instrument or approach ☑ Operational activity □ Framework condition



ACADEMIC PROOF-OF-CONCEPT BEST PRACTICES – THE UNIVERSITY CITY SCIENCE CENTER'S MULTI-INSTITUTIONAL QED PROGRAM





1. SUMMARY

This report outlines how an academic network has used an innovation intermediary, the University City Science Center, to create a unique regional proof-of-concept collaboration which facilitates technology transfer from a collective \$1.6B in annual life sciences R&D expenditure. Greater Philadelphia is the 5th largest metropolitan region in the United States and is ranked among the top life science R&D centers in the nation. However, opportunities exist to improve its performance in technology licensing and startup company formation. In response to a call from the region's academic and business leaders, the Science Center's academic consortium created the QED Proof-of-Concept Program, which deploys resources to facilitate academic-to-industry transition of intellectual property. In addition the QED Program stimulates development of a regional culture of commercialization from academic research.

Administered by the Science Center, QED program participants include 21 academic institutions (including large, multidisciplinary universities as well as small, private research institutions), more than 100 entrepreneurs, more than 50 investor and industry business development professionals, and municipal, state, federal, and private investors. The QED Program is an annual regional competition that invites academic inventors to describe their research, and that uses the input of industry and investors to prioritize projects that have commercial merit. A network of vetted entrepreneurs work with academic inventors to create commercially-relevant development plans, the most competitive of which receive funding and further support. Managed by the Science Center in direct collaboration with the technology transfer offices (or their equivalents) of the 21 participating institutions, the QED Program has, as of January, 2014, invested \$3 million in direct project funding, and \$1.5 million in business resources and program management. Funding is deployed in strict accordance with the achievement of milestones against pre-determined project and program quantitative goals, which include technology readiness level (TRL) and economic development targets.

To date, financial supporters of the Science Center's QED Program have included Philadelphia municipal institutions, Commonwealth of Pennsylvania departments, U.S. Federal agencies, public companies, and private foundations. The Science Center and participating academic institutions have also contributed a substantial proportion of operating funds. Provisions for financial return to the program in the event of successful commercialization outcomes have been incorporated into the common operating agreement of the consortium. As of January 2014, more than 300 scientists from the 21 participating institutions have submitted project proposals. More than 75% of participating institutions have had projects that the industry and investor reviewers have invited to develop, and approximately half have been awarded funding. This emphasizes that there is value in regional, rather than institution-by-institution commercialization programming. The Science Center is actively seeking international partners who are interested in tapping into a region



with \$1.6B in life science expenditures. The QED Program, a turnkey opportunity for academic-industry technology transfer, offers opportunities to industry partners for branding, clinical or technology opportunity focusing, tax benefits, and/or licensing advantages. The Science Center's QED Program was recognized by the US Department of Commerce in 2012 as a gold-standard model.

This case-study illustrates the successful approach/path developed by the Science Center to assist universities in reaching their commercialization potential. It will use the experience of one of its participants, Lehigh University, as a case study example. This report outlines a best-in-class example of a proof-of-concept program which could be used by industry partners for identifying and adopting high-potential life science technology opportunities from a previously-untapped \$1.6B research cluster.

The report covers the period of the QED program from its inception in April 2009 to January 2014.

2. BACKGROUND

Reports and articles referenced throughout this article are indicated by number and listed in Section 17 (Publications).

The QED Proof-of-Concept Program takes a regional innovation cluster approach to accelerate the transfer of promising life science technology from academic labs into the corporate sector. Its development was a response by the Science Center to meet a specific need that was recognized by the academic and business leaders of Greater Philadelphia to revitalize early-stage life sciences commercialization from academic inventions [1].

The impact of the life sciences industry on the economic vitality of Greater Philadelphia is substantial. One out of every six jobs and 15% of all the economic activity in the region is related to the life sciences industry [2]. The region's pipeline of innovative research is a recognized resource, stemming from the large number of world-class academic research and training institutes in the region. The National Science Foundation estimates that more than 8,700 life science degrees were conferred in Greater Philadelphia in 2004, making it second only to New York for output of highly-educated life science workers. However, a study by the CEO Council for Growth in 2007 recognized opportunity for increased commercialization of technologies from academic innovations [1]. Although Philadelphia is one of the highest ranking in overall R&D output, much of the R&D from the region's academic institutions is never translated into biomedical products. It was a recommendation of this study that the availability of more early-stage funding was an important component of improving the technology transfer performance of the region. It was this recommendation that led to the Science Center and its partners investigating the feasibility of establishing Greater Philadelphia's first regional proof-of-concept program.

Proof-of-Concept Centers are a Mechanism for Supporting and Accelerating Technology Transfer

Academic research communities are widely recognized as rich sources of scientific knowledge, innovation and technology. While the number of academic invention disclosures and patent filings continues to increase, the resources to develop them to the point where



they are ready for translation to the commercial sector has remained steady or even diminished – leading to a well-recognized "valley of death" for many high-potential opportunities [3]. Financing this "validation," or technical proof-of-concept, research remains a significant challenge. The federal government recognizes three stages of research: Basic, Applied and Development. Of the funding requested for the United States FY2012 federal budget, virtually none of the amounts allocated to the Department of Health and Human Services and the National Science Foundation were earmarked to support Development-stage research [4].

To help technologies overcome the Valley of Death, many organizations have created their own proof-of-concept programs which accelerate the commercialization of innovations by 1) providing seed funding to novel, early-stage research that most often would not be funded by any other conventional source, 2) enabling the funded investigators to continue to perform their research in their own respective laboratories, and 3) facilitating the exchange of ideas between university innovators and industry via various mentors associated with the center [5]. Proof-of-concept programs are an invention of the 2000s, with early nationallyrecognized iterations being launched at University of California San Diego (Von Liebig Center) and Massachusetts Institute of Technology (Deshpande Center). The Ewing Marion Kauffman Foundation, the world's largest foundation devoted to entrepreneurship, has identified proof-of-concept centers as a promising model for supporting technology commercialization from academic research institutions [6].

However, to date, all gold-standard proof-of-concept programs have been single-institution. Given Greater Philadelphia's broad regional potential for life sciences research and technology, the Science Center wondered whether the proof-of-concept program model could be adapted for deployment across multiple institutions. Founded in 1963, and owned by a consortium of 31 universities, research institutions and non-profit organizations, the Science Center is the oldest and largest urban research park in the United States. It supports technology commercialization and technology-based economic development in the greater Philadelphia region which is located at the confluence of the U.S. states of Pennsylvania, New Jersey and Delaware. In the proposed concept, the Science Center would act regionally to administer a proof-of-concept program for multiple research institutions, forming a regional academic innovation network. Given its regional footprint and relationship with a large number of academic institutions, the Science Center was well-suited to successfully play such a role.

Developing and Launching the Science Center's Multi-Institutional QED Proof of Concept Program

The QED Program was developed from a large amount of primary and secondary research by the Science Center and a market research partner, InVenture Partner, and enabled by the Science Center's shareholder relationships with a large number of institutions in the region. The model for QED was built by first conducting a baseline analysis of "best practices" proofof-concept Centers and other similarly-focused commercialization programs. These included the Deshpande Center at the Massachusetts Institute of Technology (MIT), the Von Liebig Center at the University of California, San Diego (UCSD), and the California Institute for Quantitative Biosciences (QB3) at the University of California, San Francisco. The operational characteristics of these programs were benchmarked through primary research and



interviews with center directors. In addition, interviews were conducted with representatives from a number of other organizations engaged in early-stage technology commercialization, including the Kauffman Foundation, Accelerator, and Johnson & Johnson.

In order to investigate regional needs and strengths, this best-practices benchmarking study was integrated with a primary assessment of more than 40 representatives of the region's research organizations, custodians of developmental technology, investors, and industry representatives. These included the VPs of research, and directors of technology transfer from 10 research institutions, representatives of economic development organizations emphasizing life science technologies, and the program directors of the Coulter Foundation's Translational Research Program at Drexel University. Input was additionally sought from members of the Science Center's Board of Directors, which have included representatives from many regional investment organizations and companies, including Quaker Partners, Phoenix IP Ventures, Endo Healthcare Solutions, NuPathe, and FujiRebio Diagnostics.

As a result of this research, the QED Program was developed as an experiment in regional innovation commercialization that is potentially expandable and transferrable to other industry sectors and geographic regions.

3. OBJECTIVES

The QED Program was designed to grow the regional innovation ecosystem of Greater Philadelphia. The specific objectives of the QED Program are to:

- 1) facilitate technology transfer of intellectual property assets from academia to the commercial sector, and
- 2) enhance the culture of collaborative commercialization among scientists, entrepreneurs, and investors in the region.

The achievement of these objectives is, in the long term, expected to result in a material increase in the number of direct and indirect jobs in the Philadelphia region, together with the development of new life science products, which will significantly improve the quality and efficacy of healthcare delivery.

4. **RESPONSIBILITY**

The QED proof-of-concept program is a regional collaboration among a variety of stakeholders, all of whom have contributed substantially to program design and implementation. The program is overseen by a Science Center program manager who maintains responsibility for the coordination of the following four main components:

- Academic Institutions (technology): 21 universities and research institutions (listed in Section 10: Outcomes"), and more than 300 inventors in Pennsylvania, New Jersey and Delaware have supplied and managed intellectual property and technology expertise.
- Entrepreneurs (business guidance): Over 100 individuals with documented experience in commercial product development or market evaluation have engaged, on the basis of their domain expertise and each project's needs, in a matching process for project business advisors.



- Companies and Investors (market input): A total of 51 individuals representing 37 investment firms, angel investor networks, and medium or large companies (listed in Section 11: "Impacts"), are responsible for reviewing proposals, prioritizing opportunities, and making investment recommendations.
- Regional Economic Developers (funders): Private (company and foundation) and public (federal, state, and local governments) organizations have provided funding for the program, recognizing that it contributes to the region's commercial activity. These organizations are listed in Section 9: "Funding".

Case study example: Lehigh University, a participating academic institution

One of the academic institution partners of the Science Center is Lehigh University (LU), a private, coeducational university in Bethlehem, Pennsylvania (USA) offering degree programs through the doctoral level in the arts and humanities, business, education, engineering, and the natural and social sciences. Since its founding in 1865, the University has emphasized the integration of the academic disciplines, providing each student with a well-rounded education that serves as preparation for a useful and productive life. LU has been a shareholder of the Science Center since 1964. Through partnerships with the City of Bethlehem, the Commonwealth of Pennsylvania, and Ben Franklin Technology Partners of Northeastern Pennsylvania, LU is a major contributor to the incubation and development of new businesses and entrepreneurial activities in northeast Pennsylvania. LU has a flexible intellectual property policy, a growing Office of Technology Transfer (OTT), entrepreneurial curricula, and novel programs exemplifying integration across disciplines. But, like most academic technology transfer programs that encounter the "valley of death" roadblock, LU has designated the identification of resources/opportunities for commercially relevant R&D as a priority. OTT is fortunate to be partnering with the Science Center and participating in the QED program, which not only provides funding assistance, but also facilitates opportunities for academic inventors to work alongside seasoned business entrepreneurs who provide significant knowledge and insight into the market landscape and company connections. It is these attributes of the QED program that are especially valuable for LU.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

Since its inception in 2009, the QED program has served to focus regional resources to retire business risk in early-stage life science R&D projects and to attract follow-on investment through the provision of funding, business advice, market drivers and guidance to exit. The QED Program was designed to engage local academic institutions, research scientists, entrepreneurs, investors, and industry in early stage life science commercialization, and ultimately to increase the pace and value of life science technology transfer in eastern Pennsylvania and the surrounding region.



ACADEMIC PROOF-OF-CONCEPT BEST PRACTICES – THE UNIVERSITY CITY SCIENCE CENTER'S MULTI-INSTITUTIONAL QED PROGRAM

Operating Model

The QED Program considers projects for support in discrete application and funding rounds, offered annually (except in the case of Year One in which two rounds were offered). Each application period lasts approximately six months, followed by implementation of supported projects over a 12-month period. All aspects of application and implementation are coordinated by the Science Center through the technology transfer and sponsored research offices (or equivalent) of participating institutions. Figure 1 shows the basic process flow of each round of the Program.



Figure 1: The QED Process

Each round is launched by the release of a Request for Proposals (RFP), which initiates a twostage application process by Principal Investigators (PIs) at participating research institutions. This launch coincides with site visits to the research institutions by QED program managers who in conjunction with the respective TTOs, offer an overview of the program and the application process to prospective PIs. In the first stage of application, PIs are invited to submit White Papers (simple forms that request specific information about the technology, including non-confidential descriptions of: the need, product, users, and payers; the fundamentals of the technology including protected intellectual property; preliminary and supporting data; plans for proof-of-concept validation; and the follow-on business model/concept. These White Papers are reviewed by a Selection Team comprising business development, licensing, and investment executives of pharmaceutical and device companies and investment organizations. Ten projects are selected for further project planning development.

Finalists are matched with Business Advisors (BAs), drawn from a network of vetted professionals with relevant experience either in industry, with start-ups, or both. Matching is achieved through a step-wise process in which BAs first define their own industry-vertical expertise, then are formed into panels to which PIs make verbal presentations, and finally are attached singly or in pairs to particular projects through a combination of self-selection and programmatic assignment. BAs work with PIs and technology transfer representatives to develop a written proof-of-concept plan that defines how critical technical and business questions will be answered to "de-risk" the technology and prepare it for investment and transfer to the private sector. "Floating" advisors include professionals with expertise in intellectual property management, regulatory strategy, and reimbursement. These floating advisors provide specific insight to the project teams during development of the proof-of-concept plans.

The Selection Team once again convenes to assess written plans, technical evaluations that are commissioned from a third-party organization, and presentations by each team. The goal of the Selection Team is to make recommendations to provide funding support for up to four



projects. Successful project proposals are awarded \$100,000 - \$200,000 (half of which is supplied by the Science Center, and half of which is supplied by the recipient institution) to implement their proof-of-concept plan over 12 months. Business Advisors and program managers continue to work with each team during the implementation phase to establish and assess progress against technical and commercialization milestones and a timeline for project execution, and to make connections with resources and potential follow-on funders/licensees. Continued project funding is conditional upon satisfying the objectives of the proof-of-concept plan on schedule.

Successful projects transition to the private sector, either by the launch of a new company, or the licensing of the technology to an existing company. The Program is agnostic to either outcome, and the goal is to select the mechanism that is most appropriate for the technology and capabilities of the project team. The transition of projects via either mechanism is planned by the PIs, BAs, QED program managers, and technology transfer offices. Institutional technology transfer offices are responsible for negotiating the terms of such transition.

6. MONITORING AND EVALUATION

The QED Program institutes methods for monitoring performance at two levels: 1) the performance of funded projects against short-term technical and commercialization goals, and 2) the performance of the program against mid-to-long-term goals.

Project Monitoring

An offer of an award by the QED Program to a project team is contingent upon the development of a milestone plan that incorporates both technical and commercialization milestones throughout the period of the award. The milestone plan is developed, using a template provided by the Science Center, by the project investigators, business advisors and technology transfer office, in collaboration with Science Center staff and Selection Team representatives when appropriate. The plan is customized for each project. The final plan is incorporated into the award agreement package and funding tranches are linked to performance against the plan. The QED program has terminated projects early due to failure to meet technical or commercial milestones according to plan. At such an early stage of development, the tranching of funding against the achievement of commercial milestones is a significant challenge, and a process that the QED program continues to evaluate and refine. The plan includes a schedule for performance update reports and meetings by the project team, business advisors, technology transfer representatives, and QED staff, typically no less frequently than quarterly. In addition to evaluating progress against objectives and approving on-going funding, these meetings serve as an important forum to strategize on identifying and seeking appropriate follow-on resources that could enable the project to transition from the academic institution to an appropriate commercial partner for further development and ultimately a market launch.

Program Monitoring

Ultimately, the success of the QED program will be assessed by determining achievement of the program's objectives. However, the impact of the QED program on metrics of regional technology transfer and the culture of collaborative commercialization are likely not to be measurable for seven or more years. In the interim, the Science Center has been monitoring


a wide range of interim metrics that are indicators of progress of the program towards ultimate performance goals. Three of the most important, and those for which we present some data in this report (see Section 10: "Outcomes"), include:

- Engagement of constituents, including principal investigators, regional entrepreneurs and representatives of the marketplace (investors and companies).
- Technical progress of projects against developmental milestones.
- Achievement of commercial milestones including licensing and follow-on fundraising.

This monitoring is being conducted through several mechanisms implemented by QED staff, including the analysis of recruitment and submission data, the analysis of cumulative and aggregate project progress data, and the regular distribution of participant surveys. Program performance data is evaluated annually by the Science Center's Scientific Advisory Committee, a committee of the Science Center's Board of Directors, which makes recommendations as to the continuation of the program.

7. SUSTAINABILITY MEASURES

During development of the QED Program, there was strong agreement among participating institutions that if the QED Program creates value for participants, it should be supported by a share in financial returns from licenses that might result from successful projects. The consortium agreed, therefore, to a revenue-sharing mechanism characterized by the following terms: 1) a share in licensing revenues to a three-fold cap of the program's investment in that project, after which the program's share diminishes; 2) the program share to exclude monies paid for sponsored research, or monies paid specifically to reimburse patent expenses; 3) in lieu of up-front and other fees waived in the case of a license to a start-up company, a share in (only) the research institution's share in equity in that company. All 21 participating research institutions have agreed to these terms.

The Science Center's projections show that while these revenue-sharing terms are likely to substantially contribute to program sustainability, revenue sharing is unlikely to completely meet program financial needs in the long-term. We have therefore concluded that in order to ensure sustainability and growth some alternative adjunctive mechanism, such as endowment-like funding, is likely to be necessary in the medium term.

8. COSTS

Approximately two-thirds of the annual QED budget comprises direct funding awards to projects. Historically, the QED program has offered project awards in the amounts of \$200,000 or \$100,000, where the former have been used to support traditional life science product development projects, and the latter have been used to support software-development projects, or pilot projects that are expected to lead to full awards if successfully completed. Eligible expenses by awardees include R&D staff, R&D consumables, R&D contracts, and specific commercial development costs. Indirect costs beyond 10% of the total project budget are excluded, as are intellectual property management costs or marketing expenses. Awards are administered on a reimbursement basis, and are contingent upon approved performance against the milestone plan.



Approximately one third of the annual budget for QED is allocated to 1) business resources, including reimbursement of professional experts and technical evaluation of projects (all finalists, not just those that are ultimately selected for funding); and 2) program management, which includes program staff and several contract support organizations.

9. FUNDING

Since its launch in April 2009, the QED Program has been nationally-recognized as a model public-private partnership [7]. Funding for the program has been contributed from the following sectors:

►	Science Center and its academic partners/participants:	20%
►	Academic partners/participants:	33%
۲	Public sector (local, state, and federal government agencies):	36%
►	Private for-profit and non-profit funders:	11%

In addition to the Science Center and its academic partners/participants, funders of the QED Program have included the Commonwealth of Pennsylvania (Department of Community and Economic Development, and Department of Health); Philadelphia Industrial Development Corporation; the U.S. Department of Commerce's Economic Development Administration; William Penn Foundation; and Wexford Science and Technology [now a division of BioMed Realty Trust].

A major focus of the Science Center has been to highlight the opportunity that the QED Program represents to private funders. In this vein the Science Center has been exploring creative partnerships that will provide substantial benefits to corporate or foundation supporters that might include, in addition to tax incentives, scoping of award focus (e.g., along technology or clinical verticals), and preferential access to intellectual property resulting from awards. A major advantage of supporting the QED Program is that it provides access to a largely-untapped consortium of academic institutions that are expending more than \$1.6 billion in life science R&D activity each year.

OUTCOMES & IMPACT

10. OUTCOMES

In total, 21 research institutions from Pennsylvania, New Jersey, and Delaware are participating in the QED Program. These institutions account for approximately \$1.6B in annual life science research output and include 97% of the output within a 75-mile radius of Philadelphia [3,8-11].



Participants, who have all signed a common participation agreement, include:

- Children's Hospital of Philadelphia
- Delaware State University
- Drexel University
- Fox Chase Cancer Center
- Harrisburg University of Science and Technology
- Lankenau Institute for Medical Research
- Lehigh University
- Monell Chemical Senses Center
- New Jersey Institute of Technology
- > Pennsylvania State University College of Medicine and Hershey Medical Center
- Philadelphia College of Osteopathic Medicine
- Philadelphia University
- Rowan University
- Rutgers, the State University of New Jersey (University of Medicine and Dentistry of New Jersey, a stakeholder itself, merged into Rutgers in 2013)
- Temple University
- Thomas Jefferson University
- University of Delaware
- University of Pennsylvania
- University of the Sciences
- Widener University
- The Wistar Institute

Since its launch in April 2009, and as at January 2014, the QED Program has completed five application and funding cycles. Below is a select list of significant program metrics:

►	Regional research institutions participating:	21
►	Approximate annual life science R&D activity of participating institutions:	\$1.6B
•	Scientists who have submitted an application:	>300
•	Technologies selected for project planning:	67
►	Vetted entrepreneurs providing business guidance to projects:	>100
•	Investor and industry professionals contributing to project screening:	>50
•	Projects selected for funding:	16
•	Project funding expended:	\$3.0M
►	Projects transitioned to the commercial sector:	6



UIIN GOOD PRACTICE SERIES

• Total external capital leveraged as follow-on project investments: \$11.8M

Projects that have been funded to date include:

- Near infrared monitor for chronic wounds (Drexel University) Diagnostic device*
- Breast cancer detection device (Drexel University) Diagnostic device*
- Sol-gel drug delivery platform for antimicrobials for orthopedic hardware (University of Pennsylvania) – Combination therapy
- Magnetic nanoparticle drug delivery system for peripheral vascular disease (Children's Hospital of Philadelphia) – Combination therapy*
- Heart valve replacement system (University of Pennsylvania) Implantable device
- U1 adaptor system for gene silencing (Rutgers) Therapeutic/research*
- Differentiation therapy for leukemia (Temple University) Therapeutic*
- miRNA treatment for Hepatitis C virus infection (Children's Hospital of Philadelphia)
 Therapeutic
- Nanopore system for detection of miRNAs (University of Pennsylvania) Diagnostic/research device
- Markers and antibodies for pancreatic cancer diagnosis (Thomas Jefferson University) – In vitro diagnostic
- Miniaturized medical oxygen concentrator (Lehigh University) Therapeutic device
- Biologic for treating diabetic retinopathy (Penn State Hershey) Therapeutic
- Device for upper limb rehabilitation following stroke (Rutgers) Therapeutic device*
- A new class of antiandrogens for prostate cancer (Delaware)—Therapeutic
- Antimicrobial fabric for use in sterile environments (Philadelphia University)--Device
- Imaging software for prostate cancer assessment (Rutgers) Diagnostic system
- *Technology has been licensed to a third party

Typically, projects that have entered the program have been at the "develop" stage (they have discovered the concept and produced some laboratory evidence in support of the concept), and the QED funding has supported progression through pre-clinical validation (sufficient in vivo data to justify a clinic-ready prototype or equivalent). The Science Center has developed a Technology Readiness Level (TRL) scale, based on the one used by the U.S. Department of Defense for its life sciences projects [12]. On average, QED projects enter the program at TRL 2.7 (component development/testing) and exit at TRL 4.5 (definitive *in vivo*/clinical readiness) using the standard nine-point scale.

Case study example: Lehigh University's QED award

Lehigh University (LU) Office of Technology Transfer (OTT) has been one academic institution that was selected as a QED Proof-of-Concept project awardee. OTT had established close ties with the QED Program of the Science Center in Philadelphia as a result of their expanded network in the Greater Philadelphia region. The QED program was brought to the attention of the Lehigh community through this relationship -- the program manager of the QED program visited Lehigh to give an overview of the application process for this program. This allowed the project PI and his team to have access to QED proof-of-concept grant opportunity information and thereby apply to the program. The invention was in it is initial stages of development at Lehigh as a result of some internal and Federal National Science Foundation grants, but was facing the typical "valley of death" problems as a result of lack of funding.



The QED program allowed the Lehigh team to take their invention from a conceptual idea to a proof-of-concept device that was a key step in moving forward the technology closer to commercialization.

The key outcomes/benefits of the QED award for Lehigh University's technology can be summarized as follows:

- Concept moving from idea to bench-top prototype;
- Additional Patent application and protection;
- Increased regional involvement with entrepreneurs and business advisors;
- Better understanding of the market landscape and future commercialization potential;
- Follow-on funding opportunities and licensing potential.

11. IMPACTS

Academic Institutions

One of the key hypotheses of the QED Program has been that a regional approach to proofof-concept funding would enable the identification and development of high-potential projects across a number of institutions, big and small, in an effective manner. This requires firstly that scientists across the spectrum of participating institutions be engaged, and secondly that the projects being identified and developed be of sufficient quality to warrant funding in anticipation of a commercialization event. In the first instance, the program has received applications from all 21 participating institutions, indicating that there is a significant interest from the "supply side." Among the 21 participating institutions, 16 have had projects that have been selected as finalists, and 10 have ultimately had projects selected for funding. Given that prioritization of projects was conducted by an independent panel of industry and investor representatives, this suggests that there is commercialization potential across a wide selection of participating institutions, not just the few large universities. This supports the hypothesis that a competitive regional approach to selecting and developing technologies might unearth opportunities that could be overlooked if only concentrating on cumulative metrics (such as publication or government funding) for individual institutions.

Case study example: impact of participating in the QED program for Lehigh University

The Science Center defined three main metrics to measure impact of the QED Award on regional technology transfer and cultivating a culture of collaborative commercialization. In short, these are engagement of regional innovation ecosystem, technical project development, and commercial progress. The impact of QED funding on Lehigh University's project includes:

- International Patent Application (PCT) filed
- Five peer-reviewed research publications/papers
- Collaborations with regional and national companies, institutions and entrepreneurs
- Proof-of-concept Bench-Top Prototype Device
- Follow-on funding for the National Science Foundation (NSF) ICorps Program was secured to move forward with a specific business plan for commercialization



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Entrepreneurs

The QED program has engaged more than 100 of the region's entrepreneurs and product development professionals, with expertise spanning regulatory affairs, intellectual property management, marketing, sales and distribution and other critical areas, in providing mentorship to principal investigators participating in the program. These business advisors have been recruited through broadly-distributed solicitations, and selected through an interview process conducted annually by Science Center staff that assesses expertise, willingness to contribute, and ability to provide guidance (rather than management). Business advisors give their time voluntarily. The Science Center has monitored engagement and re-engagement rates, and has determined that the rate of new business advisor recruitment has increased steadily from QED launch (approximately 30 individuals engaged) to the current state (more than 100 individuals engaged). Importantly, more than 75% of business advisors have engaged in more than one round of the program (as determined from a survey in Round 4), suggesting that the experience has been rewarding. Reasons given for continuing participation include becoming aware of early-stage technologies, with some ensuing entrepreneurial activity, and networking with and assisting scientists and giving back to the community.

Investors and Industry

Over the five rounds of the QED selection process that accounted for activity from April 2009 to January 2014, 51 individuals from 37 organizations participated in the QED Selection Team to prioritize projects for resource allocation. The organizations included:

- Astra Zeneca [www.astrazeneca.com]
- Ben Franklin Technology Partners [www.benfranklin.org]
- BioAdvance [www.bioadvance.com]
- Blue Highway [www.blue-highway.com]
- Bracco [www.bracco.com]
- > Delaware Crossing Investor Group [www.delawarecrossing.org]
- Exponent [www.exponent.com]
- FemmePharma [www.femmepharma.com]
- First State Innovation [www.firststateinnovation.org]
- GE Healthcare [www.gehealthcare.com]
- GlaxoSmithKline [www.us.gsk.com]
- Integra Life Sciences [www.integralife.com]
- IP2Biz [www.ip2biz.com]
- Johnson and Johnson [www.jnj.com]
- Mentortech Ventures [www.mentortechventures.com]
- Merck [www.merck.com]
- New Jersey Commission on Science and Technology [www.state.nj.us/scitech]
- New Spring Capital [www.newspringcapital.com]
- Novartis [www.us.novartis.com]



- Osage University Partners [www.osagepartners.com]
- Quaker Partners [www.quakerbio.com]
- Robin Hood Ventures [www.robinhoodventures.com]
- Safeguard Scientifics [www.safeguard.com]
- Seguro Surgical [www.segurosurgical.com]
- SR-One [www.srone.com]

Following Round 4, an anonymous survey of the Selection Team members (with a response rate of approximately 30%) indicated that benefits to participation included 1) networking, exchanging thoughts with their peers, and giving back to the community, and 2) increased awareness of academic technologies, and interest in eventual investment.

Finally, there is considerable diversity in terms of research organizations participating in QED. Evaluation of impact on stakeholders suggests that: 1) QED is able to identify highpotential technologies across a wide range of universities and research centers, and 2) key participants across the Greater Philadelphia region are eager to play a role in the commercial advancement of commercially-relevant research.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Case study example: Lehigh University's experience as a participant of the science center's QED program

One of the primary functions of the Office of Technology Transfer (OTT) at Lehigh University (LU) is to market and license technologies/inventions developed at LU by faculty, staff and students. In addition to using their web-based search engine for this purpose, OTT also taps into their vast network, both regional and nationally to reach out and obtain interested parties to review LU inventions. Since LU is based in the greater Philadelphia region, OTT decided to reach out to the Science Center QED Program to gauge their interest in funding projects. This process resulted in bridging the gap between conceptual idea and prototype development for one project titled "Miniaturizing Medical Oxygen Concentrator" that was funded by the Science Center QED Program. The project deals with the design and development of a medical device that can produce high-purity oxygen from air. The key innovation in the project design was the substantial reduction in size and weight of the device compared to what is currently available in the market. The device works on the principle of Rapid Pressure Swing Adsorption (RPSA). The project team had originally proposed either a two bed or one bed design for the RPSA process to minimize bed size factor and make the device more compact and efficient. Eventually, it turned out that the team decided to go with the one-bed design with an integrated storage tank. This seemed to be the right decision for several reasons: simpler operation, process flexibility and ease of scalability to larger or smaller cycle times and sizes. The resulting design led to a patent filed on this technology. This also provided the key differentiation between the team's design and that of the current devices in the market. The QED Program allowed the Lehigh team to take their invention from a conceptual idea to a proof-of-concept device that was a key step in moving forward the technology closer to commercialization.

The QED process was novel in that it allowed the team to iterate with the QED staff members on various aspects of the program, starting from feedback on the white paper,



teaming up with two industrial mentors for preparing the final proposal, help with reaching out to appropriate constituents in various aspects of the proposal preparation, and feedback from industry professionals and investors. This process itself in preparing the final proposal was a learning experience that went beyond the technical components of the project and into various tangible issues that were critical to commercialization. As a result, the final submitted proposal was well-thought out, beyond what the scientific and technology transfer team would have been likely to achieve alone. The business advisors that were provided to the project team gave an excellent perspective on the commercialization of the technology and worked effectively with the team members. The program was tightly managed with regular conference call meetings and reports that were submitted to the QED program manager on reaching proposed milestones.

The key outcome of the project was a novel design proof-of-concept bench-top device that demonstrated the benefits of size and weight reduction using the LU team's technology. Some of the enhancements that resulted from the QED award program were also included as patent claims in a PCT patent application that was filed as a direct outcome of the QED Program. The QED Program provided critical bridging support to translate ideas to a proof-of-concept/benchtop prototype device that is now allowing the team to contemplate launching the next phase of the commercialization involving either licensing or a start-up company. Follow-on opportunities that the OTT has been working with as a result of the QED funding include, but are not limited to various state-level funding agencies such as the Life Sciences Greenhouse of Pennsylvania, Ben Franklin Technology Partners, etc. and federal agencies such as the newly established NSF I-Corps program and the NSF Partnership for Innovation (PFI) program to identify further opportunities to move forward with commercialization.

In conclusion, LU has had a highly positive experience participating in the Science Center's QED Program. The QED Program has provided a variety of member-benefits including, but not limited to, access to seasoned entrepreneurs, venture capitalists, business advisors, commercialization experts and regulatory specialists; opportunity to collaborate and work with regional educational/research institutions; identification and exploration of different paths towards commercialization; and educational and knowledge exchange seminars/symposiums, understanding of the market landscapes and different players in the technology transfer supply chain. OTT is looking forward to future and newer opportunities to engage with the Science Center.

13. AWARDS / RECOGNITION

The Science Center's QED program has been highlighted by a number of organizations in conferences and reports, including:

- The NIH's Clinical and Translational Science Awards program: included a poster describing QED as one of the presentations at its 2010 Industry Forum.
- ► U.S. Department of Commerce: highlighted QED as a model for public-private partnerships in innovation and commercialization in its 2012 report The Competitiveness and Innovative Capacity of the United States
- The Economy League of Greater Philadelphia: identified QED as one of a number of critical investment activities contributing to the evolution of University City as an urban innovation center.
- (http://worldclassgreaterphila.org/blog/2013/12/20/innovation-centerinvestments-adding-up-in-university-city)



 Association of University Technology Managers: invited a panel discussion around the role of QED in creating regional funding and investment partnerships at its 2014 annual conference.



14. PRIMARY CHALLENGES

The development and design of the QED Program was conducted by a core group of 10 of the founding participating academic institutions, all of which ultimately agreed upon a common set of operating parameters. Two of the items that were debated during that process, and that highlight challenges of a regional program such as QED, are outlined here.

Institutional Commitment

The Science Center and its partners were motivated to ensure that the proposed QED Program should not be a "fund of last resort", and so sought to find ways to engage commitment from participating institutions.

It was proposed that institutions contribute matching funds to projects selected for support by the QED Program. While there was general acceptance of this concept among all stakeholders, the form of this contribution was the topic of much discussion. A direct contribution of new cash toward a selected project, and a waiver of indirect costs (such that all program funds supported technology development) were considered ideal by many interviewees. However, the ability to contribute new cash to a project varied from institution to institution. It was argued that indirect costs represent a real expense to the university, and that for both practical and philosophical reasons, waiving these costs created a real burden to participants.

A compromise, whereby institutions could make some or all of their matching contribution through in-kind mechanisms (such as salary waiver) was suggested. Furthermore, there was considerable discussion regarding the ability of research institutions to waive indirect costs. A compromise was to consider reducing (rather than eliminating) the proportion of an award that could go toward indirect costs (in much the same way that many foundation awards are managed). Establishing the source of matching funds prior to selecting finalists is a requirement of the QED Program.

Inventor Participation and IP Management

Not surprisingly, there were strongly held views about who should manage participation by scientists and the protection and marketing of intellectual property. Some founders felt that the development of a regional proof-of-concept program could be an opportunity to move toward regional or third-party management of academic intellectual property. As expected, institutions that were heavily invested in existing mechanisms for technology transfer strongly asserted a role for these mechanisms as the sole conduit for communication with



faculty, and management and marketing of intellectual property. A case was made for the need to protect against inadvertent public disclosure and the familiarity of existing technology transfer personnel with faculty research (although the latter was not always a view shared by faculty). One thing that became clear through interviewing the 10 core participating institutions was that there was a high degree of variation in structure, capacity, and culture of the technology transfer mechanism across institutions. A side effect of the QED Program was expected to be the strengthening of the region's "technology transfer" community and perhaps some standardization of processes.

The Science Center and its partners concluded that the most logical model was to utilize existing technology transfer offices (TTOs) as the principal point of contact for each research institution. In all cases, TTOs continued to retain responsibility of all aspects of intellectual property management. In order to safeguard against inadvertent disclosure and to ensure that the TTOs remained serially in the process, an online mechanism for proposal submission was developed, which allowed TTOs to manage applications prior to their submission to the Science Center. In practice, while the system for managing interactions through the TTO has been largely successful, there have been course corrections required due to complexity of other administrative offices (e.g. departmental or sponsored research), variation in TTO size and sophistication at various institutions, and differing cultures of faculty interaction. This has been greatly facilitated by forming an oversight committee involving VPs of Research who oversee all research administration functions at their institutions.

Case study example: Lehigh University challenges and lessons

Challenges encountered during Lehigh University's onboarding and engagement in the QED program included:

- Sharp learning curve for academic team members to understand the business needs and their relation to the technology/invention
- Maintaining Project team focus on achieving proposed milestones
- Managing Project team expectations
- Simplification of the benefits of the technology into words that are understandable to a non-expert
- Bridging gaps between academic team (technology) and business advisors (markets)
- Lessons learned as a result of Lehigh University's experience in the Science Center's QED Program include:
- Business Advisors are a critical part of the team
- Great technology is not sufficient for good commercial success
- Reducing uncertainty in technology greatly increases chance of commercial interest

15. SUCCESS FACTORS

Two key factors have particularly shaped the success of the QED program: Business Guidance and Market-Driven Selection.



ACADEMIC PROOF-OF-CONCEPT BEST PRACTICES – THE UNIVERSITY CITY SCIENCE CENTER'S MULTI-INSTITUTIONAL QED PROGRAM

Business Guidance

A differentiating characteristic of the Science Center's QED proof-of-concept program, compared with typical "gap funds," is the input of external guidance from vetted professionals with documented commercialization experience.

The Science Center has assembled a community of more than 100 industry professionals and serial entrepreneurs who participate in the QED program as Business Advisors to scientific investigators invited to prepare Full Applications and to those who are implementing funded projects. Business Advisors work with investigators at the research institutions to evaluate and prepare the commercial development strategy for each technology, as well as a go-tomarket plan. QED actively matches at least two Business Advisors to each project on the basis of mutual interest, technology type, specific needs of the project, and the expertise of the Business Advisor. In addition, a panel of professional specialists in areas such as regulatory, reimbursement and insurance, intellectual property, manufacturing, sales and distribution and other areas are available to provide specific input on projects as needed. Reasons given by Business Advisors for their interest in participation, which is largely voluntary, include a desire to network with researchers and technology transfer officers, and to "give back" to the entrepreneurial community. Business Advisors are assisted by students (MBA, PhD) and post-doctoral trainees with an interest in gaining commercialization experience, and who are competitively selected to participate in the QED program as Fellows. Both technology transfer offices and scientists participating in the QED program consistently rate the business guidance they receive as one of the most valuable aspects of the program.

Market-Driven Selection

QED operates on the hypothesis that commercialization of university technologies can most efficiently be initiated if projects are prioritized and selected by representatives of the marketplace.

QED utilizes a "market pull," rather than "technology push" approach to reviewing, prioritizing, and recommending projects for support. A Selection Team has been assembled that is comprised entirely of individuals whose main occupation is to evaluate acquisition and investment opportunities on behalf of their organizations. More than 50 individuals, representing almost 40 pharmaceutical and medical device companies, and investment organizations including venture capital firms and angel investors, have participated on QED's Selection Team. The Selection Team reviews initial white paper applications, full applications, and presentations by the teams, and prioritizes QED's allocation of resources to projects on the basis of each project's market potential. Importantly, each applicant is provided with detailed feedback from the Selection Team on their project - a relatively rare opportunity for academic technologists to receive direct insight on their project from the marketplace. In addition to providing guidance to the QED program on the prioritization of projects for funding, the involvement of investment and corporate business development personnel on the Selection Team provides a method for showcasing projects to potential investors and licensees.



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Case study example: Lehigh University QED award benefits

The QED Award has provided several key benefits to both, the project team at LU, as well as the OTT. In addition to obtaining funding for converting their conceptual idea into a proof-of-concept/bench-top prototype device, the project team members have gained a significant understanding of the commercialization pathway that needs to be adopted for the technology to move towards commercial reality. This has been primarily possible due to the "Business Advisor" resource provided by the QED Award who in turn guided the team towards an appropriate understanding of the market reality. In addition, the opportunity to connect with regional research institutions and entrepreneurial community has been a tremendous boost for OTT to enhance its regional network and assist several other LU researchers keen on exploring the commercial roadmap. Based in part on this partnership, LU and the Science Center has started exploring the potential of collaborating further on some other unique opportunities that could assist other life sciences technologies at LU to move from the lab-to-marketplace. It has truly been a win-win situation for both LU and the Science Center.

16. TRANSFERABILITY

Any geographic region or network cluster that possesses a critical mass of research institutions, an entrepreneurial community, and sufficient investment capital could potentially create a program like QED. Two critical requirements to combining these ingredients into a functional program are 1) a mechanism for integrating multiple organizations with different resources, cultures, and capabilities into a common process, and 2) a mechanism for aggregating and focusing expertise, assets and resources that might be spread over large distances. To achieve both of these requirements, it is of great benefit to involve a neutral organization like the Science Center, which is highly connected to all stakeholders and is able to convene and concentrate activity.

FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

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- National Science Foundation, http://www.nsf.gov/statistics/srvyrdexpenditures/ (accessed December, 2012, including industry, government and other on biomedical engineering and life sciences without agriculture).
- The Children's Hospital of Philadelphia; http://www.research.chop.edu/about/overview/ (accessed December, 2012)
- Lankenau Institute for Medical Research 2009 Annual Report, http://www.mainlinehealth.org/doc/Page.asp?PageID=DOC001466
- Biomedical Technology Readiness Levels (TRLs), prepared for the Commander, U.S. Army Medical Research and Materiel Command, under Contract DAMD17-98-D-0022, Science Applications International Corporation, (2003).

Below is a list of selected publications relating to the research project at Lehigh University supported by a QED award and described as a case study throughout this article.

- (1) Vemula Rama Rao, Mayuresh V. Kothare and Shivaji Sircar. Numerical simulation of rapid pressurization and depressurization of a zeolite column using nitrogen, Adsorption, 20(1):53-60 (2014).
- ▶ V. Rama Rao, S. W. Chai, M. V. Kothare, S. Sircar. Highlights of non-equilibrium, nonisobaric, non-isothermal desorption of nitrogen from a LiX zeolite column by rapid pressure reduction and rapid purge by oxygen. Adsorption 20(2-3):477-481, (2014).
- ▶ Vemula Rama Rao, Mayuresh V. Kothare, and Shivaji Sircar. Novel design and performance of a medical oxygen concentrator using a rapid pressure swing adsorption concept. Submitted to AIChE Journal, December 2013.
- CHIN-WEN WU, M. V. Kothare and S. Sircar. Equilibrium adsorption isotherms of pure N2 and O2 and their binary mixtures on LiLSX zeolite- Experimental data and thermodynamic analysis. Submitted to Industrial & Engineering Chemistry Research, January (2014).
- V. Rama Rao, C. W. Wu, M. V. Kothare, and S. Sircar. Comparative performances of two commercial samples of LiLSX zeolite for production of 90 % oxygen from air by a novel rapid pressur swing adsorption system. Submitted to Separation Science and Technology, February (2014).
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18. LINKS

- www.sciencecenter.org/qed
- http://www.lehigh.edu/ott



- http://www.businesswire.com/news/home/20111212006080/en/Pennsylvania-Universities-Receive-Awards-Bridge-Funding-Gap#.UxdwZRC9Z7Q
- http://www.che.lehigh.edu/blog/2011/12/kothare_and_sircar_win_200000.html

19. KEYWORDS

Technology transfer, university city science center, Lehigh University, proof-of-concept, inventions, academic, commercialization, economic development, incubators, grants, QED

20. PUBLIC CONTACT DETAILS

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DUAL STUDY PATHS IN ENGINEERING SCIENCES: How to improve learning efficacy by integrating professional practice in Academic Education

By Rainer Przywara





TITLE OF THE CASE	Dual Study Paths in Engineering Sciences	
SALES PITCH	How to improve learning efficacy by integrating professional practice in academic education	
ORGANISATION	Hochschule Hannover – University of Applied Sciences and Arts (HsH)	
COUNTRY	Germany	
DATE	February 2014	
AUTHOR	Rainer Przywara	
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Collaboration in academic education 	





1. SUMMARY

Dual study paths are specific academic courses that integrate vocational training and/or practical training in a company in academic learning. The engineering Bachelor courses developed at Hochschule Hannover – University of Applied Sciences and Arts (HsH) contain a traditional apprenticeship which is being completed in parallel to the first four university semesters. Following German tradition, the practical aspects of the apprenticeship are covered largely through work experience in a firm, while the theoretical component is delivered through specialized vocational schools (BBS). Thus, dual bachelor education integrates three learning locations cooperating in the HsH dual education partnership.

The results of the program are quite convincing:

- average duration of studies: 7.2 semesters (9.0 in standard B.Eng. courses)
- success rate: > 90 % (~ 60 % in standard B.Eng. courses)
- employability of graduates: 100 % immediately after graduating.

In a recent joint initiative by the local Chamber of Commerce and HsH, this success model has been adapted to the specific needs of students with a non- classical form of university entrance, rendered by practical education in combination with work experience (so-called "3+3 entrance"). Thus, talented "late bloomers" are given a chance for academic learning, helping firms to overcome their skills shortage.

2. BACKGROUND

Dual study paths are specific academic courses that integrate vocational training and/or practical training in a company with academic learning. The German tradition of dual education (referring to different learning locations) of apprenticeship, combining practical training in a company and vocational education at a vocational school, has been transferred to the academic system. While in 1996, only 41 dual study courses were listed, more than 800 were offered in 2012 (Wissenschaftsrat, 2013).

Over the years, different forms of dual study paths have emerged (Table 1). Dual study courses can mainly be differentiated by three variables:

- Formation phase: initial training vs. continuing education
- Practical training: apprenticeship/job vs. practical training sessions/practice
- Relation of learning locations: integrated vs. parallel



		Relation of learning locations	
Formation phase		integrated	parallel
	Apprenticeship	Integrated apprenticeship	attendant apprenticeship
Bachelor	practical train- ing	interlocked training sessions	separate training sessions
Mastor	Job	work integrated in curriculum	parallel work, no relation to studies
(Bachelor)	Internship	internship integrated in curriculum	parallel internship, no relation to studies

Table 1: Types of dual study paths in Germany (source: Wissenschaftsrat (2013), p. 9)

In a strict interpretation, only integrated study paths are to be categorized as truly dual, since only these consequently integrate practical training in the curricula.

The HsH Concept of Dual Education

At the Hannover University of Applied Sciences and Arts – Hochschule Hannover (HsH), in the early 1980s a specific concept was developed by the faculty of mechanical engineering in close cooperation with pioneering companies. The HsH intensive study path is characterized by an integrated traditional apprenticeship which is being completed in parallel to the first four university semesters. Following German tradition, the practical aspects of the apprenticeship are covered largely through work experience in the company, while the theoretical component is delivered through specialized vocational schools (BBS). Thus, dual bachelor education integrates different learning locations working closely together in the HsH dual education partnership.



Figure 1: Structure of HsH dual study courses

The three learning locations do not just provide their standard programs as for non-dual education, but a tailor-made input for the given purpose. Dovetailing is achieved via:

- matched theoretical content (BBS/HsH),
- industrial projects (firms/HsH),



 specific events (so-called extra-functional events) in companies self-organized by students, integrating theoretical content with practical experience (firms/HsH).

The transfer from the traditional Diploma to Bachelor and Master courses was implemented in 2005. Four Bachelor courses (210 ECTS points) and a consecutive Master course (90 ECTS points) are offered:

- B.Eng. Production Technology (since 1985),
- B.Eng. Machine Design (since 2002),
- B.Eng. Business Administration and Mechanical Engineering / Technical Sales (since 2004),
- B.Eng. Mechatronics (since 2008),
- M.Eng. Value Chain Management in Mechanical Engineering (since 2009).

Thus, all key areas of an industrial enterprise (from design to production to sales) are being targeted in the Bachelor courses, while the Master course seeks to convey an overview on the value chain and processes of an international firm.

The participating companies are located in the Hannover region, forming a consortium that includes the region's major industrial enterprises (e.g. VW, Wabco, Johnson Controls, Continental) and a variety of SMEs. Students are selected and supervised by the cooperating firms. Over three decades, more than 1,000 students have already graduated, more than 100 companies have been participating, and about 100 students start their bachelor courses every year.

Via consortium board meetings and student and vocational committees, 360° feedback is achieved. To ensure high quality standards at all learning locations, Deming cycles are used for permanent improvement.

University Access for Students with a Practical Background

Parallel to classical forms of university entrance, in the German federal State of Lower Saxony, multiple vocational forms have been established under the caption "open university" *(Offene Hochschule Niedersachsen, OHN)*, enabling people with a sound professional qualification to study at universities (see figure 2).





Figure 2: Overview on Qualifications for University Entrance in Lower Saxony from 2010

Additional to prior forms established from 1993 which involved theoretical training (e.g. master craftsman, skilled technician), from 2010 university access has also been granted to persons who underwent a three years apprenticeship and have gained additional three years of work experience. For these so-called 3+3 candidates, university access is granted for degree courses within their field of practice. As an example, a skilled industrial mechanic could study mechanical engineering after working three years in a company.

In the first years after introducing the 3+3 entrance, the results were rather disappointing. According to HsH experience, the new form of university access so far has not found major acceptance: Only two out of 395 (0.5 %) 3+3 students enrolled at the department for mechanical engineering for the winter semester 2011/12. This result is very poor, given the number a good 1,000 persons that qualify in the Hannover region each year via accomplishing an industrial qualification suitable for studies in mechanical engineering according to an analysis by the author basing on Chamber of Commerce data.

3. OBJECTIVES

To enhance the number of engineering graduates has been the goal of all German parties, no matter what political orientation. One tool aiming at boosting the number of students in this field is OHN including the 3+3 entrance. The objective of the actual project has been to establish a suitable way of recruiting 3+3 engineering students by offering attractive dual study courses and to pave the way for a successful outcome of the target group.

4. **RESPONSIBILITY**

The Hannover Chamber of Commerce (IHK) together with HsH has started an initiative to establish a new trajectory from craftsman to scientist on the basis of existing dual study courses:



- IHK is responsible for promoting the activities among its members companies and recent holders of an apprenticeship degree.
- HsH is responsible for developing a curriculum on the basis of existing dual study courses. This is carried out by the Department for Dual Study Courses at Faculty II (Mechanical Engineering and Bio-Engineering).
- HsH is also responsible for identifying the additional needs of people with a 3+3 qualification for studying mechanical engineering. This is carried out jointly by the Department for Dual Study Courses and the HsH Center for Key Qualifications (Zentrum für Schlüsselqualifikationen).
- Both IHK and HsH are responsible for defining and organizing additional training and coaching for the target group.



5. STRATEGY & ACTIVITIES UNDERTAKEN

Research was conducted in a three-step approach:

- 1. Success factors of dual education courses were identified.
- 2. Typical groups and respective needs of 3+3 applicants were located.
- 3. A dual curriculum with accompanying training measures was developed.

The research environment can be characterized as a case study (HsH consortium) with embedded sub-cases (companies, different study paths), see Figure 3.

To identify success factors, success rates and factors of dual study courses were evaluated in comparison to those of traditional study paths by a mixed-methods approach. The main techniques applied were semi-structured interviews of alumni (qualitative) during a world café workshop (at VW company) and statistical analyses (quantitative), allowing triangulation of the results.

To identify typical needs of 3+3 students, personal interviews with candidates and actual students of this qualification were conducted (semi-structured).

The curriculum was developed by the responsible professors at the department for dual study courses in close contact with firm representatives. Accompanying training measures were conceived in cooperation with the HsH Center for Key Qualifications (*Zentrum für Schlüsselqualifikationen*).





Figure 3: Research environment

6. MONITORING AND EVALUATION

Monitoring of results and personal coaching of all 3+3 students were established at HsH. Feedback from teachers in supporting measures and professors in the actual semester is recovered. Thus, constant evaluation of student progress and adequacy of curriculum and training measures is facilitated.

IHK representatives have been introduced to HsH consortium and now participate regularly in board meetings and those of the work group for vocational training.

7. SUSTAINABILITY MEASURES

The developed course model will continuously be offered to 3+3 candidates. The cooperation between IHK and HsH will be continued and deepened in the established manner.

In addition, career chances rendered by OHN are constantly promoted by an OHN agency founded and funded by the State of Lower Saxony. Close cooperation between HsH, IHK and the OHN agency have already been established, so the course model is additionally being promoted. All institutions are seated in Hannover.

8. COSTS

Costs are covered by the normal budget of the partners.

9. FUNDING

There is no special funding for this project. All tasks were performed in the course of the normal occupation. A major portion of the work at HsH is carried out on a voluntary basis.



UIIN GOOD PRACTICE SERIES Case study written by Rainer Przywara www.uiin.org The supporting HsH Center for Key Qualifications (*Zentrum für Schlüsselqualifikationen*) has been established with support from the European Commission, the European Social Fund for Germany (ESF) and the German Ministry for Education and Research (*Bundesministrium für Bildung und Forschung, BmBF*).

OUTCOMES & IMPACT

10. OUTCOMES

Results and success factors of dual education courses

Taking into account all dual Bachelor courses from 2005, the program has outperformed traditional (non-dual) programs at the same university by far in all key indicators:

- average duration of studies: 7.2 semesters (9.0 in standard B.Eng. courses)
- success rate: > 90 % (~ 60 % in standard B.Eng. courses)
- employability of graduates: 100 % immediately after graduating.

Moreover, the statistical differences between dual study paths differing in content are smaller than those of dual versus non-dual study paths with similar content.

This success can mainly be attributed to the following facts:

- The dual study consortium assures a stable learning environment with tightened structures.
- Industrial partners act as supportive and normative authorities:
- Students are selected by the companies; ratio between applicants and selected is ~ 10:1.
- Students are constantly supervised by companies.
- Students can focus on their studies since they do not need to work for subsistence.
- Students form a cohesive and competitive work group.

Improved learning is achieved by linking theory with practical experience and immediately answering the fundamental question why all the theoretical training is needed.

Wants and needs of 3+3 candidates

Concerning cognitive elements, shortcomings in (higher) mathematics have been identified as the major obstacle for succeeding in engineering studies. Shortcomings in physics have been traced as a minor but still significant aspect.

The most important social aspect is to assure a certain living standard for people who have gotten acquainted to make a living on their own. A way of financing several years of study is required.

Candidates have expressed their wish not to lose contact with professional life.

Many aspirants are looking for a family-friendly opportunity to study.



UIIN GOOD PRACTICE SERIES Case study written by Rainer Przywara www.uiin.org Moreover, some candidates find it hard to get support from their companies. In one case, the general consent of a DAX company could not be assured due to resistance of the employee representation *(sic!)*.

Curriculum of dual study paths suitable for 3+3 candidates and accompanying measures

Planning could draw from previous considerations in the course of a research project dealing with the aging society (see Przywara, 2012). As the basis of the actual program, two dual B.Eng. courses were selected: machine design and mechatronics. The university content basically remained unaltered, with the general possibility of individual recognition of specific pre-qualifications.

Instead of going through an apprenticeship during the first four semesters (see figure 1), 3+3 candidates continue to work in their firms. Thus, a gross salary typically around 60 % of the accustomed one can be realized.

In addition to the model shown in figure 1, the content of semesters 5 and 6 can be spread over two years (semesters 5-8), so the opportunity to work 2-3 day a week during term time is generated, assuring student provisioning. The total duration of the course then is $4\frac{1}{2}$ instead of $3\frac{1}{2}$ years.

Preparatory and accompanying math and physics courses have been arranged in cooperation with local educational institutions (e.g. e-learning programs based on Lon-Capa). University tutors guide the 3+3 students especially during the first semesters to avoid adaptive difficulties. Professorial attendance has also been arranged.

11. IMPACTS

After a first campaign only started in July 2013, four out of 20 persons of a group attending a presentation of the new opportunity decided to pick up their studies at HsH in September 2013. In relation to the success rates before the campaign and the very short notice, this can be considered as a major achievement. So far, all candidates are still in the program.

The expectation is that the pioneering group will set an example and will find more and more followers in subsequent years (enrolment is only possible for the winter term). As a rough estimate, 20 % of a student cohort is considered to be realistic.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Companies benefit by securing skilled employees and potential managers with tailor-made know-how.

Students benefit by acquiring professional and personal skills that render opportunities for career development and personal growth.

The society as a whole benefits by establishing a new link between two societal groups, thus improving cohesion.

HsH benefits since student cohorts in traditionally rather small courses will grow. Moreover, latest industrial practice and a professional view are brought in by the "late bloomers". Didactical experience with this group of students will help to diminish the drop-out rate also in traditional study courses.

IHK raises its attractiveness by providing a valuable offer to their members.

The OHN agency has a tailor-made study course offer at hand for recommendation.



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13. AWARDS / RECOGNITION

The project has become part of the Lower Saxony joint initiative "mobility economic systems" (Verbundprojekt Mobilitätswirtschaft) as an expanding element of the HsH subproject "*Studium Initiale*". Thus, it is recognized by the German Ministry for Education and Research and the Social Fund of the European Commission.

LESSONS LEARNED

14. PRIMARY CHALLENGES

The main challenge is to overcome the external and internal barriers of people with a non-traditional form of qualification for university access. Mainly, these are:

- lack of information,
- lack of trust in own ability to learn,
- lack of family support,
- difficulty to identify with a different societal role,
- lack of support by the employing company.

15. SUCCESS FACTORS

As a very general key factor for success, the small, but very dedicated number of persons involved in creating and running dual study courses at HsH has to be mentioned. After almost thirty years of cooperation, mutual trust and responsibility within the consortium have created an atmosphere where quick response to actual demands is possible.

More specifically, close contact of mentors and academic teachers with 3+3 students throughout their studies with a focus on recruitment and the initial phase is of essence for a successful outcome when participating in the new dual study course model.

16. TRANSFERABILITY

This course model might be useful for any cluster of universities and regional firms that wish to create an opportunity for people with a non-traditional form of access to the academic system. It makes studying feasible especially for those who need to maintain a certain income and have to allocate time to family life.

Transferability to different education systems is generally given, but has to be reviewed for each individual case.





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19. KEYWORDS

Dual study courses, cooperation between university and industry, vocational qualification, extra-occupational studies, university entrance, different learning locations



20. PUBLIC CONTACT DETAILS

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PASSPORT TO A PROFESSION IN THE DEGREE OF PHARMACY:

HOW TO INTEGRATE UNIVERSITY STUDENTS INTO THE REAL WORLD OF WORK: "PASSPORT TO A PROFESSION IN PHARMACY"

By Carmen Escolano, Encarna García, Mercè Pallàs, Montserrat Miñarro, Santiago Vázquez, Anna Marqués and Anna Lluch





TITLE OF THE CASE	Passport to a profession in the degree of pharmacy
SALES PITCH	How to integrate university students into the real world of work: "Passport to a profession in Pharmacy".
ORGANISATIONS	Faculty of Pharmacy, University of Barcelona Students advisory service, University of Barcelona
COUNTRIES	Spain United Kingdom
DATE	February 2014
AUTHORS	Carmen Escolano, Encarna García, Mercè Pallàs, Montserrat Miñarro, Santiago Vázquez, Anna Marqués, Anna Lluch
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 Strategic instrument Structural instrument or approach Operational activity Framework condition



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1. SUMMARY

The incorporation of the Spanish university system into the European Higher Education Area has brought about a series of adaptations. Among the recommendations is the inclusion of an external training period in a company, which has resulted in significant changes in the degree syllabus in order to balance the theoretical and practical education required by the students. This new framework has been legally confirmed by the Spanish Government and, in the case of the University of Barcelona, by the publication of internal guidelines. Taking advantage of this new opportunity to adapt the Pharmacy degree to real-world problems in industry, the Dean's team of the Faculty of Pharmacy, with the support of the Faculty administrative staff and the Students Advisory Service, have assumed the challenge of including a new subject in the syllabus entitled *Training in Companies*.

In parallel, a new activity has been set up to ensure that the students choose the most suitable company department/job for them and to help them pass the company interview. Under the name of *Passport to a Profession*, a series of ten explanatory talks has been scheduled every academic year. These talks deal with a broad range of topics aimed at providing the students with the basic tools they will need to make the most of a company training period and to make headway in the professional world when they finish their degree. In addition, three Faculty of Pharmacy-Pharmaceutical company workshops and two round-table conferences have been held in the last two years in order to bring the university and industry together. Notably, the project to provide students with company training is expanding on an international level, with two to three undergraduate students contracted every year by a United Kingdom-based multinational pharmaceutical company.

The statistical data of the whole process has been analysed for a more in-depth understanding of the activity and to improve the programme.

2. BACKGROUND

The University of Barcelona (UB), with six campuses, is home to over 80,000 students each year, distributed across 66 bachelor's degrees, 71 doctoral programmes, over 300 postgraduate courses and some 400 on-site and distance lifelong learning courses. The University of Barcelona is the most formidable public institution of higher education in Catalonia, catering to the needs of the greatest number of students and delivering the broadest and most comprehensive offering in higher educational courses. The UB is also the principal centre of university research in Spain and has become a European benchmark for research activity, both in terms of the number of research programmes it conducts and the excellence these have achieved. The University of Barcelona has two campuses of international excellence —the BKC Knowledge Campus and the HUBc Health Sciences Campus- that have bolstered institutional policies on intensive research.



The Faculty of Pharmacy of the University of Barcelona, established more than 150 years ago, offers three degrees: Pharmacy, Human Nutrition and Dietetics, and Food Science and Technology. Each academic year, the Faculty has approximately 2500 degree students and 250 master's students. In the professional context, the Faculty of Pharmacy pays particular attention to two main areas: pharmaceutical care and the pharmaceutical industry. Thus, close relationships have been established with Government administrative bodies, pharmaceutical associations and companies, hospitals and other associations to bring the professional reality closer to the education of the students. Undoubtedly, this approach facilitates the integration of the students in the professional world.

The Students Advisory Service (SAE) was created with the objective of dealing with student issues in a personalized manner. Among the functions of the SAE is to guide students through their degree and help them acquire skills for their future professions.

Therefore, the project can be represented by a triangle whose vertices are occupied by the Faculty of Pharmacy, the Students Advisory Service and the Pharmaceutical companies. In this sense, *Passport to a Profession*" represents a three-way intersection between the academic world, industry and students. The goal of the project has been to introduce in the Pharmacy degree syllabus the possibility of spending a training period in a company and prepare the students in the best possible way to take advantage of this experience. Passport to a Profession can thus be considered as a guidance programme.



3. OBJECTIVES

The main objective of the Faculty of Pharmacy is to implement the European Higher Education Area recommendations in the Degree of Pharmacy, including the provision of an external training period in a company. The Faculty of Pharmacy has faced this challenge by developing a strategic partnering approach of cooperation with pharmaceutical companies. This project has proved to be an excellent opportunity to build bridges between academia and industry and it has been a testing ground of our capacity to directly introduce degree students to the pharmacy profession. With the aim of maximising the success of the project, the degree syllabus has been modified, so that before embarking on the training period, the students will be equipped with the necessary tools to take the utmost advantage of it. The modifications fulfil the following primary objectives:

- Successfully placing students in pharmaceutical companies during the degree.
- Enhancing the training experience for students.



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- International growth and expansion.
- Persuading both the students and companies of the need to perform a training period.
- Creation of a structured network between the academic and industrial communities.
- Academia-industry joint programmes/projects/activities to stimulate collaborations.

More specifically, the strategy of the Faculty of Pharmacy is to ensure quality and provide the students with support in their education and training. The ultimate goal is to create more flexible structures for boosting the student training periods in unison with industry.

4. **RESPONSIBILITY**

The *Passport to a Profession* project is supported by three different organisational entities, all working in collaboration: the Faculty of Pharmacy, the Students Advisory Service and the pharmaceutical companies. Responsible for the successful implementation, monitoring and evaluation of the project is the Dean's team of the Faculty of Pharmacy and in particular the Vice-dean of Students. The Dean's team has undertaken the role of reinforcing the innovation capacity of the Pharmacy degree syllabus and promoting the interconnection of the academic activities of the degree with the productive pharmaceutical companies of the country.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

When the Faculty of Pharmacy decided to implement the training period in the syllabus of the Pharmacy degree, three main areas were considered: pharmaceutical companies, students and the Faculty of Pharmacy administration.

Pharmaceutical companies

As a first requirement, several pharmaceutical companies should be willing to provide between 300 to 750 hours for tutoring and mentoring students. To this end, the Human Resources Departments, by mail or telephone, of companies that already had a relationship with the Faculty of Pharmacy were contacted. This initial approximation was quite fruitful since the companies were already familiar with the Faculty and its students. It was only necessary to introduce the idea of students carrying out a short-term training period to include in their curricula. However, a drawback was that Human Resources personnel were unable to quickly evaluate the possibility of accepting a student.

Following, numerous pharmaceutical companies without any previous contact with the Faculty were contacted by extensive mailing, but they gave very little response. Without any doubt, the most effective way of obtaining company participation was directly through



previously established contacts who were working in a department able to host a student. In those cases, the response was quick and specific. The activity of securing company involvement in the project was considerably time-consuming but worthwhile, since this is central to the project.

Each pharmaceutical company is required to provide a tutor, who will be in charge of the training the student receives. The role of the company tutor in the project needs to be wellestablished. They need to provide a training plan so the students know in advance what their responsibilities will be. The tutor should keep the Faculty informed if there are any problems with the process or complaints about the student. Furthermore, the tutor is responsible for writing a final report about the work of the student, stating if company expectations have been fulfilled. This report is central to awarding the student a mark for the training period.

Faculty of Pharmacy administration

The optional subject *Training in Companies* has been introduced into the Pharmacy degree syllabus after obtaining approval from different academic commissions. Before taking this subject, students need to have passed half of the degree credits. An internship agreement between the Faculty of Pharmacy of the University of Barcelona, the pharmaceutical companies and the student, including all the data of the three participants, has been prepared by the Faculty administrative staff.

The Student

The undergraduate student is the one who decides if they want to spend a period in a company or not, since it is not compulsory for finishing the degree. The training period (between 300-750 h, representing 12 credits of the syllabus) can take place any time during the year, including out of term time, with the company having the final decision. Therefore, the student is free to make whatever timetable modifications are necessary to ensure the training period is compatible with theoretical classes, receiving full assistance from the administrative staff of the Faculty of Pharmacy. The student has to fit the training period in with their academic curricula, which to some extent is like solving a jigsaw puzzle.

Steps for the students to follow

Since *Training in Companies* is so different from the other subjects of the Pharmacy degree, it needs to be introduced by an informative session at the beginning of each academic year. It is important to explain to the students that spending a training period in a company during their degree will give them a more comprehensive education, help them develop professional skills and establish contacts with the professional world, and ultimately give them a greater chance of succeeding in the labour market. Students who decide to carry out the training period should complete the following steps.

1.- The student applying for this option should provide a document specifying their preferred timetable (first or second semester), their level of foreign languages and preferred field of activity. The five main areas to choose from are marketing, quality control, medicinal chemistry, registers and patents, and quality warranty. The students provide their curriculum vitae and give permission to the Faculty of Pharmacy to send it to companies.

2.- When the collaborative companies have a vacancy, they contact the administration office of the Faculty of Pharmacy, informing about the training proposal, timetable, the field in



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which the work is to be developed, etc. The students with the most suitable curricula are sent to the company to be interviewed. Alternatively, and more conveniently, students can arrange their own placement, with the advantage that they can look for what they consider to be the most suitable conditions, in terms of location, field of interest and even economic aspects.

3.- One of the important points to be considered in the process is that ultimately the company assesses the suitability of the student by interview. If the student is selected, the administration office of the Faculty is contacted and the internship agreement is prepared and signed by the company, the student and the responsible coordinator in the Faculty.

4.- A requirement for taking the subject *Training in companies* is that the student is accepted by a company and that the internship agreement is correctly drawn up. The rights and duties of participants in the training period are legally regulated by the "University of Barcelona Guidelines for training periods". Students without a host company cannot carry out the training period.

Since the most crucial point in the whole process for the student is passing the company interview, an activity was prepared to equip students with the necessary tools to succeed. To this end, the Faculty of Pharmacy contacted the Students Advisory Service to provide students with specific guidance in personal aspects, coaching, etc. This new activity, conceived to help students enter the professional world, was named "Passport to a Profession", an umbrella term that covers target-oriented aspects related with gaining professional experience not usually dealt with in the academic syllabus.

Passport to a Profession includes a series of talks focused on providing students with knowledge about the companies and generally helping them prepare for the interview. These sessions are held in the Faculty at midday, which is the intersection between timetables of students that attend classes in the morning or afternoon.

The most representative sessions are the following:

- How to start looking for a job". In this session the students receive information about how to contact a company, obtain information about the companies they are interested in, decide on their area of interest, etc. Since their last years have been mainly dedicated to academic activities, the students are receptive to receiving guidance in the job-searching process, and have an opportunity to become familiar with the professional world.
- *"How to present a curriculum vita and a motivation letter"*. Most students at this stage had no experience in writing a curriculum vita oriented to obtaining a position in a pharmaceutical company. In this session students are given highly practical advice, which they are able to take considerable advantage of.
- *"Round table: what positions are available in a pharmaceutical company"*. The fields in which a pharmacist can develop a career are remarkably wide-ranging and varied. It can be difficult for a student to distinguish between the activities performed in each department of a pharmaceutical company. When applying for a job in a particular department, it is essential they understand what the work will involve, an aspect not dealt with specifically in the degree. To this end, five professionals from different company departments are invited to participate in a round table. After talking about the



specific activities of their department, they are happy to answer student questions. By understanding what tasks they will be expected to perform in each department, the students can make an informed choice of their preferred area of interest. It is essential for the students to be equipped with this information before attending the interview, so the position on offer will fulfil their expectations.

• "Opportunities abroad". This talk is dedicated to the students interested in spending their training period abroad. One of the main targets of our activity is internationalization. In this sense, students need to have information about how to access pharmaceutical companies based in other European countries. Notably, in the academic year 2006-2007, the United Kingdom-based multinational pharmaceutical company Glaxo-Smith-Kline began contracting one or two students from the Faculty of Pharmacy for a period of one year. Interestingly, all the students that have spent their training period in this company have done/or are doing their PhD Thesis in the medicinal chemistry field. Currently other companies are contacted to arrange student work experience abroad in the next academic year.

Additionally, *Passport to a Profession* gives students the opportunity to simulate interviews with specialized professionals and improve their curricula, both activities provided by the Students Advisory Service. In this way, the students are strongly supported for achieving success in the real interview.

6. MONITORING AND EVALUATION

Monitoring and evaluating the quality and outcomes of the various programmes is a continuous effort, especially as the project has been so recently established. Several steps are followed in processing the data.

- A variety of statistical data for the whole process are collected before and after the training period.
- These statistical data and the two years of experience acquired in the project so far are analysed to enhance our understanding of the main requirements of the students as well as the reasons that drive the companies to participate in the programme.

The reports are structured according to the two main activities:

- 1. Passport to a Profession
- 2. Training in a Company

The final aim of the statistical analysis is to introduce significant improvements in the programme, which will be implemented in the following years after the careful examination of the data collected after the training period.

7. SUSTAINABILITY MEASURES

The mechanisms and activities that have been created need to be maintained in order to achieve sustainable results in the future. First of all, at the operational level, sustainability is ensured by embedding both activities, *Training in companies* and *Passport to a Profession*, in the study plan of the pharmacy degree. The students obtain 12 credits for the training period



and 1 credit for attending a minimum number of the Passport to a Profession activity sessions.

The commitment of the Faculty leadership to the actions presented here is also grounded in a firm believe that the relationships established with the pharmaceutical companies will be long-lasting.

8. COSTS

The most significant cost assignable to the current case constitutes the time committed to setting up the activity by the authors of this paper. All of us are permanent staff at the University of Barcelona and have invested a considerable number of hours to starting, following up and improving the project every year. The time dedicated to this project needs to be combined with the time that each of us has to spend in research, administration, teaching, etc., depending on each individual position.

9. FUNDING

Improvement and innovation in teaching programm from the UB (Call 2013).

OUTCOMES & IMPACT

10. OUTCOMES

The long-term outcomes of this recently implemented programme are hard to assess at this point in time. However, a number of directly visible outcomes can already be detected and (sometimes) measured.

- The number of students that participate in the activities of the Student advisory service has improved notably. Moreover, they consider the sessions are very useful regarding the rates obtained by the tests.
- The number of students that spend a training period in a company and enrol in the *Training in companies* activity has increased considerably, from 40 in the academic year 2011-2012 to 60 in 2012-2013, and this academic year is considerably increasing.

After the training period, the students fill in a document about different aspects of the programme. The aim of this process is to identify any weak points in order to take active measures to improve the whole process and fulfil the expectations of both students and companies.




The data collected from 100 reports is divided in two main areas: the training period and the student perception of the Faculty orientation.

Company:

- 90% of students attended only 1 or 2 interviews before obtaining their placement. Two main aspects of this outcome can be highlighted: the ability of students to choose their placement well in terms of their preferred areas of interest, timetable, etc., which is the result of effective pre-interview coaching provided by the *Passport* to a Profession sessions.
- - The internship assessment was mainly for 300 to 450 hours (46%). Only 18% of students spent the minimum required time (300 h) and the rest more than 450 h.
- The majority of the 100 students received economic compensation. It is worthy of note that although not compulsory for the companies, most students (80%) received payment. The amount of money was less than 500 euros per month in 61% of cases, while 32% received between 500 and 750 euros per month and only 6% received more than 750 euros.
- - 87% of the students reported that the placement satisfied their expectations and interests.
- The students were also very positive about the role played by the tutor at the company. The tutor is considered to have been very accessible by 82% and to have taken an active role in the training by 87%. Of the latter, half of the students had the impression that the tutor was very involved in their training. These data are important because the most important person in the whole process is the tutor responsible for the training of the student. The positive marks awarded the tutors are indicative that the companies take this training period seriously and make a considerable effort.





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Faculty of Pharmacy:

- The majority of the students (93%) consider that the Faculty is involved in the process, 40% of whom perceive that the implication is notable.
- 76% of the students recognize that the orientation given by the Faculty of Pharmacy is optimal or highly optimal.
- - 92% of the students consider the paperwork in the process is easy or very easy to handle.

More ambitious is the idea of detecting what is lacking in the training period, so that the degree syllabus can be improved, with the ultimate aim of providing the students with the academic education they need to meet real-world necessities.



11. IMPACTS

The impact of the programme, despite its recent instigation, can already be seen at three levels.

Firstly, the students increased their awareness of the importance of carrying out a training period in a company during their degree. It is very important for the Faculty of Pharmacy that students engage in a valuable learning experience in a real-world scenario, by working in pharmaceutical companies. The syllabus of the Pharmacy degree has been considerably modified according to the recommendations of the EHEA to bring the university closer to both industry and society. Notably, every each at least two students has been contracted after the training period for the companies. In that sense the training period has been the way to entry in the company.



Secondly, the staff involved in the launch of the programme has proved to be a very efficient team that contributes to the project at different levels. On the one hand, students receive guidance in the *Passport to a Profession* sessions and advice from the coordinators of the subject in the Faculty. On the other hand, companies are constantly being informed by staff about the project. Considerable effort is dedicated to maintaining already established contacts and to starting new relationships with other pharmaceutical companies. Reflecting the importance of giving students access to the widest range of work areas possible, the staff have secured the collaboration of companies working in cosmetics, drug synthesis, drug analysis, drug development, drug production, water analysis, clinical analysis, food and wine production, heath inspections, regulatory affairs, among others.

It is essential to establish a fluid and quick process that provides the company with candidates whose profile matches the required one as closely as possible in the shortest possible time. Having to interview a large number of candidates who are unsuitable for the placement offered is a waste of company time as well as being unproductive for the students. As part of the quality control of the process, it is vital to control the time the students spend in finding a placement and the time the company needs to find a good candidate.

Thirdly, the new programme has increased cooperation between the academic world (Faculty of Pharmacy) and pharmaceutical companies, thus successfully implementing the recommendations of the European Higher Education Area in the degree in Pharmacy. The process of transferring and exchanging knowledge contributes to the region's social and economic development. The presence of the Faculty of Pharmacy in pharmaceutical companies has increased and several agreements have been signed. Future goals include increasing the mobility of students by searching for placements in companies based elsewhere in Europe.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Faculty of Pharmacy-Student Advisory Service-University of Barcelona

For a non-profit organization like the Faculty of Pharmacy, one of the main benefits of the new programme is being more connected to the "real world", which includes an improved preparation of students for the labour market. The most important target of academia is to educate students to meet the necessities of society and to contribute to the development of the region and the world. The only way to carry out this important task is to provide the students with knowledge that can improve the quality of life of the general population as well as equip them with the tools to succeed in the professional world. The main benefit for the academic and administrative staff is an enhanced reputation and the personal satisfaction of being able to contribute to the success of the students.

Students

Undergraduate students are provided with an education that helps them gain access to the professional world. The university interactions with industry benefits students primarily by providing them with an educational program that is better aligned with the needs of the pharmaceutical companies, thus producing graduates well-equipped to pursue successful careers. The programme activities give students direct experience of leading companies where they can learn about the real needs of industry and establish contacts that might lead



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to future projects or employment. The students also receive inspiration and ideas that increase the quality of their education.

Companies

By having the opportunity to meet undergraduate students from the Faculty of Pharmacy, pharmaceutical companies gain access to students with a high level of education. The training period is sufficiently long for the tutors to evaluate the potential of the students and identify those that can be employed in the future. On the other hand, by contributing to the training of the students in specific areas, the companies can benefit from the availability of better-prepared graduates when they are recruiting new personnel in the future. In some cases, a training period in the company can be avoided if the employee has already received it during their degree.

Society

The impact of this project on society is not easy to measure, although a higher degree of integration of academia and industry is occurring. Companies generally benefit from students who are better prepared for the market environment.

LESSONS LEARNED

13. PRIMARY CHALLENGES

The foremost challenge was to find enough companies willing to accept undergraduate students for a training period. The number of collaborative companies already in contact with the Faculty was not enough to host all the potentially interested students. The most time-consuming aspect of the project was to inform companies of the project and to secure their collaboration. A pharmacist can develop a career in a wide range of positions. As part of the degree it was already compulsory to spend six months working in a hospital or communitary pharmacy, so to avoid a duplication of training it was necessary to find placements not related with the work carried out in these places,. In this sense, we were very strict in the acceptance of placements. The tutors of proposed training periods had to previously submit a brief definition of the work the student was expected to do, and after acceptance by the coordinators in the Faculty of Pharmacy the company was accepted as a collaborative pharmaceutical company and students could be sent for the training period. Obviously, the same company can offer different positions at different times in the year. Another critical point was to prepare easily filled-in documents to facilitate and speed up the whole recruiting process. Then, reports were modified from the beginning until we were happy with the information we collected in each case.

The next challenge was that students should understand that a training position in a company cannot be guaranteed, since it depends on available offers. Also, once they obtain a placement, the students have to modify their syllabus. At the beginning, this created some conflicts, since some of the students would need an extra semester to complete their degree, depending on their existing timetable. However, others were able to fit their training period



into their timetables simply by moving some theoretical classes. The final decision was ultimately up to the student, which was a new responsibility previously not part of the degree syllabus.

Finally, the project has been marked by the general economic downturn, which has resulted in the loss of tutors no longer employed by a company. However, in difficult economic times it is crucial that occupational training in higher education receives more attention.

Currently, there is no specific reward for the staff involved in the programme.

14. SUCCESS FACTORS

A number of important factors have fostered the success of the *Training in Companies* programme and the *Passport to a Profession* activity for undergraduate Pharmacy students.

A high level of partnering between the Faculty and industry has proved key to the success of the program. We have built up an extensive list of collaborative companies that are willing to accept students depending on their necessities. Moreover, the attendance of company representatives at informative meetings for students in the Faculty has increased the university's contact with the real professional world. Worthy of note, Galenicum an outstanding pharmaceutical company set in Spain, has granted a whole formative programme related to the tasks that a graduate in pharmacy could develop in each department of a company, of 20 h for students.

The second crucial factor has been the willingness of the students to engage in the programme. They were quick to understand that spending a period of their degree in a pharmaceutical company would not only enhance their education but also greatly increase their chance of successfully finding work in a company after their studies. The students were very participative and interested in attending the *Passport to a Profession* sessions.

An extremely dedicated and enthusiastic team was willing to take on the challenge of integrating a training period in the syllabus of the Pharmacy degree. The team was aware that in a tough economic environment companies could be more reluctant to accept students. Another key point was making the administrative changes in the syllabus to incorporate the training period and adjust the timetable of the theoretical classes accordingly. In this sense, the academic commission and the administration staff gave invaluable support to the project. The team held regularly scheduled meetings to build a solid structure for the project, taking into account all the different points of view (administrative, companies, Faculty and students).

15. TRANSFERABILITY

The general transferability of the presented approach may be considered as high in all science faculties that follow the recommendation of the European Higher Education Area by including a period of external training in companies.

Many aspects of the programme and networking are transferable. The case of the Faculty of Pharmacy provides key learning points specifically for science faculties in Catalonia.





16. PUBLICATIONS / ARTICLES

- El grado de farmacia de la universidad de Barcelona oferta la asignatura optativa prácticas en empresas presented by García, E.; Escolano, C.; Pallas, M.; Miñarro, M. at the IV Congreso Internacional de Educación Superior en Ciencias Farmacéuticas in La Laguna, Spain
- Passaport a la professió: Nova activitat del grau de Farmàcia presented by Miñarro, M.; Pallas, M.; Garcia, E.; Lluch, A.; Escolano, C.at the Setena Trobada de Professors de Ciències de la Salut in Barcelona, Spain. Published in Revista de la Fundación Educación Médica 2013, 16 (S1)
- Resultados del semestre de la asignatura optativa: prácticas en empresas en la Facultat de Farmacia de Barcelona presented by Garcia, E.; Escolano, C.; Pallàs, M.; Miñarro, M. at the XI Congresos de la Sociedad Española de Farmacia Industrial y Galénica: SEFIG 2013 (6-8 febrero 2013) in Barcelona, Spain.

17. LINKS

- http://www.ub.edu/farmacia/atencio_est/practiquesfarmacia.htm
- http://www.ub.edu/farmacia/atencio_est/practiquesfarmaciaprocediment.htm
- http://www.ub.edu/sae/orientacio/docs/lorientaciofacultats/1314/PRpassaport_farmaciaweb.pdf
- http://www.ub.edu/sae/orientacio/lorientacio1314-passaport-farmacia.html

18. KEYWORDS

Passport to a profession, training, syllabus of the Degree of Pharmacy, pharmaceutical companies, evaluation, employability, coaching, career education.

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INNOVATION CAFÉ: An example of how to create a sustainable Engine for the entrepreneurial ecosystem

By Keith Marmer





TITLE OF THE CASE	Innovation Café
SALES PITCH	An example of how to create a sustainable engine for the entrepreneurial ecosystem.
ORGANISATION	The Pennsylvania State University
COUNTRY	United States
DATE	February 2014
AUTHOR	Keith S. Marmer
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	□Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition



CASE STUDY PROFILE

1. SUMMARY

The Innovation Café is a focal point for expanding and sustaining the entrepreneurial ecosystem. The centerpiece of the initiative is a reoccurring networking forum featuring high profile guest speakers discussing industry innovations, business trends, regulations and their impact on the ecosystem. Each event also features a start-up company introducing regional stakeholders to entrepreneurs, intellectual and investment capital, and commercialisation opportunities. Innovation Café is a platform to engage investors, entrepreneurial faculty, students, government and industry professionals committed to building a vibrant start-up community.

Building on the Innovation Café brand, Penn State University and its partners have expanded the platform to include educational programming, access to capital and entrepreneurial mentorship. Educational programs include entrepreneur forums and topic-specific lectures for early entrepreneurs all the way through advanced year-long programs for high growth CEOs. These and other programs are delivered in collaboration with partners including economic development organisations, local and state government agencies, chambers of commerce, non-government organisations, service providers and venture capital investment organisations.

2. BACKGROUND

In 2009, Penn State University ranked 75th in the United States for licensing revenue from research-based intellectual property (IP) yet ranked 11th among all university systems in total research expenditures. Licensing revenue is one of a number of metrics by which a university entrepreneurial ecosystem is measured. Another metric, number of start-up companies, likewise revealed a weakness. Penn State had not created any new companies in the previous four years. Further highlighting the rationale to change how IP is commercialised were the economic opportunities not being recognised by Penn State and the regional economy. Licensing revenue for Penn State in 2009 was \$1.2 million. By way of comparison, the average rate of return on research spending was 8% for the top 50 licensing revenue generating U.S. universities in 2009. Accordingly, the imputed return for Penn State would have been \$61.4 million by simply achieving average efficiency.

At an operational level, the reasons why entrepreneurship lagged at Penn State are numerous and cut across several areas of the organization. The challenges included a weak culture of innovation and entrepreneurship; a bureaucratic approach to an entrepreneurial process; a lack of meaningful engagement with the entrepreneurial ecosystem; inflexible, passive policies and practices towards commercialisation and, with respect to the School of Medicine, geographic isolation from the other Colleges within Penn State University. The School of Medicine for Penn State University is located approximately 160 kilometers from the primary campus of the University. This causes a geographic disconnect among faculty, students, research and investment. Moreover, the School of Medicine is dependent upon creating its own ecosystem to foster entrepreneurship and innovation. Given that the School



of Medicine accounts for approximately 40% of the inventions at Penn State, the importance of growing a sustainable entrepreneurial ecosystem was clear.

Recognising that the School of Medicine was not successfully advancing medical and healthcare innovations to serve their patients and community, the leadership decided to relaunch the Office of Technology Development with the mandate to serve as a conduit for the transfer of promising School of Medicine technologies to industry, to contribute to regional economic development by engaging innovation ecosystem stakeholders and to support new venture creation and encourage greater collaboration between academia and industry.

In April 2011, the Office of Technology Development (OTD) was officially re-launched with new leadership. The mandate for OTD required extensive benchmarking research into university commercialisation processes and outcomes. This analysis included an examination of university spending levels on research and development, economic impact, funding sources supporting research commercialisation activities, university-industry interactions, licensing income and new company formation. Beginning with this initial needs analysis, OTD endeavoured to lead organisational change to drive innovation and entrepreneurial success across the Penn State School of Medicine ecosystem.

3. OBJECTIVES

The primary objective was to create a cultural change that fostered an entrepreneurial ecosystem. This would be measured by the following outcomes:

- Increased invention disclosures
- Increased industry sponsored research
- Increased number of start-up companies
- Increased ecosystem stakeholder engagement and investment

4. **RESPONSIBILITY**

Primary responsibility for implementation of the initiatives in this case belonged to the Office of Technology Development (OTD) at the School of Medicine. The author of this case study is Director of OTD.



5. STRATEGY & ACTIVITIES UNDERTAKEN

In order to change the status quo, OTD addressed the notion that great ideas are like seeds - they need the right amount of nurturing and the right environment to grow into something



UIIN GOOD PRACTICE SERIES Case study written by Keith S. Marmer www.uiin.org vibrant and fruitful. Accordingly, OTD established an initiative – Innovation Café - where innovations had the proper environment to foster their commercial growth.

Initially, a meeting was convened with regional stakeholders. OTD recognised that in order for this initiative to be successful, it could not actually be promoted as a Penn State University sponsored initiative. In fact, during the initial stakeholder meeting it was agreed that this initiative, Innovation Café, should not be 'owned' by any organisation or individual. While OTD would champion Innovation Café, its structure, goals, objectives and success would be determined and achieved as a unified effort.

Stakeholders that convened represented academia, local and state government, chamber of commerce, industry, economic development organisations, investors, entrepreneurs and service providers. These stakeholders formed an advisory board to shepherd the development of the initiative. Innovation Café was structured to become the regional engine for the entrepreneurial ecosystem. The primary vision for Innovation Café was to create a place to meet; where entrepreneurs, researchers, industry, investors and other people can get together to share ideas and opportunities and ultimately foster innovative new technologies and companies.

The advisory board deemed that in tangible form, Innovation Café would have four main components. The first component would be a recurring networking event, ideally on a monthly basis, where introductions are made and business is transacted. The events would feature a speaker of prominence as well as showcase technologies that are ready to enter the commercialisation process. The goal being to establish Innovation Café as the 'can't miss' event on stakeholders' calendars.

The second component would provide for delivery of educational content. The content would need to vary and target different stakeholder groups. For example, one educational series was designed to target researchers, to promote innovation and invention disclosures within the academic environment. Another series was created to provide in-depth training on entrepreneurship and new venture creation. While Innovation Café was to cultivate a strong educational programming function, the advisory board noted to take care to ensure timely and appropriate content and not to 'overload' the community.

Investment opportunities would be the basis of the third component of Innovation Café. This included regular events for showcase presentations to investors. Beyond the showcase itself, these events would also provide a forum for investors to interact with technologies even before they are ready for investment as well as to interact with each other.

The fourth component of Innovation Café was a physical presence. A physical hub was identified as a necessary foundation to support regional entrepreneurship and economic development as well as provide a sense of place for Innovation Café; where people from various stakeholder perspectives can interact on both a spontaneous and organized basis.

Two strategies employed by OTD were Lean Startup and Open Innovation. Given the lack of resources, the Innovation Café initiative was treated much like a start-up company. Borrowing from Eric Ries' "The Lean Startup" OTD did not wait to launch until all the details were worked out and funding secured. Instead, Innovation Café began as a 'Minimum Viable Product -- MVP.' In other words, a grass roots initiative to gather the ecosystem together was



taken. The first event was managed on a bare bones basis and attracted a handful of participants. As word spread and resources grew, attendance at events has gone from a small gathering to routine attendance of more than 100 at most events. This has led to Innovation Café taking on a branding effort to support other regional innovation and entrepreneurial initiatives. Innovation Café now lends its brand cache to several events sponsored by other groups.

The open innovation approach to Innovation Café has required that OTD allow the name and events to be free from university bureaucracy. To accomplish this, an advisory board of key external stakeholders was created. The advisory board is tasked with bringing ideas and issues impacting on the ecosystem to be incorporated into events and related programming. Although OTD provides the operational support for Innovation Café, the initiative openly invites stakeholders to participate and shape the effort.

Innovation Café is unique in that it established a regional ecosystem without 'gatekeepers' to access investors and key decision makers. In addition, Innovation Café did not employ a local perspective. Rather it capitalizes on its proximity to the Philadelphia region and its assets, as well as geographic positioning on the western border of the Boston-Washington DC corridor. While the members of the advisory board represent a number of key stakeholder groups within the entrepreneurial ecosystem, there was recognition that broader engagement was required. In effect, Innovation Café sought to become the 'Innovation Concierge' for stakeholders across the regional ecosystem, providing navigation and access to further ones' pursuits based on individual needs.

6. MONITORING AND EVALUATION

With respect to monitoring and evaluation, the most direct measure is participation at Innovation Café events. Attendance is routinely close to 100 people. Participation across stakeholders, and in particular from Penn State, is monitored for continual increases. To date, almost 1,000 people have participated in at least one Innovation Café event.

Specific to the desired outcomes, anecdotal monitoring of individual participation is linked to specific outcomes such as invention disclosures and start-up companies. Given the myriad of influences that lead to these measures, monitoring of first-time inventors and cross-referencing start-up company stakeholders to Innovation Café participants is evaluated.

7. SUSTAINABILITY MEASURES

In a broad sense, sustainability is achieved simply because OTD is responsible for continuous performance improvement of the aforementioned outcomes. That said, the School of Medicine is simply one stakeholder within the ecosystem. Accordingly, sustainability depends on continued stakeholder engagement. This is accomplished in several basic ways. First, the advisory board, comprised of representatives across the stakeholder ecosystem, meets regularly to discuss ways to improve engagement. Second, each event has 'Innovation Ambassadors.' These are key representatives of the ecosystem each with a vested interest in its' success. Although it may sound simple, these representatives are asked to wear a name badge that identifies them as 'Innovation Ambassadors.' Each of these individuals assures they will participate in each event and be available to anyone in attendance to make an introduction to any other member of the



ecosystem. By having the most senior and well-connected stakeholders serve in this capacity, it assures sustainability in that participants recognize the continued value of being able to meet freely with individuals they may not otherwise have the opportunity to do so.

8. COSTS

The School of Medicine bears the administrative cost of salaries and overhead for each event. Administratively, this amounts to approximately 25% of one individual's time and effort. Meeting space is typically provided on Penn State's campus. Food and beverages are paid for by OTD, which are not a significant cost. On occasion, when alcohol or more elaborate catering is desired, a sponsor within the ecosystem is sought to pay the costs of the event. On rare occasions, speakers may be paid an honorarium and/or travel expenses. Most speakers volunteer their time, however, without cost based on the shared nature of the initiative.

9. FUNDING

Initially, Innovation Café was self-funded by Penn State. After a year of increasingly successful events, OTD applied for an economic development grant from the government. The government provided a two-year grant to expand the initiative and fund events. As previously noted, event sponsors are sought on a case-by-case basis.

OUTCOMES & IMPACT

10. OUTCOMES

Specific outcomes of Innovation Café include:

- Six new startup companies in 2013 (compared to just one startup formed in the previous nine years combined).
- 217% increase in inventions disclosed.
- Over \$3 million in follow-on sponsored research from startup companies and Innovation Café-related initiatives.
- Over \$10 million (known) in follow-on investments in startup companies.
- 211% growth in number of faculty involved in entrepreneurship, innovation and industry interactions.
- Creation of technology commercialisation seed investment fund.
- Events attended by almost 1000 members of the regional ecosystem.

11. IMPACTS

The primary benefit, beyond the outcomes highlighted above, is the positive influence on the entrepreneurial attitudes and culture at the Penn State School of Medicine. Innovation



Café events can be directly attributed to faculty and students direct engagement with commercialisation and entrepreneurial activities. While it is not a statistic tracked by OTD, there has been a significant increase in requests for information on how the School of Medicine provides entrepreneurial support and introductions to industry and other ecosystem stakeholders.

There has also been a positive impact on the reputation of the School of Medicine as an institution that is seen as 'easy to work with' by industry. Again, while there are no statistics that are monitored, there has been a rise in positive feedback from industry in terms of engaging with the School of Medicine in collaborative research, licensing of intellectual property and start-up companies.

In addition, Penn State's School of Medicine innovations are for the first time competing regionally and nationally in the innovation ecosystem for investment and entrepreneurs. Early successes include multiple commercialisation competition awards, investment funding and job creation in our startup companies.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

There are numerous stakeholders that benefit from the Innovation Café initiative. The primary beneficiaries are the employees and students at Penn State's School of Medicine. They now have support, resources and access to engage the regional innovation ecosystem. Previously, this was an impediment that had been identified which now has been positively integrated. Regional and national industry are likewise benefitting from Innovation Café. They now have a forum for regular engagement with the innovation and expertise at the School of Medicine.

The region itself is also a beneficiary of Innovation Café due to the economic impact. Jobs are being created and investment made in the regional economy. This effect is expanding beyond School of Medicine as start-up companies attract industry stakeholders to collaborate and invest in the region.

Ultimately, the patients and community served by the School of Medicine and Medical Center are benefitting as a result of innovative research being translated into preventions and treatment of diseases, care for individuals at risk and tools for improving health.

13. AWARDS / RECOGNITION

The University Economic Development Association (UEDA) recognized Innovation Café as an Award of Excellence finalist in the Innovation and Entrepreneurship category in 2013. UEDA defines this category as focused on initiatives designed to support startup companies, high-growth companies and clusters within a region. A region's prosperity depends in large part on how well the region can convert talent into wealth through innovation and entrepreneurship.



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14. PRIMARY CHALLENGES

A key challenge to maintaining Innovation Café is the ability to continuously identify topics and speakers that engage members of the regional ecosystem. As the stakeholders enhance their education and experience it is increasingly difficulty to hold events that will attract an audience. Efforts to identify new practices and strategies must be maintained on a continual basis. In addition, efforts to reach individuals that have not yet engaged in an Innovation Café event becoming increasingly challenging. Promotional efforts likewise must be continually evaluated to ensure that response is optimised.

Scaling Innovation Café to include a physical space has proven challenging. This is largely due to the costs associated with creating a physical structure as well as identifying the appropriate business model. While the concept of a physical space persists, the timeline to create a space has been delayed.

15. SUCCESS FACTORS

One key factor that has contributed to the success of Innovation Café is the involvement of Penn State University. Penn State is viewed as a premier institution and regional stakeholders have welcomed its engagement in the innovation ecosystem. Another factor has been the willingness of School of Medicine employees to recognize and accept the changing dynamics in academic research funding. Given the reduction in federal funding and the economic downturn that began in 2008, researchers have been open to engaging in Innovation Café events to become better educated on collaborating with industry and commercialisation of their research as an important aspect of their efforts.

16. TRANSFERABILITY

The Innovation Café model can be replicated in almost any ecosystem. The initiative and related programs are likewise sustainable because they have become embedded within the ecosystem. Innovation Café can be deployed by universities, economic development organisations and other stakeholders within an entrepreneurial ecosystem. The low dependence on financial sponsorship, on a single organisation and on a key individual has made Innovation Cafe a highly scalable, sustainable and reproducible initiative for ecosystems of any size.





17. PUBLICATIONS / ARTICLES N/A

18. LINKS

http://innovationcafepsu.wordpress.com/

19. KEYWORDS

Ecosystem, entrepreneur, innovation, university, commercialisation, regional, licensing, startups

20. PUBLIC CONTACT DETAILS

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FOSTERING THE ENTREPRENEURSHIP USING UNIVERSITY-INDUSTRY INTERACTIONS:

HOW TO COMBINE THE EXPERIENCE OF MENTORS WITH THE EAGERNESS TO THRIVE OF ENTREPRENEURIAL STUDENTS AND GRADUATES

By Fernando Vidal-Giménez, Domingo Galiana-Lapera and Abel Torrecillas-Moreno









1. SUMMARY

Universidad Miguel Hernández de Elche (UMH) began the 2010/11 academic year a Mentoring Program in two areas: professional and entrepreneurial development. This program seeks to combine the experience of mentors (professionals and business partners) with the eagerness to thrive of students and graduates. Thus, the availability of a mentor is a boost to the career of the students and graduates and facilitates the implementation of their business projects.

The call for candidates is done at the beginning of the academic course, students or graduates interested can complete their applications in a website. From the information registered, a matching is done with mentors that best suit their needs. This software application improves efficiency in the registry of interests, information management, and adequacy of the proposed mentors based on the requirements of students / graduates. Three meetings (start, end and follow-up) are scheduled with all parties involved. In addition to these meetings, guidelines and recommendations are given to ensure the optimal development of the program and facilitate contact between mentors and mentees along the program.

The mentoring program has been running for 3 full academic years in the UMH, and now is starting its 4th edition. The track of enrollments (of mentors and students/graduates) have been the following: 19 pairs, 48 pairs, 50 pairs and 60 pairs (current edition). When the program ends participants take a satisfaction questionnaire, giving feedback for improvement of the program.

During the design of the program and its development there have been several benchmarking activities at national and international level. This Mentoring Program was selected as a model of good practice and innovative methodology in a national symposium, and received the award for best practices for Universities Forum Club Management Excellence.

Through the institutional and systematic implementation of the Mentoring Program we have learned: that the support and guidance of an experienced person is a differential value in promoting university entrepreneurs.

2. BACKGROUND

The University Miguel Hernández of Elche, since its inception 16 years ago, was born with a clear focus on quality and employability. At that moment the career service called Occupational Observatory has been created.



This service's mission is to increase the level of "employability " of students and graduates, through tools such as internships, jobs, skills training, information on labor market dynamics, personalized guidance or entrepreneurship promotion. Its functions are:

- Management practices of students in companies and institutions.
- Promotion of university-industry relations through educational cooperation agreements and job vacancies.
- Preparation of reports on the labor market: needs, employment of graduates, etc.
- Organization of activities to facilitate the search for employment in the various campuses and advise students in the active search for their first job.
- Management of networks of business contacts with the dual purpose of promoting work placements for students and work contracts for new graduates.
- Promoting entrepreneurship, training, informing and advising students to entrepreneurship. Also, encouraging the entrepreneurs to present their business plans to various awards and competitions.

The experience gained through other programs (such as the Internship Program, the Job Days or University Entrepreneurs Program, etc.), showed the importance of factors such as networking, experience, or coaching to assist students and graduates with their professional projects, whether for themselves or for others. Literature shows that relationships and mentoring are very important in building positive relationships, as well as improved self-esteem and goal setting by mentees.

Through the testimonies of several of our graduates, collected through our website, it became evident that in many cases the figure of a professional relevance, or a prominent contact, marked a turning point in their professional development or as an entrepreneur. This allowed them to learn from their experience, provide other relevant contacts, or join in the process of job search, career options, or creation of the company. Thus was born the Mentoring Program, in which participants have the advice of professionals from different sectors of the business world who guide and provide guidelines to facilitate the implementation of business projects and increase their confidence and self-esteem.

3. OBJECTIVES

Following the line of increasing professional development opportunities for our students and recent graduates, the University began a Mentoring Program with two areas: professional and entrepreneurial development. This program seeks to combine the experience of mentors and university entrepreneurs with the potential students and graduates. Thus, the availability of a mentor can be a career impulse, or facilitate the implementation of business projects, while academic performance have also increased among college students participating in mentoring programs [1].

Through this program, University Miguel Hernández tries to boost the careers of graduates and facilitate the implementation of projects of their entrepreneurs. It has also been observed by some authors that the acquisition of skills and abilities from novice entrepreneurs is also evident through mentoring relationships. They showed an increase in



knowledge and management skills, improved view of their business and an increased ability to identify new opportunities [3].

In this moment, given the current economic situation we are facing, students and graduates are pressured to steer their own career and obviously, to have someone who really listen and advise, can help them. Mentors can show a wide perspective on the options presented in the professional or entrepreneurial field and bring a clear vision and a point of view that adds aseptic certainty.

4. **RESPONSIBILITY**

The Mentoring Program depends on the Vice-Chancellor of Business and Economics, and it's managed from Occupational Observatory.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

Mentoring is a very useful tool that is based on a relationship of personal development, in which a more experienced or more knowledgeable person helps another novel. Depending on the degree of affinity established between mentor and mentee, best results are obtained in the process. In our university we want the mentor to be a person with high expertise, whose mission is to lead, guide and advise students and graduates in developing their professional project or business idea. This also includes looking for different options for each of the issues raised, guiding them to find solutions and facilitating to discover the most successful options. It is not exactly training, but rather an act that refines and enriches the students or graduates, adding more options and views so they can choose with confidence and helps them discover for themselves what is best in their decisions about their professional or business development.

Regarding mentors participants in the entrepreneurial side, they are professional tutors that collaborate with university entrepreneurs program, members of chambers of commerce, foundations that support entrepreneurs, young entrepreneurs associations, European Business and Innovation Centers (BICs), or companies with which the university maintains educational cooperation agreements. Therefore, they are highly experienced professionals who volunteer for mentoring students or graduates. Each mentor is assigned, in general, only to one student, in the aim to perform the best job.

Regarding mentors that collaborate in the professional development area, they are professional tutors from Internships Program, ensuring a great work experience. Our university currently has more than 10,000 tutors who have participated in internship programs for over 16 years. As in the case of the Mentoring program for entrepreneurs, mentors are chosen for their dedication to service and interest in helping others.



The Mentoring Program starts with an outreach campaign to the potential interested public, i.e. students and recent graduates, who are called to a briefing. From there, participants complete a form in which they state the preferred modality (professional development or as an entrepreneur), expectations for the program, mentor desired profile (sector of activity, type of company or position), degree of development of the business project in its case, or person nominated as Mentor if they have identified it.

From the information provided by the student, a search for potential mentors is performed from a database of professionals and entrepreneurs collaborators with the internships program and entrepreneurial university program. Based on the preferences and profiles provided by students and graduates, we get in touch with potential mentors, inform them about the program and subsequently invite them to participate.

Once the match between students / graduates and mentors is done, both parties are called to an initial meeting. Each participant is introduced to its assigned mentor, establishing a first direct contact between them, and some brief notions of coaching are exposed. We also thank both parties participating in the program, and provide recommendations for a successful outcome: setting goals, maintaining contact, activity suggestions, etc.

Between December and September each mentor will contact the student and will carry out the assigned program development. After the initial meeting, a follow-up session and closing are performed, in which the findings and results are presented.

6. MONITORING AND EVALUATION

Three months after the start of the Mentoring Course Schedule, a satisfaction survey is sent to the participants, as a mechanism for monitoring the development program. The questionnaire is structured with two distinct blocks, the first one on satisfaction with the following items:

- 1. The Mentoring Program in general.
- 2. The dissemination of information (objectives, agenda...) and organized events (reception, monitoring...) by the Occupational Centre.
- 3. The calendar of events proposed by the Occupational Observatory.
- 4. Student involvement / titled and mentor's contribution to their professional development or as an entrepreneur.
- 5. Expanding your network (mentors, businesses, students...) through the Mentoring Program.

In this case, the items in which the respondent could range from "Not at all satisfied" to "Fully satisfied".

The second block is oriented to detail contacts between students / graduates and mentors:

- 1. Meeting in person
- 2. Phone contacts
- 3. Communication via e-mail (or other written forms)

In this case the responses could range from "never" to "more than 4 times".

Finally there was an open response in which participants could reflect aspects of their experience in the program, both from the students/graduates and mentors. This system of measuring results through surveys has been done in the past and is planned for future editions.



7. SUSTAINABILITY MEASURES

To improve the management of the program, a software application has been developed. It allows contact of the persons concerned (both entrepreneurial profiles and professional development) with mentors. By accessing this web platform, people can register their interest. Thus, the interested people enter information about their profile, interests and needs. In this way, a student may choose a mentor under professional experience, industry or company in which they are working, etc. Next, the application displays them companies or entrepreneurs that match their search criteria. Finally, the application sends an email to Mentors with the contact form. In those cases where the interest is mutual, starts the contact between the two parties, virtually through the application, or specifying a traditional appointment.

The mentoring program generates synergies for all parties involved, sustainability is warranted.

8. COSTS

Apart from the implementation of the software application, with an investment of ≤ 2.500 , the rest of activities and tasks are carried out by the Occupational Observatory team, as well as by mentors that participate on a voluntary basis. In other words, the mentoring program doesn't involve any additional cost for the university.

9. FUNDING

The Mentoring Program depends on Universidad Miguel Hernández, and it's managed by the Occupational Observatory team. It means that the Mentoring Program doesn't involve any additional cost for the University. This new program is done with no additional budget.

OUTCOMES & IMPACT

10. OUTCOMES

During the first edition, which established the basis of the program, 19 pairs were made. In the second edition, 48 pairs of mentors and students or graduates were performed. Finally, in the third edition were 50 participating couples. In the present edition (in course), 60 couples are enjoying the program.

11. IMPACTS

Participants are provided an opportunity to increase their skills in leadership skills, coaching and empathy, all of them contribute to their personal, professional and organizational development. Also, during the initial meeting, follow-up or end they have the opportunity to expand their networks or mentors interactions with other participants.



Following the feedback received from the last edition the following conclusions were drawn:

- The overall program satisfaction exceeded 88% in the case of mentors and 93% among students / graduates. The overall program satisfaction were not achieved in 2 students / graduates and mentors on 2 (different pairs), because their students / graduates had not contacted them.
- The 82.35% of mentors who responded were very or completely satisfied with their involvement students / graduates.
- Students / graduates who responded were satisfied by 79.31% with the contribution of his mentor with his professional future.
- In addition, students / graduates appreciated the expansion of the network of contacts in 72.41 % of cases.
- The e-mail contacts were the most frequent. The face to face contacts had not been given in many cases, although this has not interfered with the development of the program.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

For the students or graduates, the opportunity of having a mentor can be a very important element of support and advice when they need, to feel that they are not alone, that have either an expert counselor with the proper training, bringing aid, perspective, new vision, advice, etc. to facilitate the exploitation of opportunities. Thus, the support of experienced entrepreneurs has proven to be beneficial in supporting entrepreneurs programs. We offer them the knowledge and experience that treasure professionals, in the aim to improve their career options and to facilitate the implementation of entrepreneurial projects. In short, we create a new element to support the professional development and support for entrepreneurs.

At the same time, for mentors that participate in the mentoring program have an opportunity to increase their skills like coaching and empathy, both of interest to their personal, professional and organizational development.

13. AWARDS / RECOGNITION

The Mentoring Program is awarded with:

'Good practice model' for his innovative methodology at the Symposium for Entrepreneurship Education at the University, that took place in Madrid in September 2012.

- 'Good Practices in University Management', awarded by the Universities Forum Club Management Excellence', which seeks to promote and enhance the implementation of good practices by universities in Spain in the fields of quality management and excellence.
- In September 2013, this program was selected for exhibition in the III Iberian Conference on Entrepreneurship, in Lisbon.





14. PRIMARY CHALLENGES

One of the improvements identified during the early editions was the ability to systematize the process of assigning mentors to students and graduates. While the criteria to match both parties (mentor and mentees) were based on objective categories (such as degree, industry, expertise), finding mentors whose profiles fit in with the needs of students / graduates required seeking mentors by staff involved in the University. Therefore, to improve the efficiency of the matching, the software application was designed. In it, both parties (students / graduates and mentors) fill out a registration form stating several information, so a student can see which mentors fit its profile, and request assignment. At the same time, a mentor who has received a request from a student, can see what his needs are, and accept the match. Thus, the registration procedure and allocation is automated, and enables a single mentor work with more than one student, avoiding unnecessary delays or queries and maximizing efficiency.

On the other hand, from the second edition, and in order to ensure the commitment of both parties in the development of the program, several informative leaflets were prepared. The first, with recommendations for optimal use of it, was called "Mentoring Program - Take your chance". As a Decalogue, was oriented on how to proceed with several assumptions, activities to do with the Mentor, how to contact, etc. At the same time, another informative leaflet was developed as a "road map", the 50 participants in this year partners must complete to reflect their commitment to the program

15. SUCCESS FACTORS

Through the implementation of the Mentoring Program is institutionalized and systematized what the experience had been showing: that the support and guidance of an experienced person is a differential value in the employability of students and graduates.

Besides generating valuable contacts, support, advice and guidance that an experienced person can give to another with less professional experience, it is of great value in discovering opportunities or options that are not always referred to by the students or graduates. Also for university entrepreneurs, the fact of being accompanied by consolidated business mentor provides an impetus for the development of their ideas or to their implementation. It also provides an aid to various issues related to entrepreneurship, such as finding customers or suppliers, choosing legal form, etc.

The development of the software application to manage the program represents an innovation in terms of various processes, such as registration, matching, and monitoring contact between all parties involved: professionals, entrepreneurs, students, graduates and university.



16. TRANSFERABILITY

This program is based on collaboration between university and its different partners, as companies, professional tutors that collaborate with Occupational Observatory, foundations, associations, etc. The university already has different agreements with them, so the Mentoring Program could be exported to other entities that have similar partners or collaborators.

FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

- "Programa Mentoring UMH para emprendedores" (pp. 171-173), in "Educación emprendedora: buenas prácticas en la universidad española". Dirección General de Industrial y de la Pequeña y Mediana Empresa. September 2012. Available in: http://www.fue.es/seeu/images/DOCUMENTOS/Educaci%C3%B3n%20emprended ora.%20Buenas%20pr%C3%A1cticas%20Nacionales.pdf
- "Programa Mentoring de la Universidad Miguel Hernández de Elche", in "3^a Conferência Ibérica de empreendedorismo", september 2013 (file "Ciem2013_17", available in http://www.empreend.pt/conferencia2013/wpcontent/uploads/Ciem2013_proceedings.rar).

18. LINKS

- http://observatorio.umh.es/estudiantes-bolsa-de-practicas/programa-mentoring/
- http://www.mastermas.com/Noticias/html/N13396_F15012014.html

19. KEYWORDS

Mentoring, entrepreneurship, university, companies, career, professional, partnership, training.

20. PUBLIC CONTACT DETAILS

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UIIN GOOD PRACTICE SERIES Case study written by Fernando Vidal-Giménez, Domingo Galiana-Lapera & Abel Torrecillas-Moreno. www.uiin.org

THE UNIVERSITY OF SKOVDE AND GOTHIA SCIENCE Park - An integrated approach:

AN INNOVATIVE AWARD WINNING AND Competitive environment for education, Research and business

By Patric Eriksson and Sigbritt Karlsson









1. SUMMARY

The University of Skövde and Gothia Science Park have over the last 13 years developed a strong environment for education, research and business, aligned with the profile of the University. The University and Science Park are located in a Swedish region with the majority of industry working in manufacturing with limited R&D and a with lower percentage of the population with higher education compared to Sweden in average

Explicit strategies and the operation of these have led to the development of an integrated innovation environment enabling new forms of university industry interactions, research, innovation processes and business development. The cooperation between the University and the Science Park organization takes place on the strategic level, on the tactical level and on the operational level. The success of the case is characterized by strong commitment, the courage to select, openness and trust, organic growth and enthusiasm

The development has resulted in the University multiplying its research funding for projects with industry, the Gothia Business Incubator becoming one of the leading Swedish incubators and the science park growing into the regions third biggest workplace in trade and industry and one of the 10 largest science parks in Sweden.

2. BACKGROUND

The Skövde region, as part of West Sweden, is a region with a strong agricultural and industrial heritage. The City of Skövde has a population of about 50.000 people and the functional labour market about 190.000 people with Skövde as the centre. The regional industry depends primarily on the automotive sector with the majority of the workforce employed by the public sector, or subcontractors and suppliers with minor or non R&D functions. The percentage of the regional population with higher education is significantly lower than the average of Sweden. The University of Skövde started in 1977 and was fully established in 1983. The University today has approximately 11.000 students and more than 400 employees. One of the objectives in establishing the University was to increase the number of people with higher education. Right from the start, the University focused on information technology, economics and engineering sciences. In the late 90's the University started to develop larger research groups on information technology and engineering.

Due to lack of in-house R&D and qualified employment positions, the regional industry, except from the major automotive companies, did not have the capability to employ graduates which caused most students to leave the region after graduation. As the majority of the regional industry neither was used to, nor had the capability to act as partners in research projects, there was and still is a strong need to attract companies that can take on the role as long term research partners with the University. There was a strong need to create a base of companies that wanted to and had the ability to employ graduates. The number of new companies started as a result of the establishment of the university was also relatively low.



This is the background to why the City Council of Skövde, The University of Skövde, Volvo Cars Corporation, Volvo Truck Corporation, Electrolux, ALMI and the Provincial Government in 1998 initiated the formalization of Gothia Innovation AB with the mission to create Gothia Science Park. Gothia Science Park went into operation in the year 2000.

3. OBJECTIVES

The primary objectives are :

- To create a Science Park that exploits the potential of the University in order to
 - create new jobs and renew the industrial structure
- Enhance the innovation mechanisms and increase the volume of start-ups
- Increase volume of industry related research and funding
- Create an environment and methods that supports collaboration
- Enable for demand driven research and education and thereby constitute an attractive research partner
- Attract companies with in-house R&D to localize to the region

4. **RESPONSIBILITY**

The responsibility was shared between Gothia Innovation who develops and runs Gothia Science Park and The University of Skövde. The project also had strong support from The City Council of Skövde.

A steering committee consisting of the senior management from the University and the Science Park, the Vice Chancellor, the Pro-Vice Chancellor and the CEO was established. The steering committee led the strategic work on the implementation of research and business profiles and framework of processes. Education and research has been the responsibility of the University whereas the responsibility for innovation and business support processes lies with Gothia Innovation AB. The physical Campus and Science Park development has been a shared responsibility. To ensure alignment of strategies and support initiatives the steering committee has had a regular interaction with the City councils manager for trade and industry and with the Regional Development Agency.



5. STRATEGY & ACTIVITIES UNDERTAKEN

The main strategies have been

- 1. Establish a strong commitment from stakeholders, board of directors and senior management
- 2. Create strong and profiled research centres
- 3. Align the focus areas and profiles of the Science Park with the University's
- 4. Establish a strong incubation process enabling organic growth of the Science Park



- 5. Exploit without draining the university of students or staff
- 6. Create a physical innovation environment shared by the University and the Science Park supported by methods, processes and activities
- 7. An integrated research and innovation process

Strategy 1 Establish a strong commitment

This strategy has been implemented through a series of actions and continued work. Examples are strategic conferences with participation from major stakeholders such as regional government, city officials, board of directors, vice chancellor, pro-vice chancellors and senior management. Through these strategic workshop based conferences, long term goals and strategies have been developed. Strategic stakeholders have appointed the same member to participate on both organizations board of directors to ensure as much alignment as possible between the strategies. Board of directors has been appointed from major industrial stakeholder and public stakeholders.

On senior management level bi-weekly meetings have been conducted. Continued involvement and participation in each other's actions that coexists besides the main mutual strategies, has helped create a better understanding of each party's interests, frameworks and missions.

Strategy 2 Create strong and profiled research centers

As a relatively new university it has for University of Skövde been critical to be selective in choosing research areas and to delimit the scope to enable to build a critical mass of staff and research within the chosen scope and thereby create a competitive research environment. The University started by creating 3 distinct research centres which now has evolved in to 5 research centres.

Strategy 3 Aligning the focus areas and profiles of the Science Park with University's

With limited resources an important strategy has been to align the profile of the Science Park with the focus area of the university. This to allow sufficient resources and long term commitments to make a difference when it comes to e.g. building of knowledge and structural capital within the organizations, establishing and maintaining industrial relations and attracting business and entrepreneurs.

Strategy 4 Establish a strong incubation process enabling organic growth of the Science Park

This strategy has been to organically build the base of membership companies in the Science Park. The main instrument in developing a base of knowledge based companies has been the business incubator. More than 50 % of the deal flow to the business incubator has originated from the University of Skövde and has thereby been a source for start-ups within the same profile as the education and research. After the initial start-up phase of the business incubator itself, the annual number of new start-ups entering the incubator has been between 8 and 12. Combined the start-ups have grown to be one of the biggest employer of graduates from the university.

The business incubator process has been built around customer needs and via these try to identify the business cases. The process is also built around the particular needs of the startup team. Gothia Innovation has permanently employed business developers that work both as coaches to, as well as consultants working within the start-ups.

The business incubator also delivers educational programs targeting the teams in the incubator. A pre-incubation program in the form of a School of Entrepreneurship has jointly



been run by the University and Gothia Innovation. The target students for the School of Entrepreneurship have been graduate students with their own business ideas, usually originating from their final year projects.

Strategy 5 Exploit without draining the University of students or staff

There has been an understanding between the partners not to encourage students to fully engage in start-up activities until they have graduated. As the Swedish system stipulates that ownership of research results in academia belongs to the individual researcher, there is also a continued dialog regarding exploitation of research results and how to maintain the competitiveness of the research groups. The University of Skövde engage staff from Gothia Innovation to act as innovation advisors to the research groups and projects.

Strategy 6 Create a physical innovation environment shared by the University and the Science Park and supported by methods, processes and activities

The University and the Science Park organizations have for a long time nurtured the idea to create a common research and business facility to be used by both organizations. The idea was presented as the creation of an innovation environment in the form of a shared building for research groups, business, demonstrator projects, areas for spontaneous and formal meetings supported by methods and processes. The investment in the building was done by a private real estate company. The infrastructure and the concepts were financed by the University, the Science Park and through the project SIM2011 funded by the City council of Skövde, Västra Götalands Regionen and the European Union. In 2008 the idea was formalized and the project started. Right from the start, as many as possible of the staff at all organizational levels from both the University and Gothia Innovation, as well as member companies of the Science Park were involved. A joined project organization with staff from both organizations was created and "lifted out" of regular operation in order to remain neutral.

The architects took their starting point in the work performed in different user groups trying to simulate the processes of a building in operation. Throughout the project, needs of the research groups, businesses, innovation support, open innovation, administration, and facility management was taken into consideration. One focus was to try to avoid duplication of resources and facilities in each organization, in order to create a constant flow of people and interaction points, thereby supporting daily and spontaneous interaction between academia and industry.

The goal was to create a work and meeting place, not just for the staff performing their daily work there but also to allow temporary visitors to work from there, making it the natural meeting place for academia, business and public sector in the region. The Portal was inaugurated in 2009 and today hosts approximately 500 people using it as their everyday workplace. Research demonstrators have been built and are utilized on a regular basis. Annually more than 20.000 business people take part in projects, meetings and events held in this innovation environment. In specially designed and built classrooms and laboratories more than 3.000 employees from regional industry have undertaken university led education and training. It has become a de facto portal for business, research and entrepreneurs in the region.



7 An integrated research and innovation process

Through Gothia Science Park Open Arena activities are carried out that create the conditions for effective and sustainable collaborations, from network activities to project collaborations between companies and between companies and academia. By offering activities where individuals from different companies, competence areas and industries get the chance to meet and work academia, the conditions for research projects and development are created in the form of new knowledge, products and services or in the form of a new application area/industry. One goal is to create forums and processes where problems and needs are identified and paths to solutions are discussed with industry and academia together often resulting in collaborative research projects with a target user or application in mind.

6. MONITORING AND EVALUATION

Key performance indicators have been defined and are used to monitor the progress on monthly, quarterly and annual basis. Monitoring is performed as self-metering by the organization (monthly), by the board of directors (quarterly) and by major stakeholders (annually).

Examples of key performance indicators used are:

Number of companies participating in collaborative projects

- Number of individuals participating in collaborative projects
- Volume of research funding for collaborative projects with external funding
- Number of companies participating in knowledge transfer and training activities
- Number of individuals participating in knowledge transfer and training activities
- Number of new start-ups
- Number of start-ups in the incubation process
- Number of people working in research and development

7. SUSTAINABILITY MEASURES

To ensure the sustainability and continued development of the innovation environment the cooperation is carried out on strategic, tactical and operational level.

On strategic level the cooperation is undertaken in multiple ways e.g. strategic stakeholders has appointed the same member to participate on both organizations board of directors to ensure as much alignment as possible between strategies. At senior management level regular meetings and workshops are undertaken. Senior management participate in each other's development programs and councils.

On tactical and operational levels the strategy has been to establish as many redundant connections and contact point as possible. By trying to engage as many of the staff as possible from both the University and the Science Park organization, it can be avoided relying too much on specific individuals.



8. COSTS

The "case" is over time assembled by bringing various organizations, initiatives and projects together. The major cost elements over time are :

- Staff
- Activities
- Projects
- Buildings
- Infrastructure
- Labs
- Process development

9. FUNDING

- The City Council of Skövde funded development of buildings, infrastructure and basic operational costs
- The regional authorities, Västra Götaland, funded basic operational costs and projects
- Swedish national funding for staff and projects
- European funding for infrastructure and projects
- > Private investments in projects, infrastructure and venturing
- Self-funding from the university of Skövde and Gothia Innovation

OUTCOMES & IMPACT

10. OUTCOMES

The last 12 years of the initiative has in metrics resulted in an integrated innovation environment with:

- ▶ 700 people
- ▶ 70 companies
- 3 research centres with 200 research staff
- 12 new start-ups annually
- 45 M€ in external research funding with industry partners

A new successful industry, Computer and Video Games, has been established in the region.



11. IMPACTS

The Science Park has become the regions third biggest workplace in trade and industry and one of the 10 largest science parks in Sweden.

The Gothia Business Incubator is one of the leading Swedish incubators and part of the national incubator program

The University is one of three by the Knowledge Foundation selected universities for coproduction with industry.

Since the establishment of the integrated innovation environment, Portalen, the amount of industrial related research funding has increase more than 150 %. Integrated innovation processes have been developed and shorter decisions paths between the organizations has evolved

A new successful industry, Computer and Video Games, has been established in the region.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Stakeholders benefiting from the initiative are:

- The entrepreneurs and member companies of Gothia Science Park
- The regional authority
- The local authority
- National authority
- The University of Skövde
- Regional industry

Gothia Science Park is by the Provincial Government and Regional Development Agency appointed to be one of six nodes in the regional innovation system.

13. AWARDS / RECOGNITION

The initiative was rewarded with the 2009 European Enterprise Awards, in the category, Enterprise Development.



14. PRIMARY CHALLENGES

The University and the Science Park has somewhat different missions in regards to e.g. geography and time horizon on economic impact, making it necessary to continuously compromise.



As the University and the Science Park grow, more effort has to be made to maintain it as one integrated innovation environment.

15. SUCCESS FACTORS

The key factors that have led to success are:

- A common vision and strategy
- Strong support from key stakeholders
- An open cooperative climate
- Openness about each other's organizations needs and limitation
- A team of enthusiasts wanting it to be realized
- Relatively limited resources making it crucial to be pragmatic and entrepreneurial

16. TRANSFERABILITY

The results of this case study might be useful for smaller regions with less developed R&D infrastructure that wants to utilize a competitive academic resource for regional development. Regions thus having a vision, strong leadership and passionate people with a mandate.



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- www.his.se
- www.thegameincubator.se
- www.swedengamearena.se

19. KEYWORDS

Integrated innovation environment, research and innovation processes, science park, business incubation, university and industry research corporation


20. PUBLIC CONTACT DETAILS

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THE SIGNIFICANCE OF THE UNIVERSITY ENVIRONMENT FOR ENTREPRENEURSHIP EDUCATION:

AN EXAMPLE OF THE DEVELOPMENT OF AN ENTREPRENEURIAL UNIVERSITY ENVIRONMENT

By Rafael Alcaraz-Rodriguez, Marcia Villasana and Mario Alvarez



THE SIGNIFICANCE OF THE UNIVERSITY ENVIRONMENT FOR ENTREPRENEURSHIP EDUCATION: A CASE STUDY OF AN ENTREPRENEURIAL UNIVERSITY IN MEXICO



TITLE OF THE CASE	The significance of the university environment for entrepreneurship education: A case study of an entrepreneurial university in Mexico
SALES PITCH	An example of the development of an entrepreneurial university environment
ORGANISATION	Tecnologico de Monterrey
COUNTRY	Mexico
DATE	December 2013
AUTHORS	Rafael Alcaraz-Rodriguez Marcia Villasana Mario M Alvarez
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 □ Strategic instrument □ Structural instrument or approach ☑ Operational activity ☑ Framework condition







1. SUMMARY

University involvement in firm creation has increased over the past two decades, transitioning into the "third mission" where the entrepreneurially oriented university fosters and promotes new venture creation, technology transfer, and commercialization. This has been accomplished in part by embracing entrepreneurship education and integrating innovation and entrepreneurial thinking to programs. For Latin American universities, their role in educating a next wave of entrepreneurs has become enhanced due to the regional need for creating jobs and generating wealth. However, experiences on this regard are not widely documented. This paper presents the entrepreneurship education model at Tecnologico de Monterrey, a private university located in Mexico which since its conception has sought to create strong links with industry and contribute to local development. Besides offering solid academic programs, this Latin-American university has engaged physical, economic and human resources in fostering a university environment conducive of entrepreneurship which has led to over 25,000 business projects from students which have derived in the creation of about 2,500 firms; over 6,000 incubated projects and businesses; and about 65% of alumni with their own firm or self-employed within 22 years of graduation. The current challenge for Tecnologico de Monterrey is to make the development of entrepreneurship competences cross-curricular, and to implement systematic evaluations to such efforts.

2. BACKGROUND

The city of Monterrey, located in northern Mexico, historically has been characterized by a close-knit industrial elite; a close relationship with the economy of the southern states of the US; and a high pro-entrepreneurial consensus among regional stakeholders. In this context, in the 1940s Tecnologico de Monterrey emerged as a private higher education institution focusing on developing human capital to meet the demand from industry. Monterrey was the first campus, and it grew into a nation-wide university with presence in most Mexican states. In the 1960s, complementary business courses were added to the curricula given that a large number of students began occupying high-level management positions following graduation. The university`s authorities realized that Tecnologico de Monterrey alumni should develop an entrepreneurial attitude and consider creating their own business as a viable and desirable career choice. This made necessary to provide education that would give students the knowledge and develop competences to become successful entrepreneurs.

This eventually led to the creation of a project denominated Entrepreneurial Program in 1978, led by a committee integrated by professors and local entrepreneurs. Its objective was to have students create a firm that would serve as a laboratory as well as a training ground. The project was housed by the Business Division and began operating in 1979, in which senior students from both business and engineering majors could participate. Sessions were divided into lectures, conferences, case studies, research, and the participation of entrepreneurs who shared from their experience on creating new businesses.



This program was the first stepping stone for what was to become one of the most consolidated entrepreneurship programs offered by a Latin-American university, and led the way for the transition of Tecnologico de Monterrey into an entrepreneurial university.

3. OBJECTIVES

In 1985 the Entrepreneur Program emerged with an ample vision for strengthening and expanding on its predecessor, aimed at developing in students a new career option: to become entrepreneurs.

The university explicitly embedded entrepreneurship into its mission, and by 1990 the Entrepreneur Program was redesigned and given a new structure to:

- operate throughout all the university`s campi implemented in different phases
- be based on three pillars: academic, motivational, and institutional

4. **RESPONSIBILITY**

The responsibilities defined for each component to support entrepreneurship in the university were carried out under a collaborative approach between different entities at each campus where the program was implemented:

Entrepreneurship programs	University overseeing academic unit on entrepreneurship, supported by campus academic coordinators for the program
Incubator and accelerator network	 Coordinators for each type of incubator (social, high- technology, intermediate technology) at each campus Technology Transfer Offices at each campus

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The Entrepreneurship Program

The academic structure of the Entrepreneur Program evolved and in 2003 the minor in entrepreneurship had been incorporated. This new minor was also offered to all undergraduate students starting their third year of studies, and was integrated by a series of workshops and courses aimed at developing entrepreneurial competences in students. It focused on two areas: a) professional and entrepreneurial development; and b) personal development. The first involved technical skills for business opportunity identification and business concept development, aiming at the student starting a new venture with the support of the business incubator before graduation. The second focused on developing or strengthening entrepreneurial characteristics in students through a personalized plan.



In addition, the E+E network emerged as a complementary service in 2008 under the initiative of alumni with successful experiences in starting new ventures. The objective was to provide support and relational capital for new firms incubated at Tecnologico de Monterrey.



Business incubators

Derived from the growing inertia and structure of the Entrepreneur Program and its core course Development of Entrepreneurs, in 2001 the first business incubator was launched at Monterrey Campus, and by 2003 a university-wide network of business incubators was already operating.

The model drew on past experiences such as collaboration agreements for use of the university's infrastructure and laboratory equipment for business incubation, as well as fruitful interactions with NAFIN (a Mexican development banking institution) and private banks and groups of investors, all interested in supporting the development and modernization of the industrial sector and services to the community. Also, international experiences and good practices were important sources for the conception of the model, such as those from business incubators in the Netherlands, United States, Spain, France, Canada, England, Ireland, Italy and Brazil.

From the analysis of such models emerged the first proposal for a business incubator model at Tecnologico de Monterrey, and a pilot was implemented in the form of a business support area. Agreements were initially signed with the Ministry of Economy and the development bank for international trade in Mexico to house an export assistance center. At the same time, intra-university collaborations were established for use of laboratories, pilot plants, research centers to provide support for student projects. In addition, financing was sought among alumni, private firms and banks to round up the re-sources for establishing the first incubator at Monterrey. After the model proved to be successful locally, it then first was transferred to other four sites on a first stage, and ten others on a second stage. In 2003, the process was initiated to acquire the ISO 9000 certification for the business incubator network, and in 2004 to become certified by the Mexican Ministry of Economy as part of the National System of Business Incubators.



Currently, the business incubation model is currently integrated by three phases:

- Pre-incubation (business planning)
- Incubation (business implementation)
- Post-incubation (business development)

The portal EmprendeTec (www.emprendetec.com) was also created in 2002 as a technological tool to provide complementary services for entrepreneurs who are part of the business incubators. This site also allows for exchanges among the 33 business incubators distributed throughout Mexico.

Center for Innovation and Technology Transfer and the Technology Research and Innovation Park

In 2004, a patents office within the Office of Research and Graduate Programs was created, which later led to the establishment of the Office for Technology Transfer (TTO). the university contributes to the creation of knowledge-based start-ups with the support of the Center for Innovation and Technology Transfer (CIT2) and the TTO.

CIT2 was conceived under the vision of not duplicating efforts from other areas at the university, and focus on providing services that were not available for new technology based firms or NTBFs. Thus, CIT2 performs the following activities:

- Incubator, by providing a physical space as well as coaching services for IP, fund procurement, and facilitates reaching out to the university`s professors and students that are participating in different entrepreneurship programs.
- Brokerage, by identifying and managing technological and business services, as well as acting as an information broker for the NTBF.
- Gatekeeper, by selecting those NTBFs with the highest potential for development in the region.
- Showcasing, by promoting member enterprises as well as technologies developed by the university

The TTO offers services to the academic and student community for guidance for pa-tenting; licensing and financing for prototype development; and promotion of patented technologies. Between 2007 and 2011, this office supported the creation of six academic spin-offs. Overall, the entrepreneurial ecosystem at Tecnologico de Monterrey is as depicted in the following figure:



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6. MONITORING AND EVALUATION

Assessment of entrepreneurship programs is key for curriculum redesign. In order to identify the impact of the course Development of Entrepreneurs, a quantitative analysis was conducted with 327 as part of a larger study on the entrepreneurial profile of undergraduate students. Entry and exit results were compared. The objective was to determine if the course had an impact on 10 entrepreneurial characteristics, identified in the literature as desirable in entrepreneurs: innovation and creativity, initiative, self-confidence, energy and work capacity, perseverance, leadership, risk acceptance, need of achievement, tolerance to change, and problem management skills. Results indicated that the course had a larger impact on creativity, risk management, self-confidence, and problem management skills.

Further assessment efforts are currently being conducted at Campus Monterrey in order to redesign a measuring instrument for entrepreneurial spirit in students.

7. SUSTAINABILITY MEASURES

The university, since its origin, has had close relationship with industry. Many captains of industry have been and are members of the governing boards of Tecnologico de Monterrey. Their support of the many different initiatives undertaken to develop entrepreneurship at all levels, ensures the long-term sustainability of such measures at the university.

At the operational level, a cross-curricular design for entrepreneurship is being undertaken with the objective of a homogeneous implementation throughout the university. This has involved reorganizing the internal structure of the university to facilitate communication and flows of information. In addition, the mechanism for evaluating the evolution of the entrepreneurial spirit in students currently under design will become a key element for assuring sustainability of the entrepreneurship ecosystem at the university.



8. COSTS

Throughout the years, a large amount of effort has been dedicated to the development of the entrepreneurship program, from professors who contributed with their time to mentor students, receive training, and participate in meetings, to university authorities who have invested in the creation of fruitful relationships with universities around the world with successful entrepreneurship programs.

In addition, large investments have been made on the physical infrastructure for the business incubators, the office of technology transfer, the buildings at the innovation and research park, laboratories, among others.

9. FUNDING

Internal university resources have historically been allocated to support a system-wide approach to entrepreneurship. Industry has also contributed for specific projects. Public funds have also been accessed such as those from the Ministry of Economy through the National System of Business Incubators, and other federal and state funding programs.

OUTCOMES & IMPACT

10. OUTCOMES

- Business incubator network is currently integrated by 98 business incubators of which 25 are high-technology based, 8 are intermediate-technology, and 65 are social; and 16 business accelerators providing service to 159 businesses.
- The course Development of Entrepreneurs evolved into Leadership for Entrepreneurial Development, and is currently offered in 25 of Tecnologico de Monterrey campi to approximately 300 groups which represent 8900 students per year, and involves 110 professors. The minor in entrepreneurship is offered in 13 campi with over 500 students working on their own business project.
- The evolution of entrepreneurship education at Tecnologico de Monterrey led to the creation of two undergraduate academic programs focused on business creation: Business Creation and Development; and Business Innovation and Management.

11. IMPACTS

Overall, since its conception, there have been 6, 049 enterprises incubated at Tecnologico de Monterrey. Currently, there are 733 businesses in pre-incubation status, 418 incubated, and 943 in post-incubation.

The model may also be transferred to interested education institutions and civil society organisations.



12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Student and academic community

Tecnologico de Monterrey has not only focused on the university community, but also has reached out to the families of faculty, staff, and students. One example is the Center of Family Businesses, which focuses on coaching students` family owned businesses.

Region

Tecnologico de Monterrey is aligned with regional strategies for promoting a regional innovation system under a Triple Helix model. The university is one of the strategic partners of the state government in this effort.

Industry

The university holds close ties to regional and national enterprises, not only for providing highly skilled talent, but for technology transfer activities, projects, and other types of collaborations.

13. AWARDS / RECOGNITION

Tecnologico de Monterrey has been recognised as the Latin American university with highest alumni employability by QS University Rankings Latin America. Its EGADE Business School, was ranked by QS Global 200 Business Schools Report 2013-2014 as leader in the region and among the top 50 in the world for one of the specializations of its MBA program.



14. PRIMARY CHALLENGES

One of the challenges is to make the development of entrepreneurship competences crosscurricular. Engaging undergraduate and graduate programs also requires adjusting the organizational structure for effective flows of information and processes. Another perceived challenge is the assessment and monitoring of the performance of incubated businesses. Thus, it is essential to develop and implement systematic evaluations to measure the impact of those efforts.

15. SUCCESS FACTORS

The success of the different strategies implemented at Tecnologico de Monterrey have been due in part to:

- High level of commitment from university authorities and professors
- Active implementation of strategies



- Entrepreneurship focus of many of the university activities
- Internationalisation as a university strategy which exposes students and faculty to different entrepreneurial cultures

16. TRANSFERABILITY

Tecnologico de Monterrey transfers the Entrepreneurial Program model to other higher education institution or civil society organisation that may be interested in implementing a similar program.



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19. KEYWORDS

Entrepreneurship education, entrepreneurial university, Latin America

20. PUBLIC CONTACT DETAILS

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GENERAL COURSE ON INTELLECTUAL PROPERTY: AN EXAMPLE OF DEVELOPING EFFECTIVE AND SUSTAINABLE E-LEARNING COURSE IN BRAZIL

By Maria Helena de Lima Hatschbach, Adriana Castello Guimarães and Araken Alves Lima









1. SUMMARY

The enactment of Technological Innovation Law in Brazil, in 2004, created better conditions for university-industry interaction. Such interaction, however, requires a structured environment to give legal certainty to transactions involving intangible assets, and intellectual property rights are a key factor in these processes. This legal act increased the demand for training in intellectual property (IP) all over Brazil. Due to Brazil continental dimensions, the Academy of Intellectual Property Innovation and Development, of the National Institute of Industrial Property of Brazil - INPI, in partnership with the Academy of the World Intellectual Property (DL101P-BR) to respond to this demand. The use of instructional tools and web resources has been chosen for the implementation of a program of basic and comprehensive training in IP in Portuguese language, for a wide and diverse audience, which includes college students, teachers, professionals, entrepreneurs, researchers and government agents.

2. BACKGROUND

The National Institute of Industrial Property (INPI) was created in 1970 as the successor of the National Department of Industrial Property of the Ministry of Industry and Commerce. At that time, INPI was established as the entity responsible for managing the grant of Industrial Property.

Since this period, changes occurred in the international economic scenario. In four decades of its existence, INPI's mission has become more sophisticated and complex. Immaterial assets started to occupy the core of globalized economy, increasingly dependent on efficient systems for its appropriation and commercialization. In such a context, institutions that manage intellectual property have been undergoing reformulations.

In the context of a knowledge economy, the role of an Intellectual Property Office goes beyond examining and granting of intellectual property rights. An important goal is to use the Intellectual Property System as a tool for capacity-building and enhancement of competitiveness of firms and nations. In this sense, the Brazilian Industrial Property Office established, in 2007, the Academy of Intellectual Property, Innovation and Development to introduced an Intellectual Property education policy aiming at fostering capacity-building on these themes to the main agents of the university, businesses and industry.

The main activities of the Academy are short-term courses and workshops on IP issues and related topics; Intellectual Property and Innovation master and doctoral programs. In order to reach a broader audience in all regions of a country like Brazil, with continental dimensions, the Institute has been implementing actions and seeking partners for the development of training and educational activities in distance learning education.



In this sense, under the Technical Cooperation Agreement between the INPI and the World Intellectual Property Organization (WIPO), in 2010 the INPI Academy and WIPO Academy initiated the development of distance learning courses. As one result of this partnership, the Online General Course on Intellectual Property - DL 101P BR was developed and implemented, in order to respond the specifics needs and features of Brazilian public.

3. OBJECTIVES

- Meeting the growing demand for IP courses.
- Reaching people of all regions of Brazil.
- Reducing the displacement of experts from INPI's technical areas.
- Allowing access to IP knowledge to as many people as possible.
- Improve the strategic use of the IP system by residents

4. **RESPONSIBILITY**

The responsibilities for successfully implementing E-learning activities at INPI were anchored at the Academy of Intellectual Property, Innovation and Development (Rio de Janeiro/Brazil).

INPI Academy was responsible for integrating and coordinating the work involving technical experts from all areas of the Institute. These experts developed content and made the tutoring of students.

The WIPO Academy team provided training on methodology for the development of new content, on the use of Learning Management System - LMS, on the management course and on the tutoring of students. They are also responsible for developing, hosting and give technical support to the Learning Management System.

An important role was attributed to each member of the staff. Each one should be empowered, motivated and involved in brainstorming and decision making processes.



5. STRATEGY & ACTIVITIES UNDERTAKEN

Main action:

Implementation of Online General Course on Intellectual Property -DL 101P BR.

Course features:

- ► Fully online
- Free of Charge



UIIN GOOD PRACTICE SERIES Case study written by Maria Helena de Lima Hatschbach, Adriana Castello Guimarães & Araken Alves Lima www.uiin.org • 14 content modules:

Guide / I.P Introduction / Copyrigth / Trademarks / Geographical Indications / Industrial Design / Patents / International Treaties / Unfair Competition / New Varieties of Plants / Technological Information / Technology Contracts / Debates / Final Exam

- Workload: about 75 hours
- Length: Available for 40 days
- Tutoring from Brazilian experts in Intellectual Property
- Certificates to successful students in the Final Exam

Steps to course development:

1-Trainning (by WIPO Academy) of the multidisciplinary INPI's team on:

- LMS (E-Learning platform for IP courses) administration
- Elaboration of course content based on the specific methodology (Bloom's Taxonomy)
- Tutoring students

2- DL 101P BR coordinator at INPI:

- Planning and coordination of activities that precede the launch of the course.
- Development and monitoring the work schedule of the experts involved in the project.
- > Standardization of the course modules format.
- Intense contact and information exchange with the staff of WIPO Academy.
- Service to students on administrative issues.
- Monitoring of tutors.
- Preparation of management reports.

3- Realization of the course:

- Release
- Students enrollment period
- Accomplishment (study of modules and tutoring)
- ▶ Final Exam
- Evaluation and adjustments

6. MONITORING AND EVALUATION

Regular meetings were held with the coordination, tutors and course administrators to evaluate and improve aspects related to the content, technical issues, interaction between tutors and students, interaction between students and administration. Coordination in INPI



and WIPO Academy team maintains constant communication to prevent that technical or organizational problems hinder the progress of the students. At the end of each edition of the DL 101P BR, students answer an evaluation questionnaire about the expectations of students regarding the course, courseware and methodology, the support given by tutors and course administrators.

7. SUSTAINABILITY MEASURES

To ensure the maintenance and success of the project is important as some actions: the constant training of technical and administrative staff; continuous updating of course content; implementation of DL 101P BR as an optional subject in the curricula university courses; diversify provision of new programs; establishing new partnerships.

8. COSTS

This course is conducted based on partnerships between the institutions involved. Operations related to the development of this project are expected to be covered by the INPI and WIPO, as established in the Cooperation Agreement. Each institution contributes with experts, technological infrastructure, consumables and other necessary resources.

9. FUNDING

The budget of the INPI is set by the Ministry of Development, Industry and Trade - MDIC through annual budget Law.

OUTCOMES & IMPACT

10. OUTCOMES

Some of the main results of DL 101P BR (2012 – 2013) are specified at Tables 1 and 2.

	1 ^a Session	2 ^a Session	3 ^a Session	4 ^a Session
	(2012/01)	(2012/02)	(2013/01)	(2013/02)
Students who accessed at least once the course	1.752	2.027	2065	2.011
Students who made the Final Exam	1.014	1.222	1.265	1.188
Students who passed the Final Exam	932	1.062	1.100	1.130

Table 1: DL 101P BR - Qualified Students



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Percentage of students passing the Final Exam	91,9%	86,9%	87,0%	95,1%

Regions of Brazil	1ª Session (2012/01)	2 ^a Session (2012/02)	3ª Session (2013/01)	4ª Session (2013/02)	TOTAL
North	30	45	44	24	143
Northeast	161	237	206	259	863
South	177	353	389	196	1115
Southeast	472	369	400	462	1703
Midwest	88	54	58	84	284

Table 2: Successful Students by Region of Brazil

11. IMPACTS

As can be seen in Tables 1 and 2, the DL 101P BR maintains an average of 2000 students per issue, from all regions of Brazil. The highest concentration of students, however, is from the Southeastern and the South states. 90% of students who took the final exam have passed the test, which could demonstrate the effectiveness of the methodology used. In this sense, the course is presented as a training opportunity for those interested in acting, somehow, in the institutions of the Brazilian's innovation system.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Firstly, students are the main beneficiaries of the course, as they participate in a training that offers the following benefits:

- Free of charge education.
- Portuguese language.
- Specialized content.
- Brazilian's case studies, legislation and examples.
- Personalized tutoring done by experts.
- Exclusive social network

A second group of beneficiaries are the universities and research centers, which require staff with specific skills to work in Technological Innovation Centers - NIT. The NIT, according to the Law of Technological Innovation of Brazil (2004), is responsible for managing the intellectual property policies of scientific and technological institutions. Among its main functions stand out: to support researchers in protecting the results of their research; stimulate research and work according to technological innovation policy of the institution; interaction with the public sector; prospecting partners for technology transfer.



Another group of beneficiaries is the industries and companies, since the greater the knowledge of intellectual property by society, better is the communication established between all actors of the national innovation system.

13. AWARDS / RECOGNITION

Given the short period of implementation of this distance learning program, the project was not still submitted for prizes of academic recognition.



14. PRIMARY CHALLENGES

- Shortcomings of the Brazilian educational system, once the strategic use of IP needs an education system structured to create technological innovation and to appropriate its results;
- Lack of awareness about intellectual property in various academic levels;
- High turnover of human resources in sectors related to IP management;
- Most researchers concentrated on public universities;
- Need for better interaction between university industry;
- Lack of private investment in innovation and in appropriation of its results;
- Regional disparities, which generate different knowledge needs in IP, making it difficult to build a course that specifically meets all these demands;
- Need for build studies on IP education that reflect Brazilian reality and that can contribute to develop IP teaching tools in terms of the specificity of developing countries.

15. SUCCESS FACTORS

The use of new Information and Communication Technologies has greatly contributed to the spread of Intellectual Property and Innovation, especially in a country of continental dimensions like Brazil. The creation of collaborative networks, the use of online communication tools, the training through distance learning and the establishment of national and international partnerships have intensified the exchange of information to raise awareness about the importance of intellectual property to technological, economic and social development.

16. TRANSFERABILITY

The case presented provides significant insights for establishing institutional partnerships to join efforts for the development of training activities that can connect Academy with industry, small and medium enterprises, research centers and society in general. One of the



expected results with this initiative is that with the recognition and proper use of intellectual property by agents of the innovation system, the country can reaching more favorable conditions for technology transfer, generating a consequent social gain.



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19. KEYWORDS

Intellectual Property, E-learning, Brazil, INPI, WIPO, Training, Tutoring, Innovation, University, Worldwide Academy, International, Interdisciplinary, Interactive

20. PUBLIC CONTACT DETAILS

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TARRACOLAB PROJECT: How to increase Job opportunities of Vocational School Students by Means of Increasing Their Creative Skills

By Marta Segura Bonet, Joan Ras Jansà, Ignasi Clos Bítria and Patricia López García



GENERAL INFORMATION

TITLE OF THE CASETarracolab projectSALES PITCHHow to increase job opportunities of vocational school students by means of increasing their creative skills.ORGANISATIONS- SOC (Catalan Occupation Service, Government of Catalonia) - CEPTA (Confederació d'Empresaris de la Provincia de Tarragona) - INDUCT SEA, SL - AUREN - ESCI-UPF International Business - Tarragona City Council - El Vendrell City Council - Valls City Council - Valls City Council - Valls City Council - Spanish vocational schools and 1 Danish vocational school: - Andreu Nin Institute (El Vendrell) - Calupolis Institute (Tarragona) - Escola d'Hoteleria (Cambrils) - Jaume Huguet Institute (Tarragona) - Vidat i Barraquer Institute (Tarragona) - JoensCOUNTRIESSpain Denmark December 2013AUTHORSMarta Segura Bonet Joan Ras Jansà Ignasi Clos Bitria Patricia López GarciaNATURE OF INTERACTION Ø Academic mobility © Student mobility © Student mobility © Student mobility		
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	NATURE OF INTERACTION	 ☑ Collaboration in R&D ☑ Academic mobility ☑ Student mobility ☑ Commercialisation of R&D results in science



- ☑ Lifelong learning
- ☑ Curriculum development and delivery
- ☑ Entrepreneurship
- □ Governance
- □ Other

SUPPORTING MECHANISM

- Strategic instrument
 Structural instrument or approach

 - ☑ Operational activity
 - ☑ Framework condition





1. SUMMARY

Tarracolab Project was carried out (during 2013) in the province of Tarragona, Catalonia (Spain) and it has been focused in increasing job opportunities of vocational school students by means of fostering their creative skills.

Tarracolab Project has involved several agents belonging to both private and public sector: municipalities of Tarragona, Valls, El Vendrell and Salou; 8 vocational schools; 4 companies, and with the support of International Business School of the Pompeu Fabra University (ESCI-UPF), consultancies (Induct and Auren) and a business association (CEPTA).

2. BACKGROUND

The context in which the Tarracolab Project must be analysed is that of the virulent Spanish Economic Crisis, which has had an specially dramatic impact in the Spanish Labour Market. In 2013 there was more than 6 million unemployed people in Spain (an unemployment rate of more than 26% of the active population). But the worst collective facing occupation opportunities are that involving young people. In such case, the overall unemployment rate (from 16 to 25 years) was more than 50% and it was focused, mainly, in young people without specific formation.

Finally, in Catalonia, the most affected province by the impact of youth unemployment is Tarragona. In such a context, it seemed interesting to implement a project that could introduce new skills in vocational school students in order to foster their attractiveness in the labour market. It was important to involve different agents in this challenge: City Councils, companies of the Tarragona province and, the most important, a group of several vocational schools that believed in such innovative initiative.

3. OBJECTIVES

Tarracolab Project has been focused in allowing two main objectives:

- To increase opportunities of young people who are studying in vocational schools.
- To stimulate the creative skills of the students, in order to complement their management skills acquired in formal studies.



4. **RESPONSIBILITY**

PARTNER	RESPONSIBILITY	DESCRIPTION OF ACTIVITIES
SOC, The Catalan Occupation Service, (Government of Catalonia)	Fund the project	Funding External control
CEPTA	Institutional organization	Administrative and organizational support
INDUCT SEA, SL	Organizational and training leadership	Organization of creative sessions with teachers, companies and students Maintenance of Tarracolab blog (www.tarracolab.cat) and active participation in social networks. Parametrization, dinamization and management of Tarracolab Open Innovation Community (tarracolab.induct.no)
ESCI-UPF	Start Up Event	Organization of Start Up Event (10-12 November 2013), preparing three different sessions: Business Model Development, Design of the Product and Project Communication.
AUREN	Consultancy	Consultancy tasks
COMPANIES	Launch challenges and recognition of talent	They have to identify different problems that could be overcame in the Tarracolab Project. With the help of Induct' consultants, the involved companies defined several challenges to launch to the innovation community
CITY COUNCILS (Tarragona, Valls, El Vendrell i Salou)	Local economic development and territorial leadership	The four involved City Councils fostered the Tarracolab Project inside their organizations. Three of them (Tarragona, El Vendrell and Valls) also launched different challenges to the innovation community.
VOCATIONAL SCHOOLS	Participation	Seven vocational schools of Tarragona, El Vendrell, Valls and Cambrils have participated in the project by means of providing: The possibility of integrating the Tarracolab Project into their curriculum Academic support of 1 or 2 teachers of each institute Their facilities (mainly in the case of Pere Martell Institute in which buildings had been developed most of the off line creativity sessions)





5. STRATEGY & ACTIVITIES UNDERTAKEN

Tarracolab Project was divided in three different phases:



CHALLENGES

Identify the challenges that municipalities and companies had to launch to students We did 4 workshops by means of bring together companies, City Council experts and teachers, with the goal to find out challenges of markets or cities. In these workshops we used different methodologies: Osterwalder canvas, work café, brainstorming or CPS, in order to identify, define and refine those challenges. Finally, we selected 11 different challenges, 5 from companies and 6 from cities.

IDEAS

- In this phase we trained teachers and students in creativity techniques, we did creative workshops with students in order to generate ideas for our challenges.
- We created an on line open innovation community, located in Induct platform, in order to record those ideas, and to foster collaboration among students and companies. In the platform students shared and improved ideas, with the support of Tarracolab Staff. We collected almost 1,000 ideas! In one month.

PROJECTS

- Choosing the best ideas to give them more content by means of several creativity workshops (pains and gains, costumer's journey map, prototyping...).
- Teaching entrepreneurship conferences (3 days Start Up Event) to the set of students who promoted the top 10 ideas, in order to set the business plan associated with each.



6. MONITORING AND EVALUATION

We have taken into account the following set of indicators:

- Number of vocational schools participating in the project.
- The minimum number in order to make the project feasible was three and we allowed involving 7 Spanish vocational schools and 1 Danish center in the project.
- Number of teachers participating in the project.
- A set of 15 teachers has formed in creativity items in order to be able to advisory their group of students.
- Number of students participating in both off line and on line sessions: more than 500 students
- Number of students actively participating in the open innovation platform: more than 150 students.
- Number of ideas proposed by students to solve the challenges launched by entities: more than 900 ideas.
- Number of public administrations involved in the project: 4 city councils, the Catalan Employment Service (SOC, the entity that has funded the most important part of the project), the biggest business association in Tarragona (CEPTA).
- Number of challenges launched: 11 challenges proposed by 7 different entities (3 city councils and 4 companies).
- Territorial scope of the project.
- Number of ideas that successfully overcame the innovation process.
- Number of participants in the final Start Up Event.
- Students' valuation.
- Vocational schools' valuation.
- > Students' mobility generated by the project.
- Number of ideas that can be developed in the framework of new business models.

7. SUSTAINABILITY MEASURES

The Tarracolab Project is going to continue. The satisfaction levels achieved by all actors involved are very high. The project has managed to bring the needs of the business world with vocational schools, while increased creative skills of the students.

Vocational schools involved in Tarracolab Project are internalized creative skills in the curriculum of several subjects.

Moreover, the Tarragona City Council will lead the second edition of the project, involving the same group of vocational schools, different companies, entrepreneurs' networks and other local administrations.

Also, there will apply a new entrepreneurial program focused in the group of students who provided the most interesting ideas in the initial part of the project. The main goal is to be able of creating new business models around such winner ideas by means of providing specific coaching (both individual and collective) to these group of students.



8. COSTS

The total cost of the project has been of 133.463,60 €. Its distribution between different cost elements is as follows:

- Labour costs: formation and consultancy
- Material
- Open innovation platform (Induct©)
- Mobility
- Blog and social networks interaction
- External consultants
- Elaboration of a book (both a printed and a digital edition) that explained Tarracolab Project

Each specific phase of Tarracolab Project included workshops and seminars, community management of open innovation and diffusion of both seminars as news of the progress of the project through social networks.

PARTNER	ACTIVITIES
CEPTA	 Institutional organization
INDUCT	 Consultancy tasks
	 Formation
	 Organization of creativity sessions
	 Parameterization and maintenance of open innovation platform
	 Blog and social networks dinamization
AUREN	 Consultancy tasks
	 Participation in creativity sessions
ESCI	 Participation in creativity sessions
	 Development of the Start Up Event

In the budget of Tarracolab Project, over 50% were destined for workshops and seminars. This is understood by the fact that to carry out this project, it was to train the participating companies and the tutors and students. One goal of this project is to identify which areas of knowledge that we need to incorporate into the curriculum of vocational schools to be in the line of the labor market needs of today.

Another very important item of the project budget was the dissemination of the project through social networks. Today, we must recognize the fundamental role of such networks and cannot work around them. Networks are not only the witness the progress of the project but also about its impact thanks to the numerous visits to the web page and the comments on Facebook and twitter. The third item of the budget was allocated to the management of the open innovation community, through the Induct platform.

The most time consuming activity has been that of validating the whole set of ideas offered by students to the different challenges launched by entities.

9. FUNDING

The initial availability of the Tarracolab Project has been guaranteed thanks of a grant from the Catalan Occupation Service (SOC, Servei d'Ocupació de Catalunya) (ORDRE EMO/312/2012, de 8 d'octubre, per la qual s'estableixen les bases reguladores que han de regir



la concessió de subvencions per a projectes innovadors i experimentals cofinançades pel Fons Social Europeu i s'obre la convocatòria per a l'any 2012), which had financed it by means of using funds coming from European Union (European Social Fund).

Actually, two official entities have allowed conducting Tarracolab Project, the European Social Fund and the SOC.

The European Social Fund (ESF) is the European main instrument in order to supporting jobs, helping people get better jobs and ensuring fairer job opportunities for all EU citizens. It works by investing in Europe's human capital – its workers, its young people and all those seeking a job. These goals are at the core of the Europe 2020 strategy for generating smart, sustainable and inclusive growth in the EU. One priority is to boost the adaptability of workers with new skills, and enterprises with new ways of working, by helping young people make the transition from school to work, or training less-skilled job-seekers to improve their job prospects.

The ESF provides an investment in the human capital of Europe - workers, young people and all those seeking a job according to the objectives of the Europe 2020 Strategy to generate smart growth, sustainable and inclusive European Union: to help workers and help people from disadvantaged groups to gain new skills, and create new ways of working, knowing that employment has an important role to help people integrate better into society.

The SOC, like the EFS, has a same goal, serves individuals, businesses and territories in areas affecting employment and local development and aims to promote quality jobs, equal, to contribute to social cohesion and competitive development of Catalan companies.

The SOC is the intermediate agency of the operations financed by the ESF Programme of Community Intervention in Catalonia for the years 2007-2013, for the regional competitiveness and employment. SOC is responsible in Catalonia of the management and implementation of ESF resources.

The amount of the grant has been of 100.097,70 \in , that is, participating entities has cofinanced 33.365,90 \in (in is worthwhile to mention the disinterested participation of ESCI-UPF in the project).



10. OUTCOMES

Until then, the Tarracolab Project has achieved the following milestones:

- 8 vocational schools involved in the project (7 from Tarragona, Spain, and one from Viborg, Denmark).
- 7 public and private entities launching challenges.



UIIN GOOD PRACTICE SERIES Case study written by Marta Segura Bonet, Joan Ras Jansà, Ignasi Clos Bítria & Patricia López García www.uiin.org

- A set of 11 challenges launched to vocational schools' students.
- The introduction of cooperative processes between 8 different institutes.
- ▶ 15 tutors trained in methods of creativity, innovation and entrepreneurship.
- More than 500 students participating in ideation workshops.
- More than 300 students participating in open innovation platform associated to www.tarracolab.cat.
- More than 900 ideas contained in the ideation phase.
- ▶ 50 student's teams in the prototyping session.
- 10 finalists' teams participating in the Start Up Event.
- More than 40 students participating in the Start Up Event.
- Reward and recognition elements: several prizes for students, tutors and institutes participating in the project (depending on success, participation and creativity items).
- Collaboration with Mercantec House of Technology (vocational training center in Viborg, Denmark). With the appropriate use of English in some of the workshops held.
- ▶ 7 ideas for potentially exploitable entities launchers of challenges (and which will have a special support during 2014 in order to make them viable as new business models).
- Creation of a database of innovative talent of almost 300 students.
- The edition of a book explaining this experience (both in digital and press editions)

11. IMPACTS

There has been more benefits than disadvantages in Tarracolab Project:

BENEFITS

PARTICIPANTS	SHORT TERM	LONG TERM
Vocational	Visibility in front of Catalan Education	Reputation
Schools	Department	
	Acquisition of new creativity techniques	
Students	Acquisition of creativity skills Interaction with companies and municipalities 5 students got a job in Denmark 3 of these projects found a sponsor in order to be developed	Increase of their occupation opportunities
City Councils	Participation in an innovative initiative	Territorial development
Companies	Participation in an innovative initiative Identification of talent	Selection of future job force



DISADVANTAGES

PARTICIPANTS	LIST OF DISADVANTAGES
Vocational Schools	Difficulty to integrate such initiative in the academic schedule
Students	More academic activity
City Councils	Time consuming activity
Companies	Time to dedicate to students

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

We believe that the whole set of agents involved in Tarracolab Project have obtained interesting advantages from participating in it.

- Tutors: they have been formed in different creativity techniques that can be useful in the curriculum of the vocational schools where they are working. Moreover, they have been able of accrediting as training (to Catalan Department of Education) part of the efforts they have spent on Tarracolab Project.
- Students: they have been formed in creativity skills (both innovation and entrepreneurship), in order to complement management skills they are obtaining in vocational schools. With such type of abilities they could increase their availability of obtaining a job.
- Companies: they have participated in an innovative project that stimulates creativity of their potential work force. Moreover, the participating companies had been access to innovative ideas that can improve their opportunities in the market.
- City Councils / Municipalities: they should contribute to promote the talent of the youth. Tarracolab Project has been a good initiative to allows for it.
- Society / Citizens: in general, it results interesting to improve the potentialities and skills of a part of the future work force.
- ESCI-UPF International Business: it has been refreshing to collaborate with groups of students and tutors different from those that usually interact with this university.

13. AWARDS / RECOGNITION

November 28th 2013: Presentation of the case associated with the Tarracolab Project in the 2013 Innovation Event organized by Department of Education of the Catalan Government (Jornada d'innovació, empresa i pràctiques de referència en la formació professional, Barcelona).



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14. PRIMARY CHALLENGES

There have been several challenges and barriers to overcome before implementing Tarracolab Project:

- 1. The critical macroeconomic situation, especially in Spain, has generated an important decrease of public funds or grants that could help fostering innovative initiatives as Tarracolab.
- The immovable calendar associated to European Commission funds: the whole project had to be implemented in one natural year, that is, 2013.
 And such constraint implied the development of the project in two different academic years: 2012-2013 (January - March) and 2013-2014 (September - December).
 For this reason it has been difficult to ensure the continuity of the same group of students in the first step of the project (before summer 2013) and in its final part.
- 3. The rigidity of academic programs and curriculums in order to insert Tarracolab Project: a formative initiative not considered in the initial vocational schools schedule.
- 4. The initial reluctance of several companies to participate in a new project that involved both academic and practical relationships with vocational schools (companies are more used to cooperate with universities that with other educative institutions).

15. SUCCESS FACTORS

There have been several factors that have contributed to the success of Tarracolab initiative:

- 1. Commitment of the four City Councils involved in the project. It is worthwhile to mention special sensibility of *Tarragona Impulsa*, an entity depending of Tarragona Municipality that foster both young occupation and entrepreneurship.
- 2. The financial support of the Catalan Occupation Service (SOC) and the help provided by this institution in both organizational and administrative processes.
- 3. The contagious enthusiasm of the participating students and their teachers of the 8 vocational schools involved in the project (Andreu Nin Institute, Cal·lípolis Institute, Comte de Rius Institute, Escola d'Hoteleria de Cambrils, Jaume Huguet Institute, Pere Martell Institute, and Vidal i Barraquer Institute, in Catalonia Spain and Mercantec House of Technology in Viborg, Denmark).
- 4. The leadership of the management team of these 7 vocational schools that decided to join Tarracolab Project despite of uncertainty (it was a pilot experience) and difficulties to integrate a new initiative in a rigid curriculum.
- 5. The commitment of important business associations in Tarragona (CEPTA, SECOT) with the project.
- 6. The disinterested participation of ESCI-UPF (International Business) in the project by means of the organization of the final Start Up Event.
- 7. The leadership, availability and commitment of both Induct SEA and Auren consultants.
- 8. The kind usability of Induct Platform that has been crucial to ensure the success of the on line participation and managing innovation processes.



16. TRANSFERABILITY

Tarracolab project is fully transferable to:

- Other territorial communities involving vocational schools, companies and public institutions (both regional and/or local administrations)
- Similar programs involving different typologies of students (high school students, undergraduate students, postgraduate students...)
- Formation programs addressed to increase labour opportunities of unemployed worker.



17. PUBLICATIONS / ARTICLES

By the moment, the main option to obtain more details of the Tarracolab project is to visit the web site: www.tarracolab.cat

Moreover, the whole experience of the project has been collected in a forthcoming book (both in digital and press editions).

18. LINKS

www.tarracolab.cat

19. KEYWORDS

Young unemployment, public-private collaboration, innovation, entrepreneurship, vocational schools, creative skills

20. PUBLIC CONTACT DETAILS

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MATERIALS AND MTAS MANAGEMENT TOOL FOR UNIVERSITIES: How to manage materials and mtas for promoting scientific research

By Katsuya Fukami, Ai Sumikawa, Yuka Suetsugu and Yuki Hanada





TITLE OF THE CASE	Materials and MTAs Management Tool for Universities
SALES PITCH	How to manage materials and MTAs for promoting scientific research
ORGANISATION(S)	Kyushu University
COUNTRY	Japan
DATE	February, 2014
AUTHORS	Katsuya Fukami, Ai Sumikawa, Yuka Suetsugu, Yuki Hanada
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	☑Strategic instrument ☑Structural instrument or approach ☑Operational activity □ Framework condition




1. SUMMARY

In 2008, the Material Management Center (MMC) at Kyushu University (KU) established a web-based system to manage materials and Material Transfer Agreements (MTAs). The system was subsequently updated and improved in October 2012. All researchers at KU use this website for material transfers whenever they receive or send materials. All actions regarding the materials transfers are then recorded on the website server. Thanks to this system, researchers can now see the progress of an MTA, as well as the final, fully executed MTA on the website. Moreover, MTAs can be downloaded on the site. This system is also useful for the managers of intellectual property rights. The novel tracking system of MTAs on the website showcases materials created at KU in the course of research. Exhibited materials can be ordered via the website by interested parties. At present, roughly 700 materials are registered and 300 materials are displayed on the website. Some of the materials are sold on the website to researchers who belong to academia and private sectors, making the showcase an effective tool to obtain research funds as well.

2. BACKGROUND

Kyushu University (KU) was founded in 1911 and is the 3rd oldest national university in Japan. KU has about 2,300 faculty and 3,000 staff members. KU faculty includes departments of medical sciences, pharmaceutical sciences, life sciences, agriculture, engineering and hospital sciences. Therefore, many biological resources are maintained and created in the course of research conducted at KU. Many biosciences researchers exchange materials in order to further their research.

Materials are essential for conducting research, especially when using mice, cell lines, microbes, etc. for biological science. In order to perform and verify experiments to generate data for research papers, scientists need to be able to obtain necessary materials from other institutions. MTAs regulate the transfer of materials, in which ownership of the materials and modifications, prohibition of transfer to third parties, escape clauses, etc. related to the materials are described.

The problems related to MTAs lie in the complexities of the terms of MTAs depending on the type of materials being transferred, the stage of research underway and the domestic situation of the countries involved. Due to these complexities, time efficiency has been an ongoing problem. When researchers cannot obtain materials in a timely manner, they are consequently forced to discontinue their research. In addition, providers and recipients often lose track of MTAs after sending or receiving them. As MTAs include information regarding ownership, production details, etc., they are important documents for patent applications when scientists create new products using existing materials. Missing MTAs can be a huge hassle for material recipients when they are ready to apply for patents. One of the key issues regarding MTAs pertains to management of restrictive terms. This is often a problem when new products are created with materials obtained from others using an MTA.



New materials are being created and collected at research universities worldwide. However, many materials remain unutilized in laboratories even if they may have tremendous potential for the basic research or applied science of others. This is because there is no place to exhibit these materials to other researchers and companies. Once the technical reports describing unique materials are published, these materials are requested to confirm results and material usage. Actually, the few showcases for the materials in universities do not exist except the above-mentioned cases.

An effective system for managing MTAs and materials is desirable both to prevent the discontinuation of research due to insufficient material accessibility, and to make new materials available to the greater scientific community.

3. OBJECTIVES

Our objectives for creating the website are to improve transaction time efficiency of MTAs, to increase the amount of materials shown on our website for researcher information access, and to mediate collaboration of materials between provider and recipient.

The primary goals are:

- To use the website to simplify the process of obtaining research materials by establishing a central management system with defined material transfer policies and easy-to-sign MTA drafts
- To make materials showcased on the website available for other researchers in order to further their research pursuits.
- ➤ To use the website as a medium to establish an expansive database for showcasing available research materials so that academia-academia and academia-private sector collaborations can be promoted

4. **RESPONSIBILITY**

The Material Management Center (MMC) at Kyushu University played a main role in the creation of this project. MMC consists of two parts as follows:

- 1. Material Development Team (MDT)
- 2. Material Collaboration Network (MCN)

MDT assists in managing material transfers, MTA completion and paper work, creating the MMC website, and improvement of the website. Additionally, MDT reviews and revises material transfer policies, which refers to rules pertaining to material transfers in a situation-appropriate manner determined by university staff and administration on both ends of a sender-recipient MTA. The director of MMC has been appointed by the president of Kyushu University as the designated signer of MTAs. As such, KU gives MMC the authority to sign agreements and make decisions regarding material transfer rules and policies.

MCN is a collaborative network regarding material transfers at Kyushu University, which consist of multidisciplinary KU researchers within the faculties of medical sciences, pharmaceutical sciences, life sciences, agriculture and engineering. MCN plays a role in observing MDT's activity and outcome through annual meetings. MCN also has a role in



supporting MDT activity via information of the MMC system, material transfer rules and policies, seminars and symposiums related to material transfers, etc. to colleagues.



& FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The technical writing comprising MTAs is complex and can be difficult to understand, particularly in terms of how to conduct research using patented materials without future legal issues or lawsuits. Therefore, MTAs can be a hindrance to researchers trying to obtain the necessary materials for their research.

To solve this problem, we decided that the central management system of the material transfer to MMC needed to be regulated. We started by improving the material transfer policies at Kyushu University. Next, we updated the web system to handle incoming and outgoing MTAs, and we are currently in the process of creating automated incoming/outgoing MTA checks. Furthermore, we aim to make the website user-friendly in order to make the system accessible to researchers.

Additionally, we plan to create a web function to display the status of materials throughout the process of ordering. For example, registration of the material and MTA application could be found through this web function, so that other researchers can easily identify desired materials and contact a person who is in charge of the material transfer.

Through use of this system, our website will help researchers access materials to further their work in creating new technology worldwide.

6. MONITORING AND EVALUATION

After the website launch in 2010, MMC staff continues to oversee MTAs via paperwork of applications by researchers at Kyushu University.

This work includes counting the number of completed MTAs, recording the day of completion, and recording the number of the materials registered. Based on the data, staff members discuss how and where improvements to the web system should be made and identifying what the most time-consuming aspects of the MTA process are.

7. SUSTAINABILITY MEASURES

As far as sustainability measures of MMC, we apply Plan-Do-Check-Act Cycle shown in Fig 1 and mentioned in section 6. Additionally, we promote our activities by providing information pertaining to our system and regulations regarding MTAs several times per year.

Promotional activities include symposiums related to material transfer. Japanese government officers, government officers and researchers from foreign countries, and researchers from private sectors are invited to our annual symposium.



Periodically we receive claims from website users (KU researchers), and the claims are thoroughly discussed in our monthly meetings. We are always looking for ways to optimize our website for the management of MTAs.



Figure 1. PDCA cycle at MMC

8. COSTS

Our main costs are website construction and staff costs. We currently employ 3 staff members. Our total annual cost is 0.24 million USD, and the web construction cost including maintenance is approximately 40 thousands USD.

9. FUNDING

We have three funding sources for MMC activity listed below:

- 1. Steady funding through the Ministry of Education, Culture, Sports, Science and Technology of the Japanese Government
- 2. Unsteady funding through a portion of licenses of the material and technology transfer
- 3. Donations and funds from the joint research projects of private sectors



10. OUTCOMES

A. MMC website

MMC has established the MMC website, on which researchers can register the materials, apply for material transfers to or from outside of KU and manage MTAs by MMC and



researchers (Fig. 2). The materials registered can be exhibited on the website showcase and can be easy to access the materials as well (Fig. 3).



ebsite (http://www.mmc-u.jp/en/)

Figure 3. Result of searching for the materials

B. The number of MTAs managed by MMC

The total number of MTAs including incoming and outgoing MTAs is increasing yearly and the operations of the material transfer system are running smoothly (Fig. 4) The website is becoming increasingly user-friendly and the completion speed of MTAs is faster than in previous years. Since our technology continues to improve and total number of annual MTAs is increasing, we can safely assume our user base is expanding as well.



Figure 4. The number of the incoming and outgoing MTA

C. Number of registered materials

Before applying for a material transfer to outside of KU or from outside of KU, researchers must register their materials complete with required information. At that time, researchers can choose whether or not the material will be open to use. The materials that are not open to use for outside researchers are under direct control of the research group under whom it is registered.

The number of registered materials is increasing annually (Fig. 5 and 6) and this increase implies a higher rate of collaboration between academia and/or private sectors.





Figure 5: Number of open materials.



D. License agreement number

Materials are occasionally licensed to private companies with paid-up royalty or running royalty. The number of materials with running royalty is increasing yearly due to the demand for materials created at KU with special characteristics, such as antibodies (Fig. 7).

These distinct materials are sold by regent makers and can be easily found on our website for additional information and simple ordering.



Figure 7. Number of licensed agreements with private companies.

11. IMPACTS

The MMC website is the only website that manages materials and incoming/outgoing MTAs and showcases materials created by KU researchers. Institutions such as the NIH and some universities have websites that list their materials (research tools), but are not able to automate MTA management. Recently, some US universities have developed websites capable of signing MTAs automatically; however these sites lack functions for management of incoming MTAs and showcasing of materials systems.

As we continue to improve the efficiency of our website, the number of participating universities are increasing. Currently, six universities participate in our web-based materials system including KU. MMC intends to continue to increase the number of participating universities.



12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

MMC

Benefits of MMC include increasing the chance of materials licensing by private sectors that sell the materials on behalf of the University and decreasing the chance of legal issues with the provider. The technology transfer office can obtain records of materials from our website to perform legal checks whenever patents are applied for that include or incorporate registered materials.

Researchers at Kyushu University

Benefits to KU researchers include obtaining desired materials in a timely manner and being able to provide their materials to co-workers in the academic community. Additionally, the chance to obtain royalty through materials licensing is increased. Although the researches have to input data on the website when they obtain or provide materials, they can do so at their own convenience since the MTA office is accessible through the website.

Researchers outside Kyushu University

Researchers outside KU can obtain the materials they need with the benefit of a simplified MTA system not found anywhere else.

Private sectors

Private sectors have an opportunity to sell desirable research materials that can be displayed using our web showcase. For example, regent makers are currently selling specific monoclonal antibodies created by KU researchers on our website.

LESSONS LEARNED

13. PRIMARY CHALLENGES

The main challenges in the implementation of this case are:

A: Opposition met towards changing university policies related to MTAs and creating a materials central management system

Previously, MTAs were signed in each laboratory or faculty office where material transactions were taking place. Their switch to a central management system of material-related issues was therefore met with a degree of antipathy. Currently, MMC occasionally tries to introduce this web system to KU researchers so that they can understand the importance of MTAs completion and issues.

B:Technicalaspects of website design in order to implement such a system.

No website for central materials management existed before MMC created this site. We have to start construction of the philosophy and scheme of the process to register the materials and apply the material transfer actions.



14. SUCCESS FACTORS

The MMC system is constructed in such a way that first-time users can use the site easily without reading the on-site user manual or wasting time inputting data.

In the course of the establishment of this system, staff members are learning detailed MTA terms and how we improve clauses within MTAs. As our experience with MTAs grows, the speed to complete MTAs is becoming more and more time efficient. The manpower training on the job is also a factor to success.

15. TRANSFERABILITY

This case can be transferable through use of our website, which can be accessed anywhere in the world. Regrettably, our current website does not have English and other language versions available at present, but can be updated upon request.

MTA drafts can be transferred and discussed with EU institutions in order to create an appropriate MTA agreement to assist in the smooth exchange of materials.

FURTHER INFORMATION

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17. LINKS

http://www.mmc-u.jp/en/

18. KEYWORDS

Material Transfer Agreement (MTA), Material transfer, Intellectual property, Material management tool, Collaboration between academia and private sector



19. PUBLIC CONTACT DETAILS

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PARTNERING FOR THE FUTURE: An Approach to developing a long term Academic industry partnership using a Relationship management framework

By David Kirk and Liam Nolan





TITLE OF THE CASE	Partnering for the Future: A Case Study in Building Long Term Academic Industry Relationships	
SALES PITCH	An example of an approach to developing a long term academic industry partnership using a structured relationship management framework	
ORGANISATION(S)	Dublin Institute of Technology Bord Gais Networks	
COUNTRY	Ireland	
DATE	February 2014	
AUTHORS	David Kirk Liam Nolan	
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Relationship Development 	
SUPPORTING MECHANISM	 ☑ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition 	





1. SUMMARY

A proactive approach to engagement with industry is increasingly forming an integral part of Higher Education Institute strategy. At the heart of this engagement focus is the recognition of the need to transition from shorter term transactional relationships to longer term interactive relationships (Jeffrey, 2009)

Dublin Institute of Technology (DIT), one of Ireland's largest and most innovative third level institutions with a strong tradition in industry engagement recognised this need and sought develop it's relationship management focus with a view to creating an informed, trusting and supportive environment within which mutually beneficial interaction could be progressed.

Accordingly, in 2010, DIT established a Corporate Partnership Network to provide a framework for supporting the development of academic industry relationships through a better understanding of each other's environments. By creating a structured management approach, the Network seeks to facilitate the establishment and fostering of long term industry partnerships and to assist industry achieve their organisational objectives in collaboration with DIT.

Following an accreditation request from Bord Gais Networks (BGN), a leading Irish State owned utility company which develops, operates and maintains the natural gas transmission and distribution networks in Ireland, DIT utilised the CPN as a framework within which to develop the relationship.

Underpinned by a strong commitment from both partners to establish a long term relationship, the Corporate Partnership Network guided the relationship development process resulting in a number of significant deliverables including a Memorandum of Understanding being signed, accreditation of the company's Technical Training Centre and Gas Distribution Supervisior Programme, research collaboration including joint sponsorship of a PhD student and active input into Institute development.

Bord Gais Networks has leveraged the relationship to support key stakeholder management, promote a learning culture within the organisation, grow its awareness of academic/industry engagement and input into strategy development.

The DIT/ BGN partnership continues to serve as a very useful roadmap for DIT as it seeks to develop other relationships with external organisations. It is also helping to inform the ongoing evolution of the Corporate Partnership Network approach itself and how best it might develop to effectively serve all stakeholders.



2. BACKGROUND

Dublin Institute of Technology (DIT) has been an integral part of the Irish higher education system in Ireland for more than one hundred and thirty years and is one of the country's largest and most innovative institutions.

The Institute makes awards at Certificate, Diploma, Degree, Masters and Doctoral levels and has an enrolment of approximately 19,000 students across four Colleges: Arts & Tourism; Business; Engineering & Built Environment; Sciences & Health.

Engagement with industry and the professions is a central tenet of DIT strategy and is integral to it's approach to responding to an ever changing economic and social environment.

However, while DIT has always enjoyed a strong reputation for engagement with business, its interaction has tended to be driven by transactional rather than relational considerations. Compounding this has been the fact that the Institute is spread over thirty eight different locations across the city making it difficult to coordinate and grow longer term relationships with external organisations. This has sometimes resulted in missed opportunities and a failure to optimise industry links for all stakeholders including the Institute, companies, students and the Dublin region.

Recognising this fact and the complex nature of industry/academic engagement, DIT, in 2010, sought to take a more proactive relationship approach in its management of engagement with industry by establishing the Corporate Partnership Network (CPN). The initiative has created a structured framework through which mutually beneficial relationships can be nurtured by facilitating a better understanding of each other's environments. It provides a mechanism through which opportunities both new and existing can be optimised to facilitate the growth of meaningful partnerships and thus contribute to assisting industry/professions achieve their organisational objectives in collaboration with DIT.

Shortly after the establishment of the Corporate Partnership Network, Bord Gais Networks (BGN), a leading Irish State owned utility company which develops, operates and maintains the natural gas transmission and distribution networks in Ireland, approached the Institute with a specific request for third party accreditation of their technical training facility based in Dublin and of their Gas Distribution Supervisory Programme. However, their interest in DIT stretched beyond accreditation. As a significant employer of DIT graduates, the company already had some awareness of DIT and in particular, its broad range of expertise and capability in engineering, energy and business. The potential leverage of this expertise to support the company's operation was of special interest and they were curious to determine if and how this might be best achieved. In considering this, the company expressed its preference for initiating a long term relationship with the Institute providing an excellent opportunity to road test the Corporate Partnership Network concept.

The BGN were invited to join the CPN and this case outlines how the approach was used to support the development of the relationship between the two organsiations.



3. OBJECTIVES

The overall objective of the Corporate Partnership Network is to

- Provide a structured approach to relationship development that is both sustainable and scalable
- Bridge the communication gap between industry and academia
- Build awareness of the Institute with external stakeholders

Guided by these intentions, the specific focus of the DIT/BGN engagement was

- To expand the relationship beyond transactional to a longer term partnership model
- To optimise the specific industry/academic collaborations
- To Identify new and innovative opportunities for engagement
- To establish a coordinated, multi level network of linkages between the two organsiations

4. **RESPONSIBILITY**

The management of the CPN is overseen by the Head of Corporate Partnerships in DIT. The specific projects that emerge from the relationship are transferred to and managed in the appropriate academic/research/functional units.

As part of the agreement between DIT and BGN, both have nominated senior representatives as engagement liaisons who act as the gateways into each organisation.



IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The key approach of the CPN is to enhance proactive dialogue between the Institute and the member company with a view to creating a trusting and supportive environment within which mutually beneficial interaction can be progressed. To support this, a number of key mechanisms are utilized.

A dedicated DIT /BGN Contact

A senior member of DIT has been assigned to the participating organisation as a single point of contact. This person acts as the organisation's 'trailfinder' using their extensive internal contacts and knowledge of the Institute to direct them to appropriate personnel, address general queries, facilitate meetings with staff and researchers, explore and develop ideas, and suggest where DIT can contribute to a business solution and offer exciting networking opportunities.



Similarly, BGN has nominated two representatives as dedicated Institute contacts. These representatives work with the DIT representative to identify areas of mutual interest and opportunities for collaboration.

Personable and structured communication

Regular onsite visits take place at BGN where updates are provided on any recent Institute developments, existing projects discussed and any potential opportunities for future interaction explored

Outside of these visits, the company is briefed on DIT activities through research and enterprise publications, email updates and phone communication.

Networking Opportunities

BGN receives regular invitations to specific CPN organised networking events throughout the year as well as to other relevant DIT events. The CPN events are specially designed to offer opportunities for the company to meet key DIT staff and also other CPN members from different industrial sectors.

Memorandum of Understanding

The establishment of a long term relationship with DIT was particularly important to BGN and they were especially committed to embedding this relationship in their organisation at the highest level. To reflect this, the company proposed a Memorandum of Understanding between the parties which would, in broad terms, establish the commitment of both organisations to explore opportunities together in certain areas. This Memorandum of Understanding, which provided additional impetus to the relationship, was signed by the President of DIT and the Managing Director of Bord Gais Networks in late 2010 and renewed again in 2013. It will run until 2016.

Celebration and promotion

Developing and maintaining momentum was identified early on as a vital component in helping to embed the relationship in both organisations. One approach to support this has been to ensure that key successes were actively celebrated and promoted including the celebration of key milestones such as the signing of the Memorandum of Understanding, award of research funding, appointment of a research student and a graduation ceremony for BGN employees which took place in the BGN Technical Training Centre. In was ensured that these events featured strongly in the BGN internal newsletter, on the DIT website and internal ezine and DIT research updates thus maintaining a high profile for the relationship as it developed.

Multilayer Network of Contacts

The dialogue with BGN quickly identified four immediate areas of potential engagement which both parties committed to achieving.

- 1. Establish a formal long term relationship
- 2. Accreditation of BGN's technical facility
- 3. Joint sponsorship of PhD research
- 4. Joint programme development



To support these specific projects, appropriate contacts in relevant areas from across both organisations were quickly identified thereby initiating the formation of a coordinated multilayer network of contacts.

6. MONITORING AND EVALUATION

Engagement progress is primarily reviewed at scheduled DIT/BGN meetings which take place as part of the Corporate Partnership Network agreement. These meetings also allow discussion on the operation of the Network itself and afford an opportunity for suggestions for improvement to be tabled.

7. SUSTAINABILITY MEASURES

The longer term sustainability of the relationship is supported through maintaining an ongoing dialogue between the organizations through the Corporate Partnership Network. This is further enhanced by the existence of the Memorandum of Understanding which acts as an important catalyst in supporting the sustainability of the relationship at the highest levels in the organizations.

8. COSTS

There are two main cost strands:

a) Managing and developing the Corporate Partnership Network

Personnel costs make up the largest portion of costs in managing the Corporate Partnership Network. However at present the CPN does not directly employ people but rather existing DIT staff time is assigned to its operation and support. Additional costs that arise include travel, overhead, event management and marketing.

b) Supporting Transactional Costs resulting from the Relationship

These relate to costs associated with the BGN Technical Training Centre and Programme accreditation, research collaboration and supporting Institutional development.

9. FUNDING

The establishment of the Corporate Partnership Network within DIT was initially funded under a multi institutional engagement project entitled 'Roadmap for Employment Academic Partnerships - REAP. Currently, costs associated with managing the CPN are covered by the Institution.

The transactional costs associated with accrediting the BGN Technical Training Centre and the Gas Distribution Supervisory Programme were covered by the company while the collaborative research project was jointly funded by BGN and DIT under An Fiosraigh Research Scholarship Enterprise Partnership Programme which is a research funding initiative of DIT.





10. OUTCOMES

The key outcomes to date of the relationship between DIT and BGN are

- BGN have become active members of the DIT Corporate Partnership Network
- BGN's Technical Training Centre and their Gas Distribution Supervisor Programme have been accredited by DIT. Seventeen BGN employees have graduated to date
- A PhD student is being jointly sponsored by BGN and DIT. The focus of the research is aligned to an area of specific interest to company
- A Memorandum of Understanding was signed in 2011and renewed in 2013 by both parties
- BGN have participated on and contributed to DIT quality assurance and operational reviews
- BGN personnel have attended various CPN and general DIT events over the period of the relationship which have alerted them to other collaborative opportunities and provided an opportunity to meet with relevant DIT academic and research staff
- The relationship between the parties has assisted BGN in making a successful application to Engineers Ireland, the professional body for engineers and engineering in Ireland, to become a CPD Accredited Employer. BGN were given a 3 year award in April 2013 and deemed to be operating to the highest category within the CPD standard, 'Transformational CPD'.

11. IMPACTS

The principle impacts to date on Bord Gais Networks as a result of the relationship have been

- 1. Assistance with key ongoing stakeholder management including the Irish gas regulator (Commission for Energy Regulation) and the government department to which they are accountable (Department of Communications, Energy & Natural Resources).
 - a. Providing independent assurance on the quality of the internal training provided by BGN
 - b. Demonstrating the proactivity of the company and its commitment to training and development of staff and contractors
 - c. Opportunities to invite stakeholders to share in the celebration of achievements
- 2. Promotion of a learning culture and environment within the company
 - a. Joint award ceremonies with the DIT raising the status of specific training within the business
 - b. Award of nationally recognised DIT training certificates to trainees has increased their enthusiasm and motivation
 - c. Recognition of staff achievements given greater publicity internally within the company because of DIT involvement
- 3. Support for the process of tackling of strategic issues within the business



- a. Addressing specific research issues to support future policy making (e.g. consumption drivers in the SME sector)
- b. Contributing to the company's overall 'Gas Technical Training & Development Strategy'.
- c. The work completed with DIT assisted in making a successful application to Engineers Ireland for designation as a CPD Accredited Employer
- 4. Learning from other companies and DIT activities
 - a. Attendance at DIT forums along with other businesses to discuss topics of common interest and hear firsthand the experiences of other companies or from the DIT in relation to their community and industry initiatives
 - b. Linkages at different levels between DIT staff and BGN staff from Managing Director / President level, to business operations, HR and training staff

From DIT's perspective, the development of the relationship with BGN has increased

- a. awareness internally of the value of external engagement and raised the profile of the Institute amongst other companies as a leading academic partner.
- b. Support for applied research and development within the Institute
- c. A growing network of contacts with the company offering the potential for additional engagement in other areas.
- d. Promoting the value of a relationship development approach to Institute/industry engagement

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

DIT and its constituent stakeholders have benefited significantly from the relationship with BGN through support for research, better understanding of business challenges, support for and input into Institute development, student opportunities and improved profile within the business sphere.

BGN have benefitted from the development of their training function leading to improved workforce development, access to research expertise to support ongoing innovation, a greater awareness of how a third level Institutions can support the company's strategies and the opportunities to add value to its service offering.

In addition, this case provides a valuable template for both DIT and BGN as they seek to enrich their role as partners within the regional and national innovation ecosystem.

13. AWARDS / RECOGNITION

The success of the CPN and in particular the DIT/BGN relationship has been recognised at various external and internal Institute reviews and has been a significant contributory factor to BGN receiving the award of CPD Accredited Employer from Engineers Ireland.





14. PRIMARY CHALLENGES

The continued development of the CPN faces three principle challenges.

a. Strategic Challenge

Ensuring long term relationship development remains a strategic priority within Institution

b. Resource Challenge

Given the current economic climate in Ireland, increasing constraints on resources both financial and human could significantly impact on the success of the CPN

c. Organisational Challenge

Given the dispersed nature of DIT, successfully integrating the centrally located strategic relationship management function with the School/Department based transactional operational function to ensure a coherent and coordinated approach remains an ongoing challenge.

With regard to the existing DIT/BGN relationship, a key challenge to its growth will be sustaining the high level of momentum that currently exists. Furthermore, there may be resource implications as the level and quantity of interactions increase.

15. SUCCESS FACTORS

Much of the success of the DIT/ BGN partnership can be attributed to

a. Partner Commitment

From the outset, BGN wanted more than a simple transactional relationship with DIT. It was committed to creating a long term association backed by the support of the company's senior management. Similarly, DIT, by establishing the CPN, signaled its commitment to creating longer term industry partnerships.

b. Mechanism for Long Term Relationship Development

The growth of the relationship was greatly enabled by the existence of the CPN which provided the structure within which the relationship could be built

c. Regular Promotion and Celebration

Both organisations actively promote and celebrate the development of the relationship and importantly, the various individual engagement successes. This promotion and ongoing celebration helps validate the relationships within both organisations and helps attribute a level of an importance to the partnership.



16. TRANSFERABILITY

The case should have transferability across the third level sector broadly. It has served as a very useful roadmap for DIT as a third level institution in developing relationships with other external organizations and may help inform similar approaches elsewhere.



FURTHER **INFORMATION**

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18. LINKS

- www.dit.ie
- www.bgn.ie
- www.reap.ie

19. KEYWORDS

Relationship development, academic industry partnership, networks, engagement, long term

20. PUBLIC CONTACT DETAILS

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UNIVERSITY-DRIVEN ECONOMIC GROWTH: An example of how an 'Anchor' University Drives step change with business at its Heart

By Bill Walker



P	GENERAL INFORMATION		
	TITLE OF THE CASE	University-driven economic growth	
	SALES PITCH	An example of how an 'anchor' university drives step change with business at its heart.	
	ORGANISATION	University of Hull	
	COUNTRY	United Kingdom	
	DATE	March 2014	
	AUTHOR	Bill Walker	
	NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other 	
	SUPPORTING MECHANISM	 ☑ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition 	





1. SUMMARY

The University of Hull is in the city and of the city it serves. It has positioned itself as an 'anchor institution' driving step change and economic prosperity rather than acting merely as a supplier of excellent higher education services. It enthusiastically embraced the two-way nature of Knowledge Exchange some years ago. It is now firmly aligned to regional economic priorities it helped identify and works in close collaboration with strategic partners to deliver positive outcomes.

It opened a £20million Logistics Institute when businesses and policymakers said a fresh approach was needed to ensure the region benefitted more directly from the activities of the Humber ports – collectively the biggest in the UK. This now hosts, and chairs, HumberPort, an organisation of ports-based businesses, which has come together to promote the Humber 'offer' more coherently on the international stage.

The University built an Enterprise Centre, not just for students and graduates but for the community at large, when it was identified that more entrepreneurs were needed to boost the local economy. More than 120 new knowledge-based businesses have since been created, many based in the region, most employing graduates.

For Entrepreneurs Only, an organisation of the region's most successful entrepreneurs (joint turnover £1.5billion, employing 8,000 people) is now based at the Centre ensuring that current entrepreneurs play an active role, alongside the University, in turning bright ideas into successful businesses. The University joined with Associated British Ports and local authorities to create Green Port Hull, a £100million project which led to Siemens identifying Hull as the preferred base for its UK offshore wind manufacturing business. The partnership is now managing a £26million initiative to prepare the region for what is potentially the biggest economic change to the region in a generation. nAll this in a city which has just been named the UK City of Culture for 2017 – another ambitious 'it can never be done' venture in which the University of Hull has played a significant role!

The University is a valued leader in the very fabric of social and economic change in a region facing up to its very real challenges – and seizing its new opportunities. The traditional university approach to knowledge transfer now seems a very long way away......

2. BACKGROUND

The University of Hull is the only university located in the Humber region. As such the expectations of its contribution to the regional economy and general wellbeing are much stronger than in most other UK regions where multiple higher education institutions play a range of different, perhaps more traditional, university roles.



UIIN GOOD PRACTICE SERIES Case study written by Bill Walker www.uiin.org The University of Hull recognizes this responsibility and takes it seriously. In recent years it has by deliberate design shifted greatly away from the former 'ivory tower' image so often laid at the doors of research-rich institutions.

The Humber region is one where coherent economic leadership is vital after years of decline following the collapse of the once-mighty fishing industry. New approaches were needed and the University of Hull determined it must play its full role. It's Strategic Plan 2011-15 says:

'The University will seek to bring public benefit, intellectual leadership, to embody excellence and a focus on quality, contribute to economic growth and regeneration, prosperity and improved quality of life and social development....As an anchor institution, the University of Hull will be a symbol of aspiration and inspiration, hope, pride and confidence to its local communities.'

This approach has proved to be a key driver of economic planning in the Humber region as the University continues to work with key stakeholders to deliver the step change required. The University established a specialist unit, the Knowledge Exchange, dedicated to working hand-in-glove with strategic and business partners; it is represented on the board and on operational groups of the Local Enterprise Partnership and takes an active lead in areas including innovation and higher-level skills; it works closely with local authorities and business groups,; it has helped found and lead new key sector organizations (ports, digital etc) charged with driving economic change and has itself created more than 120 new knowledge-based businesses through its state-of-the-art Enterprise Centre.

This provides the context and background for the case study presented here.

3. OBJECTIVES

Given the background and context explained above, the primary objectives were to:

- Demonstrate the role and impact of the University as an 'anchor' institution;
- Provide intellectual and economic leadership;
- Engage effectively with key strategic partners to mutual advantage;
- Establish the University as the 'turn to' institution for innovative step change;
- Ensure University expertise has a positive, inclusive affect on its communities ('a rising tide floats all boats');
- Explore potential for future University activity and income streams through effective partnership and collaboration;
- Help shape a regional economy where there are opportunities for all.

4. **RESPONSIBILITY**

Bill Walker, Director of Knowledge Exchange at the University of Hull, through effective engagement with key internal and external partners and networks, was responsible for the implementation of the actions and activities in the case presented here.





5. STRATEGY & ACTIVITIES UNDERTAKEN

The problem was simple to identify: how can the University and business partners collaborate most effectively to address established regional challenges and seize once-in-a-generation economic opportunities? An effective response was rather more difficult to enact but, clearly, addressing the issue was an absolute necessity. It required leadership and action and needed key players to step up to the plate and work collaboratively.

There are three main strands to the case presented here demonstrating University leadership, actions and activities:

- 1) The University had already responded when businesses and policymakers identified that such leadership was required to ensure the region benefitted more directly from the activities of the Humber ports – collectively the biggest and busiest in the UK. Goods flowed straight through and visitors used the Humber merely as a convenient connection to higher-profile parts of the north. A fresh approach was needed to address such matters so that more of the economic benefit of the ports 'stuck' in the region in which they were located. So a £20million (sterling) business-focused Logistics Institute was created at the University, with collaborative funding from the University, the then regional development agency, Yorkshire Forward, and the European Regional Development Fund (ERDF). Such an approach to ports-based logistics enabled the development of new under-graduate and postgraduate programmes; bespoke courses at all levels for a range of businesses; international recruitment from business-sponsored employees in the logistics industry and a calling place for businesses interested in accessing the latest thinking in supply chain issues and developments in traceability technologies. The Logistics Institute has also become home for HumberPort, an organization of ports-based businesses who wanted to come together in an impartial, independent and intellectual place to promote the Humber more effectively on the international stage. HumberPort comprises chief executives and leading managers of those companies. They asked the Director of the University's Knowledge Exchange to chair the organization to ensure continued independent leadership and connectivity with the regional policy and decision-makers.
- 2) Geographical location, natural and industrial assets, availability of development land and labour all aligned to the urgent global need to address energy supply, sustainability and security now present the Humber region with its biggest economic opportunity since the demise of the fishing industry. As an anchor institution, the University has taken an active leadership role in this field, working with the key regional partners and stakeholders. The University used funding from the Higher Education Innovation Fund (HEIF) to establish the Centre for Adaptive Science and Sustainability (CASS). This has drawn together established University expertise across a range of disciplines and has identified new academic areas to be explored and introduced, all connected to one of the University's key interdisciplinary research themes Energy & Environment. The clarity of this focused approach by the University played a key role in the creation of



Green Port Hull, a £100million project led by Associated British Ports and the two local authorities of Hull and the East Riding of Yorkshire that persuaded global giant Siemens to name Hull as the preferred site for its UK base for offshore wind. It is estimated that up to 10,000 jobs could ultimately be created on the back of this investment decision, which may be confirmed in April 2014. The £210million Siemens investment would see the development of a world-leading wind turbine manufacturing and assembly plant to serve the new offshore wind farms in the North Sea. UK Prime Minister David Cameron, who has taken a personal part in the complex negotiations surrounding the investment decision, said: "I really believe this could be the start of a new era for Hull. In the years ahead, who's to say your city can't become the world's leader in offshore wind manufacturing? You can!" The Green Port Hull initiative subsequently led to the creation of Green Port Growth (GPG), a £25.7million Regional Growth Fund programme charged with preparing the region for the major economic change such a massive industrial investment will bring. This involves the same core partners, extending to other players from Government and the private sector. GPG is focused on improving Employment & Skills, Site Assembly, Inward Investment, Business Support, Industrial Grants and Research, Development and Innovation, a strand led specifically by the University.

3) The University built an Enterprise Centre, not just for students and graduates but for the community at large, when it was identified that more entrepreneurs were needed to boost the local economy. The Centre was opened by His Royal Highness the Duke of Edinburgh in December 2008 and more than 120 new businesses have since been created, many now established in the region, most employing graduates. For Entrepreneurs Only, an organisation of the region's most successful entrepreneurs (joint turnover £1.5billion, employing 8,000 people) is now based at the Centre ensuring that current 'real life' entrepreneurs play an active role, alongside the University, in turning bright ideas into successful businesses. The entrepreneurs provide mentoring, advice, guidance, host events - even invest in the business ideas with best potential to establish profitable and high-growth businesses in the Humber region. Over the past 12 months FEO joint activities with the University have supported more than 500 entrepreneurs and start-up businesses. UK Business Secretary Dr Vince Cable MP described as "unique" and "pioneering" the special relationship forged between the University and these leading entrepreneurs to encourage a culture of enterprise in the region. He said: "I have visited many parts of the country but I have never seen anything quite like this before. It is a unique structure....this pioneering group is a real credit to the city and it is vital to Hull's economy." HRH Prince Andrew, the Duke of York followed up with a special visit to the Centre to see for himself how the relationship was working – and quickly pledged to plug this into related activities in other parts of the country. The relationship sits perfectly with the University's strategic objective repeatedly stated in this paper to be an 'anchor institution' within the community.

"Twenty years from now, when we evaluate our success in attaining our vision, we must be able to show not only how many students graduated, how many research papers we produced or the extent of the research funding gained, for example, but rather what contribution we made to the public good; how we improved the quality of life and prosperity; stimulated economic regeneration and competitiveness; encouraged citizenship in a global community and improved social mobility and justice." - University of Hull Strategic Plan 2011-2015.



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6. MONITORING AND EVALUATION

Overall, given the examples above, it is suggested that it is self-evident that the University is delivering on its strategic intentions. Specific programmes contributing to the overall objectives have had their own individual targets and measures (detailed in outcomes and impacts below) but it is much more about employing effectively and consistently, almost as part of its DNA, the strategic role the University believes it should play in the region. This is ongoing and underpins everything the University now stands for.

7. SUSTAINABILITY MEASURES

The approach contained within this paper is embedded strategically within the University, enacted operationally as our 'raison d'être' and managed through the Knowledge Exchange, the facility established specifically to encourage, establish and oversee such activity.

8. COSTS

The University's Knowledge Exchange team is funded through the Higher Education Innovation Fund (HEIF) which is an award made available by the Department for Business, Innovation & Skills (BIS) via the Higher Education Funding Council for England (HEFCE) through a funding formula determined by the level of income achieved by recipient institutions through their interactions with businesses. Any costs specific to this case were absorbed either by those pre-existing University resources or directly by the programme funds secured.

9. FUNDING

As described above, general enabling funding came through standard UK funding routes for higher education and was apportioned appropriately to deliver on the University's institutional strategy. Specific programme funding came from University and ERDF (for the Logistics Institute and the Enterprise Centre), the Regional Growth Fund (for Greenport Growth), with additional income from ports-based businesses (for HumberPort).

OUTCOMES & IMPACT

10. OUTCOMES

Specific deliverables from programmes highlighted in this case include:

Logistics Institute:

Over a measured two-year period, the Logistics Institute:

- helped 530 businesses;
- created 161 new jobs ;
- enabled increased business sales of £55million.



UIIN GOOD PRACTICE SERIES Case study written by Bill Walker www.uiin.org It is home to HumberPort, an organization of the region's leading ports-based businesses.

Green Port Hull and Green Port Growth:

The partnership secured:

- Siemens naming Hull as the preferred base for their UK offshore wind operations;
- A £25.7million Regional Growth Fund contract to prepare the region for the new industry. This is on track to deliver the contracted targets to:
 - Increase Gross Value Added by £300m;
 - Up-skill and train up to 1,900 local people;
 - Develop over 90 ha of brownfield land and bring forward 70 ha of greenfield sites;
 - Secure £280m of large inward investment;
 - Assist up to 650 local businesses to diversify and enter the supply chains of major renewables investors and their suppliers;
 - Establish Hull as a Centre for RDI for the renewables industry.

Enterprise Centre:

The Centre has:

- Created 120 new businesses;
- Secured high-profile visits from HRH the Duke of Edinburgh, HRH the Duke of York and Business Secretary Dr Vince Cable MP;
- ▶ Become the office of For Entrepreneurs Only (FEO), whose membership has a combined turnover of £1.5billion and employs more than 8,000 people.

The specific programme of activity with FEO has:

- Supported 500 entrepreneurs and start-up businesses;
- > Delivered monthly business growth clinics to 50 individuals;
- Hosted entrepreneur 'boot camps' for 100;
- Mentored start-up companies;
- Invested in start-up companies;
- Hosted events, workshops and seminars for entrepreneurs;
- Provided internships and placements for students and graduates.

11. IMPACTS

As well as the outcomes and deliverables described above, the case presented here has:

- Been used by HEFCE as an exemplar study at UK events;
- Attracted interest and visits from other universities in UK and abroad;
- Improved profile and reputation of University with external stakeholders;
- Changed mindset and behaviours within University, with 'enterprise' now included in academic promotion criteria and used in performance measures;
- Secured interest in Hull from potential new partners in UK and EU-funded research programmes.



12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Humber Local Enterprise Partnership (LEP) and local authorities:

- Ready access to an engaged University willing to apply its resources to regional economic activity;
- A significant partner leading on its behalf on regional innovation strategy, planning and activity; on higher-level skills and on providing economic observatory and expertise;
- Demonstrating to potential inward investors the existence of an engaged University, aligned to regional economic priorities and ready to provide research-relevant support and expertise.

Businesses:

 Ready access to an economically-engaged University willing to apply a variety of high-level expertise to business growth;

Students and Individuals:

 Knowledge, understanding and evidence that the University of Hull is a place where enterprise and entrepreneurship is encouraged and access to employers and employability is made easy and rewarding.

13. AWARDS / RECOGNITION

All or part of the case presented here has resulted in the University winning:

- Guardian University Awards 2014 for business partnership;
- Customer First UK recognition as 'inspiring;'
- Humber Renewables Awards 'champion;'
- Highlighted by Higher Education Council for England as 'exemplar' activity;
- Special visits from HRH the Duke of York and Business Secretary Dr Vince Cable.



14. PRIMARY CHALLENGES

Partnership working typically provides challenges in timescales and priorities, especially when there are personnel changes within multiple partner organizations. The main challenge is retaining focus, remembering why the partnership came together in the first place and reaffirming the ultimate goal. In the case presented here we were perhaps fortunate that mutual respect, desire and understanding remained through the vagaries of changing circumstances.



15. SUCCESS FACTORS

- Taking partnerships and collaboration seriously;
- > Statement of strategic intent from the top and 'buy in' from all levels;
- Being consistent in pursuing those ideals;
- Making it matter making it count;
- Having credible champions;
- Delivery!

16. TRANSFERABILITY

If it can be achieved in Hull it can be achieved anywhere where there is the need, the desire, the commitment and the recognition of the importance of working together to achieve mutually desirable objectives.



17. PUBLICATIONS / ARTICLES

- http://www.hulldailymail.co.uk/University-Hull-best-Britain-relationship/story-20725563-detail/story.html
- http://www.theguardian.com/higher-education-network/2014/feb/27/winneruniversity-of-hull-business-partnership
- http://www2.hull.ac.uk/news_and_events-1/news_archive/2012newsarchive/april/vincecablecongratulateshull.aspx
- http://www2.hull.ac.uk/administration/the_enterprise_centre/news/duke_of_york.a spx
- http://www2.hull.ac.uk/news-and-events-1/newsarchive/2012newsarchive/april/majorplayerslaunchhumbport.aspx
- http://www2.hull.ac.uk/administration/enterprise.aspx

18. LINKS

- www.hull.ac.uk
- www.hull.ac.uk/hubs/logistics.aspx
- www.humberport.com
- www.forentrepreneursonly.co.uk
- www.greenporthull.co.uk



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19. KEYWORDS

University, entrepreneurs, change, collaboration, lead, challenges, opportunities

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SPININ: A DANISH CASE OF COLLABORATION BETWEEN STUDENT ENTREPRENEURS AND ESTABLISHED COMPANIES

By Anne Sofie Dahlmann Breindahl and Claus Thrane



GENERAL INFORMATION				
TITLE OF THE CASE	SpinIN: A Danish case of collaboration between student entrepreneurs and established companies			
SALES PITCH	How to increase the success rate and create sustainable growth and jobs by matching student entrepreneurs with established companies and to facilitate a process of mutual value creation.			
ORGANISATIONS	AU Centre for Entrepreneurship and Innovation, Aarhus University, Denmark and the Danish Industry Foundation			
COUNTRY	Denmark			
DATE	February 2014			
AUTHORS	Anne Sofie Dahlmann Breindahl Claus Thrane			
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other 			
SUPPORTING MECHANISM	 □ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition 			



E



1. SUMMARY

The purpose of this paper is to showcase a two-year-old university-industry project in Denmark situated at Aarhus University called 'SpinIN'. The aim of the SpinIN project is to increase the success rate and create sustainable growth and jobs by matching student entrepreneurs with established companies, and to facilitate a process of mutual value and job creation. A key feature of this matchmaking is that the student entrepreneur is physically located within the office or production facilities of the established company. The project address some of the problems that student entrepreneurs often experience in terms of e.g. insufficient market/customer network, insufficient or expensive production and/or office facilities, lack of industry experience, and other well known liabilities of newness. At the same the project address some of the liabilities of existing companies in their need for new knowledge, competences, and entrepreneurial orientation. Reciprocity and the creation of strong ties between the parties are key principles in the project, as both parties should contribute to each other's growth.

The paper provides a comprehensive description of the methods and tools used in the process of matching student entrepreneurs and established companies as well as the consecutive phases of clarification and facilitation of the interfirm collaboration that supports the value and job creation aim of this project and the theoretical as well as practical considerations underlying this. Semi structured interviews, recently conducted with all project participants, indicate that the shared physical location and shared value creating process, facilitated by the SpinIN project, actually do create positive synergies and growth opportunities for both parties through e.g. substantial knowledge exchange, combining complementary resources and capabilities to create new technologies, new products, new markets, new customers, and/or increased awareness of business potential. Finally, the paper discusses some of the potential challenges and learning gathered throughout the project.

2. BACKGROUND

The SpinIN project accentuates the growing acknowledgement of universities as important drivers of innovation, job creation, and economic growth regionally and nationally through various university-industry collaborations (Etzkowitz & Leydesdorff 2000; Rothaermel et al. 2007). The project is a university-industry project started of in January 2012 supported by the Danish Industry Foundation. The three-year project is situated in Centre for Entrepreneurship and Innovation at Aarhus University in Denmark acting as a knowledge center for innovation and entrepreneurship able to assist in the development of activities strengthening the university's collaboration with public and private companies among students as well as researchers. Activities undertaken around students include various entrepreneurship education activities as well as incubation facilities for students enrolled at the university who decide to start up new firms in relation to the university and the surrounding innovation ecosystem.



Research among early startups (e.g. Baum et al. 2000) as well as experience from the incubation facilities at Aarhus University suggest that student entrepreneurs often experience insufficient market/customer networks, insufficient or expensive production and/or office facilities, lack of industry experience, legitimacy, reputation, and other well-known liabilities of newness. At the same time, existing companies often experience liabilities in their need for new knowledge, complementary competences not readily available on the market, and entrepreneurial orientation concerning aspects such as innovation, proactiveness, and competitive aggressiveness (Lumpkin & Dess 1996). The aim of the SpinIN project is basically to establish idiosyncratic linkages as sources of competitive advantage and potential job creation for both parties, by matching these complementary needs based on personal strong ties and physical co-location between the established company and the student entrepreneur.

From a vast amount of general research on interorganizational relationships (e.g. Dyer & Singh 1998; Baum et al. 2000) we expect that potential gains from a "perfectly" facilitated matchmaking process between a student entrepreneur and an established company could be associated with a range of individual and collective gains. First, we expect that the level of trust between the involved parties, as supported by the SpinIN process, induce shared investments in assets and/or activities specific to the involved parties. Secondly, we expect that the combination of trust and physical co-location stimulate a substantial knowledge exchange, including joint learning activities, possibly creating competitive advantages and jobs in the long run for both parties. Thirdly, and perhaps most fundamentally, we expect the SpinIN matchmaking process to induce access to complementary resources, capabilities, assets, customers, and markets not readily available in the market space including access to external legitimacy, endorsements, status, and reputation directed at potential customers, suppliers, employees, other interorganizational relationships, as well as potential investors (Stuart et al., 1999). Forth, even though the matchmaking process is not specifically targeted toward buyer-seller relationships between the established company and the student entrepreneur we expect that the physical co-location and trust introduce relatively low transaction costs from the ability to employ informal self-enforcing governance mechanisms (Uzzi 1997). Hence, in the long run we might expect a buyer-seller relationship to emerge between the student entrepreneur and the established company.

3. OBJECTIVES

The project aims at developing a model for reciprocal, growth-oriented collaboration between student entrepreneurs and established companies. The aim is to have a model developed, tested out, and ready for implementation elsewhere in Denmark accordingly. In order to develop and test out the effect of the method, SpinIN has set forth the following targets during the three-year period of the project:

Objectives	Targets
Create a model and method for reciprocal, growth-	Develop and test out the SpinIN method
oriented collaboration between student entrepreneurs	
and established companies	
Establish and facilitate matches	20 matches
Create jobs	60 jobs
Create university-industry interaction	Raise the number of collaborations -
	especially to SMEs



4. **RESPONSIBILITY**

Centre for Entrepreneurship and Innovation is responsible for developing the entire method as well as facilitating the screening process, the matchmaking, the mapping, and the facilitation of the subsequent match in the three-year period. This entails the processes and tools for matchmaking and collaborations as well as the necessary legal documents to support the matching parties. Moreover, by the third year of the project, Centre for Entrepreneurship and Innovation is responsible for the transferability and dissemination of the method as well as educating and training other consultants in using it.



5. STRATEGY & ACTIVITIES UNDERTAKEN

The actions and activities undertaken in the project are divided into four distinct stages as illustrated by the SpinIN process figure.



Screening

The first step in the process is the screening of potential student entrepreneurs using a questionnaire. Basically, the purpose of the screening is to ensure that the student entrepreneur has a viable and scalable business model with a significant proof of concept that somehow signifies a growth potential for the student entrepreneur as well as the established company throughout the collaboration. Moreover, the screening is also used to indicate intentions for growth as well as the student entrepreneur's passion and willingness to spend a sufficient amount of resources, time, and energy in the collaboration. We have experienced these motivational and intentional issues as critically important for a successful participation in the SpinIN project.

Mapping

If the student entrepreneur passes through the screening process we then enter into a more detailed process of analyzing and mapping out the startup in collaboration with the student entrepreneur using the 'SpinIN-wheel' as illustrated in the figure below. The SpinIN-wheel is actually a preformatted canvas printed out on a relatively large poster to facilitate a group discussion as well as a hands-on tool to generate a detailed analysis of the student entrepreneur's resources and capabilities concerning either product(s) and service(s),


organizational aspects, or aspects concerning the market(s) of the startup. To accentuate possible areas of complementarity between the matching parties we use red stickers to visualize and indicate possible challenges or needs in a certain area (e.g. the student entrepreneur could be challenged by excessive distribution costs in the "market area" or a need for specific production knowledge in the "production area"), whereas green stickers are used to visualize and indicate possible strength and opportunities that may serve as basis for reciprocity in the collaboration.

Hence, the initial mapping serves as a tool for finding a relevant established company that match and actually complements the strength and weaknesses of the student entrepreneur. Moreover, we also use the red and green stickers in the SpinIN-wheel as a visual scaffolding tool throughout the remaining SpinIN processes adding a simple and dynamic visual motivation tool to convert red stickers into green through the interorganizational collaboration.



The SpinIN-Wheel

It is our experience that the SpinIN-wheel has been of great value to the student entrepreneurs not only for the matching purposes itself, but also in providing and disclosing important insights from answering and discussing the various elements in the model as well as some of the more personal reflections pertaining to an embedded entrepreneurial identity transition among the students. Furthermore, according to our recent survey (discussed in greater detail in section 11), most of the established companies maintain that the detailed mapping in the SpinIN-wheel has been essential for the subsequent collaboration providing attention to specific areas for potential collaboration right from the outset of the process.

Match

The purpose of the matchmaking process is to find an established company for the student entrepreneur that not only matches and complements the red and green stickers (i.e. the strength/opportunities and challenges/needs) as suggested by the SpinIN-wheel, but also matches the student entrepreneur on a more personal level to ensure a fruitful and



trustworthy relation between the parties. The importance of an interpersonal match is accentuated by the co-location requirement as a fundamental part of the SpinIN project.

In order to locate and attract established companies, SpinIN is engaged in strategic networkrelations with business groups, regional business councils, etc. who can pass on our requests for companies possessing the specific qualifications needed in terms of resources, capabilities, products, costumer segment, values etc. First of all, the established company needs to accept the terms of reciprocity. To match the various requirements of the student entrepreneurs we equally add some requirements for the established company in terms of time, energy, and co-location space, as well as a certain amount of "slack" resources. Moreover, we often need to address simple practical issues such as proximity meaning that the established company cannot be too far from the university, since the students often have to travel back and forth from lectures and other related activities.

At the match meeting the student entrepreneur meets the established company for the first time. Both parties have been equipped with each other's confidential profile and mapping outline from the SpinIN-wheel and we ask both parties to make a presentation of their company, their competencies and challenges. At this stage of the process it is vital that both parties obtain a genuine representation of each other and share a willingness to engage in the project with a minimum of legal contracts and formalities before entering the SpinIN project. Hence, in designing the meeting, we seek an atmosphere of seriousness mixed with informality, and encourage to sincerity, openness, and confidentiality about challenges and needs. Moreover, we strive to emphasize the apparent complementarities and value creating potential in "matching" the two SpinIN-wheels.

It is our experience that the preliminary framing and matching of expectations taking place in the matchmaking process and at the match meeting is essential for the subsequent collaboration between the two parties. The feedback from our recent interviews (discussed in greater detail in section 11) indicates that the matchmaking process is conceived of as professional and several participants ascribe the focused and professional relationship and work in the match, particularly at this early stage, to induce a fruitful interorganizational collaboration much faster than expected compared to other collaborations based on more "traditional" network-relations.

Facilitating the match

After the match making agreement between both parties SpinIN facilitates the collaboration process by coaching and challenging the parties in various way to convert some of the potential mutual contributions into concrete value and job creating actions. Action plans, according to the companies' growth targets, are prepared and evaluated on a regular basis thereby making the collaboration fruitful and focused on growth as well as maintaining a good relation between the parties.

To ensure continuous motivation and adherence to action plans as well as to maintain reciprocity the facilitation meetings take place every 6-8 week outlined in the initial match.

The focal point of these meetings is to create action plans (see figure below) pertaining to the interorganizational complementarities from the mapping-results in the SpinIN-wheel asking both parties to pinpoint concrete competencies in one company (the green stickers on the SpinIN-wheel) to address some of the challenges of the other company (the red stickers).





The SpinIN-Action plan

The action plan contains four basic steps:

- 1) The challenge/need each company wants to work with (the red sticker from the SpinIN-wheel) is pinpointed.
- 2) The effect or goal is pinpointed.
- 3) Up to three realistic and manageable actions/steps with a deadline are planned out.
- 4) At the following meeting the action plans are followed up by a reflection on experiences and learning gained from the actions undertaken.

At the facilitation meetings we also update the SpinIN-wheel in relation to the current challenges and contributions. If needed, we help the company to update goals and subsidiary goals or to shift focus onto new goals and finally new action plans are formulated. Moreover, we put an effort in acknowledging the developments in the companies and make sure to address this explicitly, in order to convey awareness of the developmental process and to motivate to further exploration of the possibilities to gain growth from the reciprocal relation.

Most participants (19 out of 20) in our recent survey (see section 11) report a positive influence on the activities undertaken in the match, as an effect of the facilitation. For example, some student entrepreneurs claim that the interaction with the facilitators qualified the way they used the knowledge and resources in the established company.

A common response is that the facilitator adds value to the cooperation by asking the "difficult" questions and addressing issues they would not have been able to manage themselves.

6. MONITORING AND EVALUATION

To measure growth in the companies and the amount of jobs created quantitative as well as qualitative data on number of employees, total number of full-time positions, wage level, turnover, and surplus are collected in the screening survey, as the companies enter the project as well as the end of the project-period. Moreover, the recent semi structured interview is equally part of the evaluation of the SpinIN project.



7. SUSTAINABILITY MEASURES

The original setting was for the method to be self-contained, i.e. that the established companies and student entrepreneurs, with a generic method available on the Internet, should be able to establish and facilitate a SpinIN collaboration. The development process and the feedback from the participants have shown, however, that especially the facilitation of the match, the reconciliation of expectations, and the ongoing preparations of action plans and reflections are crucial to the experienced value of the collaboration.

One way of creating a sustainable business model for the SpinIN methods is to include it as an accelerator program at a student incubator, where the role of the student incubator would be to establish and facilitate the process while the actual guidance of the student entrepreneur would take place in the established company. Another approach is to let the facilitation take place in existing business networks where the matching parties could "facilitate" each other according to a blueprint. Both of these alternative approaches, we believe, require some sort of intervention from a consultant matching the student entrepreneurs with the established companies and introducing the method.

Finally, in order to support a higher degree of self-facilitation and access to the method we are currently considering a solution where screening, clarification, materials, and guides for preparing action plans are accessible online.

8. COSTS

The project has a budget of 4.2 million Danish kroner, (\notin 560,000) for three years. The major expense factor is costs, covering one full-time project manager for the entire period plus several part-time consultants. Additional costs include administration, materials, consumables, public relations and travel costs.

9. FUNDING

The majority of the funding (\leq 560,000) comes from The Danish Industry Foundation. Centre for Entrepreneurship and Innovation only covers office space expenses for the project consultants, office supplies, conference/meeting facilities, etc.



OUTCOMES & IMPACT

10. OUTCOMES

Up till now, in the second year of the three-year project period, we have documented the following outcomes:

Outcomes	Total	Notes
Amount of companies interested in participating in the project	171	69 start-ups/102 established companies
Screened and clarified	63	36 start-ups / 27 established companies
Matches	23	Two matches are currently in the match-meeting phase (have participated in a match meeting and are now in a test period/consideration)
Matches being facilitated	12	12 processes including a contract
Completed match-collaborations	1	After one year of collaborating
Jobs created	26	Primarily among Student Entrepreneurs

11. IMPACTS

Semi structured interviews conducted in January and February 2014 with all project participants (20 in total) provides us with rich and detailed knowledge of a range of short and long-term impacts as well as feedback on the SpinIN project pertaining to each step in the process as presented and summarized in each step of the process in section five.

As expected from our initial "hypotheses" (see section two on project background) project participants reported short and long-term impact related to: 1) Shared investments in assets and/or activities specific to the involved parties; 2) Substantial knowledge exchange, including joint learning activities; 3) Access to complementary resources, capabilities, assets, customers, and markets not readily available in the market space; 4) A buyer-seller relationship between the student entrepreneur and the established company due to low cost of governance. Finally, from the semi structured interviews we learned that an important impact for most student entrepreneurs as well as some of the established companies had to do with: 5) Identity creation in terms of e.g. personal, cultural, and organizational development.

The table below presents specific examples of short and long-term impacts in each of these five areas from the survey. Evidently the distinction between short and long-term impact can be somewhat arbitrary – particularly pertaining to impacts on identity creation. Hence, we do not distinguish between short and long-term impact on identity creation.



	Short term impacts	Long term impacts
Shared investments in relation- specific assets and activities	One match has collected their products at a shared web-shop, several have used co-branding, one match has hired in a shared intern for communication, and one match has developed joint products.	Roughly half of all participant report future expectations in this area including co-branding, joint events and network groups, and future launching of joint products.
Substantial knowledge exchange including joint learning activities	 All participants mention the knowledge exchange as a significant impact of the SpinIN project. Specific examples include knowledge exchange around: Products, manufacturing, and production methods Pricing, sales, and PR Strategy Legal issues Cultural issues 	 18 of the participants expect to maintain a knowledge exchanging relationship after the SpinIN project period. 10 participants have already formulated informal agreements on continued sparring. Several participants consider it less of an effort in the long run to seek advice from the match partner because of the personal relation to the other company.
Access to complementa ry resources and capabilities	 9 participants report various impacts in this category. They all share the experience that the access to complementary resources through the SpinIN project have qualified their developmental process and moved their business forward, faster, or earlier than expected. Specific examples include: New products and services Product development Prototyping Concept development Access to new markets New materials 	The long run expectations reported by 10 of the participants in this area are primarily focused on future network- based sales, concept development, and product development. The student entrepreneurs stress that the established company can "open some doors into business fields or costumer segments", while the established companies frequently mention "the young and new angel" to products, marketing, media, and even sub-culture.
A buyer-seller relationship	A surprisingly high amount (6 participants) reported short-term impacts in this category, as this is not a focus area in the matchmaking process. Some have engaged in direct trading amongst each other and others in barter trading. Some of the established companies states: "we don't know of any other company providing this specific service" "What made the cooperation	 In the long run 15 participants expect some kind of buyer-seller relationship with their match partner because of the high degree of interorganizational knowledge and trust between the matching parties. Specific examples of long run expectations includes: Buying directly from each other Engaging as subcontractor for each other Acting as partners in tenders Including the other part in a consortium.



	 intense was that the student entrepreneur had time in the house prior to being assigned for the job." "Social media stuff is new to me, and I had seen what he did for others, so I was comfortable." 			
	 Some of the student entrepreneurs states: "We can't afford buying the help and competencies, but we can afford to barter trade" "We can perform our tasks in a less obligating manner" "our portfolio of products and services has been challenged and experimented with" "This gave us a chance to test and develop our products" 			
Identity	An important impact for most student entrepreneurs as well as some of the			
creation	established companies is related to issues of identity creation.			
	Specific examples from student entrepreneurs includes:			
	 Macro-/micro-perspective at my company Contributing to the established company provides experience and confidence Conscious of the worth and qualities of my company Self-help Someone to be responsible to Show that we are able to achieve our goals Role model Knowledge of jargon and culture Good vibe around our company 			
	Specific examples from established companies includes:			
	 Refreshing perspectives on the production you take for granted It's a good story in our branding New eyes appreciating our company Honest feedback and perspectives on products and concepts Boost in the daily life of the firm 			

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Stakeholders	Benefits
The Student	Our interviews indicate that student entrepreneurs benefit from e.g.:
Entrepreneurs	 Access to production facilities and equipment Increased network access to a desired segment or business Industry-specific knowledge and experience Selling to the established company or its network Personal development Product development Training in selling and negotiation Internationalization Joint products and services, co-branding, spillover effect in relation to sales and network, and other synergies between the parties It was an initial assumption in the SpinIN project that co-location within the



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	established company would be a decisive factor for the student
	entrepreneur. However, it turned out that affordable office space is not that
	hard to come by in this part of Denmark and just a few of our entrepreneurs
	have entered into SpinIN due to a lack of office space. The incentive to co-
	locate has to a higher degree been that the percention of vield and the
	value of the collaboration were cignificantly increased by provinity
	value of the collaboration were significantly increased by proximity.
The Established	As we expected from the outset of this project, the established companies
Companies	state that they have benefited from collaborating with the students
	entrepreneurs mainly through e.g.:
	New knowledge or awareness of existing knowledge/technologies
	Entrepreneurial mind set and energy
	• An alternative "modern" view of their company, e.g. in relation to
	marketing, products/services, design, etc.
	 Joint products and services, co-branding, spillover effect in relation to
	sales and network, and other synergies between the parties
	They furthermore assess the interorganizational relation as valuable due to
	the student entrepreneur's honest opinions on products and concepts that
	can be readily exchanged thanks to the strong ties and also because there
	are no hidden agendas in the relation regarding either to sell to or be
	employed by the established company later on.
	Moreover, several established companies articulate the benefits of being
	observed by an outsider. Some established companies report that seeing
	their business and achievements through the eyes of the student
	entrepreneur makes them aware of things they once struggled for, but have
	been taken for granted for a long time.
The Student	The Student incubator benefits from the SpinIN project by providing:
Incubator at	Accelerator program for the student entrepreneurs
Aprhus University	• A stronger network in the business community
Admus University	 Savings on physical location and external advisors through the SpinIN
	method
Centre for	Centre for Entrepreneurship and Innovation benefits from the SpinIN project
Entrepreneurship	by:
and Innovation at	Increasing the discomination of recearch-based knowledge into society.
	through students
Aarnus University	 Increasing university collaboration with regional SMEs
	 Creating entrepreneurs jobs and employable candidates
	 Oualifying the experiences in the Centre related to various types of
	university-industry collaborations
	 Testing hypotheses and theories on growth and entrepreneurial
	development in an applied context
	 Having access to a learning context in which the Centre can actively
	measure entrepreneurial value creation and evaluate our academic
	assumptions.
The Danish	The Danish Industry Foundation benefits from:
Industry	Increased competitiveness
Foundation	 Increased iob creation in the industrial sector
	 Increased sustainable growth
	 Increased knowledge collaboration between Industry and University
1	· increased informedge contaboration between industry and oniversity



13. AWARDS / RECOGNITION

SpinIN has received press coverage in various national medias - e.g.:

- Berlingske / Innovation: "Mindre virksomheder inviterer iværksættere ind" (Berlingske newspaper / section on innovation: "small and medium sized companies invites entrepreneurs")
- Business Aarhus newsletter october 2012: "Erfarne forretningsfolk skal hjælpe iværk-sættere" ("Experienced business people will be helping entrepreneurs")
- > JP Aarhus: "Iværksættere får mentorer" (Entrepreneurs are given mentors")

Moreover, the SpinIN project has been mentioned in a series of newsletters from public and private organizations, entrepreneurial networks, business councils, business- and student-associations etc.

Finally, one of the participating student entrepreneurs has recently won the recognized growth-prize, "Green Change", from the Danish Business Authority.

LESSONS LEARNED

14. PRIMARY CHALLENGES

It is our experience that the legal issues of the collaboration often appear to be too difficult for the student entrepreneurs to manage if the established companies are relatively large. Moreover, student entrepreneurs can meet difficulties in honoring their wish to be physically collocated with the established company, because they still have obligations in relation to their study activity such as lectures, study groups and assignments. Because of these issues they often work in their start-up at odd times. By the same token, finalizing their studies students often experience substantial obligations in terms of writing their thesis, examinations, etc. which often takes away their focus from their start-up. Finally, most of the student entrepreneurs consist of more than one person, which can be hard to fit in to an office space in an established company.

15. SUCCESS FACTORS

Key to the increase in success rate, the creation of sustainable growth and jobs, and the various positive impacts mentioned in this paper is the strength of relationship between the co-located matching parties. A measure for strength is often associated with the amount of time spent together as well as the degree of reciprocity (Uzzi 1997). In this case time does not necessarily mean time spent working directly together on very specific issues, but also willingness to allocate time for questions and discussions pertaining to a broad range of more general aspect revolving around the matching parties. Hence, it is of fundamental



importance that the creation as well as the development of the relationship between the parties is supported throughout the process – always within the realms of reciprocity.

Finally, we are confirmed, from the daily feedback we receive from participants as well as the recently conducted semi structured interviews, that the integrated elements of the SpinIN-wheel, the matchmaking process conducted on the basis of the mapping and a thoroughly reconciliation of expectations, and the facilitation of action plans in accordance with the growth targets of the companies during the period of cooperation are key success factors for the creation of sustainable growth and jobs, and all the various positive impacts mentioned in this paper.

16. TRANSFERABILITY

The SpinIN project is highly transferable since it has no specific requirements regarding regional as well as university characteristics and it holds no apparent limitations regarding businesses or field of study for the involved participants. We believe that the method can be successfully applied in student incubators at all higher education institutions, as well as public or private incubators, business councils, business associations, and various business networks. However, as suggested in section 14 large companies could represent a challenge in some cases. Hence, we believe that the model is particularly suitable in regions with a relatively large number of SME's.

FURTHER INFORMATION

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• Uzzi, B. (1997) "Social structure and competition in interfirm networks: The paradox of embeddedness", Administrative Science Quarterly, 42: 35-67.

18. LINKS

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- http://eship.au.dk/en/undervisning/
- http://cei.au.dk/aktuelt/nyhed/artikel/tasken-fuld-af-baeredygtighed/
- http://cei.au.dk/aktuelt/nyhed/artikel/paa-skanderborg-er-et-telt-ikke-bare-et-telt/
- http://www.youtube.com/watch?v=lBlsRnZXPro#t=0
- http://industriensfond.dk

19. KEYWORDS

University-industry collaboration, student entrepreneurs, job creation, SpinIN, match making, facilitation, innovation, growth

20. PUBLIC CONTACT DETAILS

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UNIVERSITAT JAUME I - NETEC: AN INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS

By María Ripollés, María Isabel Beas and Laura Martínez



INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS FROM UNIVERSITAT JAUME I: NETEC.





INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS FROM UNIVERSITAT JAUME I: NETEC.



1. SUMMARY

NETEC is an initiative directed both to academic staff and university students who want to enhance their entrepreneurial skills. Therefore, the aim of this initiative is to promote a more active role of the *Universitat Jaume* I (UJI) in the training of entrepreneurial students and the academic spin-off.

Specifically, with this program two essential objectives are pursued: First, to ease the valuation of the knowledge generated by the UJI academic staff; and second, to develop the entrepreneurial skills among its students.

The results obtained in the previous editions support the importance of the program, as almost a 25% of the projects carried out every year have been conducted in an academic spin-off. Moreover, a 50% of the involved students have developed later their own entrepreneurial project.

2. BACKGROUND

The NETEC initiative is justified by two increasing demands of the Spanish society when dealing with universities: to improve the valuation and transfer of the research generated in them, and promote their graduates entrepreneurial activity.

The need to improve the valuation and transfer of the research activity in the Spanish university context:

The current report about the Spanish Universities' state, "*La Universidad Española en Cifras 2012*", manifests the scarce importance given to valuation and transfer of the research that universities generate; especially if it is compared with their research activity (Michavila, et. al., 2013). Indeed, the report showed an increase of the scientific outcome the Spanish universities have had; from 16.000 papers in 2004 to 39.000 papers indexed in 2010.

If the number of the scientific publications is an index of the research activity, the registered patents represent an index of the obtained results that can be used in productive processes. Available data from 2010 shows that the activity of Spanish universities regarding patents has been 632 in the Spanish patent office and 102 in the European. This means an activity increase of twice and third times, respectively, along five years. Nevertheless, it is still an incidental percentage compared with the scientific productivity rate.

In the case of UJI, it is also possible to notice the evolution through the indexed publications in the latest years. According to the data supplied by the *Oficina de Cooperación en Investigación y desarrollo tecnológico* (The Office for Cooperation in Research and Technological Development, OCIT) in UJI, it has increased from 103 publications in 1997 to 520 in 2012 (Graphic 1). Additionally, following the general guidelines in universities, UJI also counts with an incidental percentage of patents in agreement to the scientific



production data. As reported by the OCIT, from 2001 to 2012, 49 patents have been requested in between priority requests and extensions.



Source: Self-production. Data from the OCIT.

The need to improve the entrepreneurial activity amongst university students:

The first part of the 21st century has been a stage of important changes in offer and demand within the Spanish university system. Regarding the offer, because this is the period of a new study system establishment, according to the Bologna Process, and regarding the demand, because there has been a decrease at the end of the last century, followed by a recovery phase due to the economic crisis (Michavila, et. al., 2013).

The graduates' employment status has been getting worse with the economic crisis' effect according to data from *Muestra Continua de Vidas Laborales* (Continuous Sample of Working Lives, MCLV) from *Ministerio de Empleo y Seguridad Social* (Employment and Social Security Ministry). This data can be found in the report of *Datos Básicos del Sistema Universitario Español* (Basic Data from the Spanish University System), academic course 2013-2014, from *Ministerio de Educación, Cultura y Deporte* (Education, Culture and Sport Ministry, MECD).

A 58% share of the graduates from 2005-2006 have been registered to Social Security the year following their graduation. This number was increasing up to 70% since the third year. If we take into account the corresponding data for graduates of the 2010-2011, it is seen that the number of the Social Security members (graduates) the year after they had ended their studies is 49% (2012), almost ten points lower of 2007 levels.

Another important sign is the employee's rate of members in the Social Security. The employee's percentage remains almost constant along the years from a 92-94%, while the presence of self-employed is a minority, in between a 6 and 8%. (Graphic 2) (MECD, 2013).







Source: MECD. Datos Básicos del sistema universitario español. (Basic Data from the Spanish University System).

The sectorial distribution of employees with university studies- similar for Valencian Community and Spain- keeps on reflecting a huge number of graduates' employees in the Public Administration, Healthcare and Education, whose percentages' sum reaches a 44% of the total. (Graphic 3) (AVAP, 2013).

Graphic 3 Employed people of 25 and over according to the activity sector / industry. Valencian Community 2012



Source: AVAP (2013). Libro Verde. Empleabilidad de los titulados universitarios de la Comunidad Valenciana. (Employability of graduates in the Valencian Community)

The intensity in university students' employability regarding several areas is directly connected with the technologic intensity of the activities or, in other words, with the intensity employed in knowledge. The Valencian Community and Spain are characterized by concentrating their work in activities with medium and low technologic intensity. (Graphic 4) (AVAP, 2013).



Source: AVAP (2013). Libro Verde. Empleabilidad de los titulados universitarios de la Comunidad Valenciana. (Employability of graduates in the Valencian Community)



UIIN GOOD PRACTICE SERIES

Case study written by María Ripollés, María Isabel Beas & Laura Martínez www.uiin.org

As the structure of Bologna has been introduced, degrees and postgraduate educative offers have grown up to certain levels, which are thought to be excessive by some people, regarding our system needs (Michavila, et. al, 2013). To solve this problem of overqualification, it is needed to partly implement change in the occupational structure, as well as in the productive context, and that transformation relies on entrepreneurial initiatives. Universities play an important role in achieving this goal. Consequently, a relevant aspect of the graduate's activity deals with their involvement in entrepreneurial tasks. The presence of students in such activities and the management occupations is crucial because of their educational levels facilitate the knowledge incorporation when taking important decisions like specializing and organizing enterprises, technologic profiles, human capital employment, the markets towards it is oriented, etc.

The entrepreneurial initiatives are necessary for entrepreneurship and business creation but also, in many other tasks and occupations and, of course, to the business management which currently exist. For this reason, when taking into account the students' participation in entrepreneurial activities it is important to make reference to three different groups: the entrepreneurs hiring employees, the entrepreneurs not hiring employees (self-employed) and the managers.

The presence of graduates within the entrepreneurs, all considered together, is similar to the existent in the outcome of the employed people (26% in the Valencian Community and 29,5% in Spain, according to the graphic 5), but the educative profiles of each one of the groups are quite different.



Graphic 5 Entrepreneurial of 25 and over with university studies. Valencian Community and Spain 2012 (% out of the total)

Source: AVAP (2013). Libro Verde. Empleabilidad de los titulados universitarios de la Comunidad Valenciana. (Employability of graduate students in the Valencian Community)



The evolution of the formative levels in entrepreneurs divided into age groups does not show a general defined tendency of educative improvements in younger entrepreneurial, since it is quite dissimilar in the three groups. In the case of the managers, the percentages of graduates clearly increase as the age diminishes; the numbers of graduates in the group of 25 to 35 years old almost double the one which allows people over 55. In the case of the entrepreneurs hiring employees a progress can be observed of the ones who are under 55, but subtlety, and less substantial between the under 35 and the ones who are above 55. Finally, within the entrepreneurs not hiring employees the presence of graduates has not increased, which points to the self-employment option as a very recurrent one within people with a low level in studies (Graphic 6)





Source: AVAP (2013) Libro Verde. Empleabilidad de los titulados universitarios de la Comunidad Valenciana. (Employability of graduates in the Valencian Community)



If we focus on the reality in UJI, we may find a slight increase in the number of graduates who manifest a preference for entrepreneurial projects as it is seen in the table behind (Graphic 7). In Graphic 8 a positive evolution of the graduates' expectations in UJI is detected for different methods of self-employment.



* Graduation Year: 1998, 1999, 2000 (Interviewed in 2003); Graduation Year: 2001, 2002, 2003 (Interviewed in 2006); Graduation Year: 2004 (Interviewed in 2010); Graduation Year: 2008, 2009 (Interviewed in 2013) Source Occupational Observatory Studies (OIPEP) http://www.uji.es/serveis/ocie/acil/prog/obser/



Graphic 8 Working expectations of graduates in UJI in relation with self-employment

Source: Occupational Observatory Studies (OIPEP) http://www.uji.es/serveis/ocie/acil/prog/obser/

In brief, if universities should assume the challenge of promoting entrepreneurial skills within the different university groups, it is necessary to get involved in the design and implementation of experiential and collaborative learning methods oriented to the acquisition of entrepreneurial abilities. Researchers need to get involved in valuation processes and transfer with the aim of making sure the results in research are used to answer concrete problems and contribute to improve the societies' comfort which enhances them. On the other side, the future graduates need a high-specialized training in the discipline



chosen, but also a multidisciplinary one to help in developing competencies related to entrepreneurship.

3. OBJECTIVES

The main objectives set by NETEC are:

- To improve the process of valuation and transfer of knowledge generated in the UJI.
- To promote entrepreneurship within university lecturers and researchers.
- To enhance entrepreneurial abilities of university students.
- To train university students in entrepreneurial skills.
- To teach students in business plans elaboration.

4. **RESPONSIBILITY**

The main responsible agents for the implementation of the NETEC initiative are:

- The Faculty of Law and Economics (FCJE), the School of Technology and Experimental Sciences (ESTCE), the Faculty of Humanities and Social Sciences (FCHS) and the Faculty of Health Sciences (FCS): the faculties are the academic centres where students and research groups that are selected in the projects come from. They are also providing funding of the scholarships for the students of their school.
- The INCREA Chair of Innovation, Creativity and Learning: its mission is to promote, both in the university community and Castellon society, the development of activities that foster creativity, innovation and entrepreneurship. In this program, INCREA Chair is responsible for training and mentoring students in entrepreneurial competences and skills.
- <u>The Office for Cooperation in Research and Technological Development (OCIT)</u>: Within the NETEC program, this Office is responsible for the assessment/valuation of the projects submitted by the researchers.
- <u>Research units</u>: They provide the technology, the knowledge and get involved in the tasks of developing and evaluating a business idea based on their research. These research units should express their will to create a company to enter into the project. Moreover, they should deliver the results of their research either in product, technology or service and must undertake to report students the characteristics of their research.
- Students with Entrepreneurial vocation: They will be selected according to their academic record and their entrepreneurial intention. They will work with the research group in order to identify business opportunities based on the commercialization of knowledge and/or the technology generated by the research team. The work groups will be created with students that would preferably come from the different faculties. The aim is to promote discussion and teamwork with different technical and social skills.
- Universitat Jaume I (UJI): UJI provides the necessary infrastructure so they can develop business plans. In this sense, the different entrepreneurial UJI agents will offer support in the areas of training, information, advice and cooperation.



INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS FROM UNIVERSITAT JAUME I: NETEC.



5. STRATEGY & ACTIVITIES UNDERTAKEN

NETEC is a strategic action that promotes entrepreneurship though the creation of working groups between the academic staff and university students to jointly develop a business plan associated with the academic staff' research results.

In order to do this, the following activities are undertaken:

- Publication of scholarship's call for students
- Selection of students according to two criteria
 - Academic rewards
 - Entrepreneurial orientation, in which the students are asked to fulfill a form about entrepreneurial intention, developed by the INCREA Chair
- Selection of research teams according to the research and Knowledge transfer the possibilities of their research results.
- Students and researchers' training and mentoring in entrepreneurial competencies and business' plans production
- Business' plans presentation in front of the university and business communities with the aim of finding possible partners to make sure their realization

6. MONITORING AND EVALUATION

Control sessions with students and researchers to evaluate the business' plan evolution. A minimum of 5 control sessions in which the product or service outcome derived from the research taken by UJI academic staff are analyzed. In these sessions the strategic and market viability, the financial and marketing plan needed to release the product or service to the market are also evaluated.

7. SUSTAINABILITY MEASURES

- Implication of ESPAITEC (Technologic Park in UJI) in the finance and mentoring of business' plans.
- Private finance to develop the program from networking established with companies participating in presentation rounds in which the business' plans are presented.
- Public finance according to several existent calls.

8. COSTS

Management costs (10% out of the budget)	800€
Training costs	7000€
Spreading and promotion expenses	1000€
TOTAL COSTS	8800€



9. FUNDING

The funds to support the program come from several institutions in UJI; The Faculty of Law and Economics (FCJE), The School of Technology and Experimental Sciences (ESTCE), the Faculty of Humanities and Social Sciences (FCHS) and the Faculty Health Sciences (FCS) together with funds from the INCREA Chair

√

OUTCOMES & IMPACT

10. OUTCOMES

During these four editions, 47 students have benefited from the program: 17 students from the FCJE, 11 from the ESTCE, 11 from the FCHS and 8 from the FCS from UJI. In addition, a total amount of 15 research units/ researchers have participated.

The results obtained from the team work including students, researchers and managers from the INCREA Chair are exposed in a business plan where different ways or means of commercialization of that research's outcome are presented.

During the four editions the following projects have been carried out:

First edition: 2010-2011 academic year: 3 projects, 6 students from the FCJE.

- Project: "Powder development for coating through thermal projection of high-resistance towards high-temperature oxidation and corrosion" Research unit or main researcher: Kudama A. Habib. Students: Maria Carmen Sidro Marin. Alejandro Barreda Parra.
- Project: "Energy consumption regulation technology in digital systems" Research unit or main researcher: Rafael Mayo Gual Students: Magdalena Costantino Gorostidi. Marina Soriano García.
- Project: "Use of sewage sludge for fuel and ecologic fertilizer production" Research unit or main researcher: Leonor Lapeña Barrachina. Students: Cristina Mas Gil y Adrián Rodríguez Hernández.

Second edition: **2011-2012 academic year:** 3 projects, 9 students from the FCJE, 3 from the ESTCE, 3 from the FCHS.

- Project: "Design of a glass cleaning machine from a mercury lamp" Research unit or main researcher: Antonio Gallardo Izquierdo Students: Salvador Gómez Iniesta (ESTCE), Isabel Esbrí Navarro (FCJE) y Mathias Rodríguez Martínez (FCHS)
- 2) Project: "Evaluation and restoration of brain damage" Research unit or main researcher: Micaela Moro Ipola



Students: Adrián José Verchili Goterris (ESTCE), Edgar José Rambla Jaén (FCJE) y M^a Amparo Montaner Ruiz (FCHS)

 3) Project: "Gamesonomy".
 Research unit or main researcher: Miguel Chover Selles
 Students: Alberto Asensi Sebastián (ESTCE), José Antonio Capilla Sancho (FCJE), Daniel Ortiz Bes (FCHS)

Third edition: **2012-2013 academic year:** 5 projects, 16 students, 4 from the FCJE, 4 from the ESTCE and 4 from the FCS.

- Project: "MamáFeliz". ("Happy Mom") Research unit or main researcher: Azucena García Students: Hugo Astilleros (FCHS), Iván Pallarés. (FCS), Carlos Gonzalvo (ESTCE), Celia Pallarés (FCS).
- Project: "EBChem" Research unit or main researcher: Santiago Luis Lafuente y Eduardo García-Verdugo Cepeda. Students: Karla Navarrete(FCJE), Juan Valero (FCJE) y Aina Cendra (FCHS)
- Project: "Quality control using molecular techniques in agricultural food and biological control of plagues"
 Research unit or main researcher: Mónica A. Hurtado Ruiz, Tatiana Pina Desfilis, Josep A. Jacas Miret.
 Students: Miguel Martí (FCJE), Andreea Sutu (FCS), Marc Monfort (ESTCE).
- 4) Project: "Educative services business "associated with the research outcome" (Conclusions on the Project Guide design of self-learning from adaptation, application and valuation of materials carried on in the educative innovation project, 11-12 school year, their contextualization within primary and nursery school curriculum 10G136)"

Research unit or main researcher: Roberto García Antolín, Miguel Salvador Bauzá y Vicente J. Salvador Martínez.

Students: Nestor Nieto (ESTCE) y Juan F. Balaguer (FCHS)

 5) Project: "Solar Decatlon".
 Research unit or main researcher: Teresa Gallego
 Students: Restituto García (FCJE), Oscar Parrilla (FCHS), Jonathan Peñalver (FCS) y Sergio Aguilella (ESTCE)

Fourth edition: **2013-2014 academic year:** 4 projects, 4 from the FCJE, 4 from the ESTCE, 4 from the FCHS and 4 from the FCS.

1) **Project:** "Attention service and prevention towards mental block in emergency situations"

Research unit or main researcher: Francisco Palmero

Students: Xavier Valls Pla (ESTCE), Rocío Vidal Menacho (FCHS), Naiara Aguirre Vidal (FCS) y Francesc Pedro Andrés (FCJE).



- Project: "Ventilation unit for covers" Research unit or main researcher: Juan Antonio García Esparza Students: Alba Valle Mas (ESTCE), Soumaia Nejjar (FCHS), Patricia Ros Zaragozá (FCS) y Alba Franch Llacer (FCJE).
- 3) Project: "La maleta de la ciencia". (The science suitcase) Research unit or main researcher: Enric Ramiro Roca Students: Elena Forcada Balaguer (ESTCE), Cristina Borja González (FCHS), Elena Fernández Gutiérrez (FCS) y Raquel Álvarez Ramírez (FCJE).
- 4) Project: "Aplications bound to the Gentt Corpus" Research unit or main researcher: Anabel Borja Students: Luis de la Fuente Roig (ESTCE), Laura Montañés Monfort (FCS), Eva Navarro Ballestín (FCJE) y Oscar Martínez Boronat (FCHS).

11. IMPACTS

The NETEC program has, as its main goal, promoting and favouring the transfer and exchange of both knowledge and abilities between students and researchers. The obtained advantages are work both ways, not only for students but also for researchers.

On the one hand, students are provided with entrepreneurial abilities and competencies that allow them to improve their employability, and encourage entrepreneurship or self-employment. The monitoring of students involved in the NETEC program show us that almost 50% of the students are currently developing their own entrepreneurial initiative, or that they are working in the innovation and creation sections favouring intra-entrepreneurship.

On the other hand, in terms of academic spin-offs, the results obtained are much modest; only a 25% of the research groups have created a business or have requested a patent.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

The NETEC program is part of the actions developed in UJI to enhance the Regional Innovation System.

13. AWARDS / RECOGNITION

- Simposio de Educación Emprendedora en la universidad (Entrepreneurial Education Symposium at the university) in Fundación Universidad Empresa de Madrid. (September 2012.) Presentation:NETEC' Program.
- Seminario Bienal, "En pos de la educación activa. Taller de buenas prácticas: presentación de experiencias". (Biennial Seminary; For an active education. Good internship course: presentation of experiences). Madrid, 29-11-2012. Presentation: "Technologic Business Program based on Technology and Knowledge (NETEC).



INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS FROM UNIVERSITAT JAUME I: NETEC.



14. PRIMARY CHALLENGES

Lack of entrepreneurial culture among the academic staff. Lack of appropriate finance resources to benefit the analyzed results' exploitation. Lack of steady networks between University and business.

15. SUCCESS FACTORS

Learning Synergy Cooperative Work Extracurricular Learning

16. TRANSFERABILITY

Easily transferable to any University or Research Centre



17. PUBLICATIONS / ARTICLES

- Fundación Universidad-Empresa of the University of Valencia ADEIT. (2011). "20 ejemplos de buenas prácticas: Fórmulas de cooperación universidad empresa"; pp.38-40.
- Fundación Universidad Empresa de Madrid. Simposio de Educación Emprendedora en la universidad: http://www.fue.es/seeu (Septiembre 2012)
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INITIATIVE FOR THE DEVELOPMENT OF BUSINESS OPPORTUNITIES BETWEEN HIGH PERFORMANCE STUDENTS AND RESEARCHERS FROM UNIVERSITAT JAUME I: NETEC.

18. LINKS

www.uji.es/serveis/increa

19. KEYWORDS

Entrepreneurial universities, entrepreneurial students, academic spin-off, experiential learning

20. PUBLIC CONTACT DETAILS

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FROM RESEARCH TO MARKET: An example of how to manage the innovation process

By Marco Casagni, Gaetano Coletta, Alfredo Fontanella and Davide Fratini





TITLE OF THE CASE	Concentrating Solar Power (CSP) technology: from Research to Market. A Case Study.
SALES PITCH	An example of how to manage the whole innovation process, avoiding the pitfalls of the intermediate stage between basic research and commercialization
ORGANISATION	ENEA – Italian National Agency for New Technologies, Energy and Sustainable Economic Development
COUNTRY	Italy
DATE	February 2014
AUTHORS	Marco Casagni Gaetano Coletta Alfredo Fontanella Davide Fratini
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 □ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition





1. SUMMARY

Since 2001 the Italian Agency ENEA undertook a wide research and development program aimed at developing a new concept of Concentrating Solar Power (CSP) technology (parabolic trough variant) using high-temperature (550°C) molten salt as either heat-transfer and heat-storage fluid, instead of synthetic oil (390°C) which is the current heat transfer fluid in CSP plants. In 10 years the technology developed from the laboratory phase to the industrial-scale demonstration, with the realization after 10 years in Sicily of a 5 MW plant realized by ENEL (the biggest Italian electricity company) and giving rise to a complete national supply chain.

The case study presented is, therefore, a success case of public applied research entailing relevant technology transfer to the productive sector that can represent an example of how to manage the whole innovation process, avoiding the pitfalls of the intermediate stage between basic research and commercialization.

The worth of the reported experience lies in the consideration that, whereas it is widely recognized the usefulness of a public intervention into the innovation process (such as the intellectual property system, government support of innovative activities, R&D tax incentives, and the encouragement of research partnerships of various kinds are therefore justified) to overcome the tendency of the private sector to under-invest in R&D, there is generally a lower awareness of the circumstance that economic activity does not arise from basic research alone, but from later diffusion of new products, services or processes into the economy, and that this stage of the innovation process is often characterized by the existence of a so called "Valley of Death". Among the causes of such a gap between basic research and the commercialization stage, it is possible to recognize the basic uncertainty involved by the whole innovation process and the expertise, both technical and commercial, required by an innovation project as it moves away from "pure knowledge" toward commercialization, unlikely uncovered in the same organization. All of this considerations, together with the awareness that innovation drives economic growth, seem to support a public intervention in the intermediate stage of the innovation process too.

2. BACKGROUND

ENEA (the current Italian National Agency for New Technologies, Energy and Sustainable Economic Development) has been for a long time since its foundation in 1952 the Italian body specialized in the peaceful applications of nuclear energy and has, therefore, developed sizeable skills, know-how and expertise on technology development to design and build nuclear plants and fuel-cycle facilities, reaching an international excellence level especially in the fields of plant designing, proof-plant building and new materials. In 1982 the research field of ENEA was extended also to renewable energy sources, that became its main research field after the nuclear ban in Italy of the 1987.



Among the renewable technologies, Concentrated Solar Power (CSP) is aimed at turning solar heat into electrical energy. The CSP technology is based on optical systems that gather the direct solar radiation, concentrate and send it toward a receiver, where it is converted into high temperature heat and transfer this heat, by means of a heat carrier fluid, to the thermodynamic power cycle, similar to those used in the fossil fuel fired power stations. There are various arrangements that differ in the shape of the concentration device, so we have the following types:

- 1) parabolic dish;
- 2) solar tower and mirror field;
- 3) linear parabolic collector or parabolic trough;
- 4) linear Fresnel collector.



Figure 1: Types of CSP

Several pioneering attempts to exploit solar heat as an energy source are traceable in the last 2,000 years (starting at least from Archimedes in 212 BC), and Italy was among the pioneers in this field also in the 20th century with the studies performed by Professor Giovanni Francia since the early 1960s, on which were based the CSP plants later achieved. Restricting our attention from the 1970s onwards, a period in which the oil crisis hard pushed on politicians and the industrial community, giving rise to a renovated interest for renewable energy sources, it is possible to recall the fulfilment first in 1977 of the



prototypes of solar tower and mirror field in Sant'Ilario (Genova - Liguria), on initiative of the Ansaldo engineering company, and then, at the beginning of 1981, of "Eurelios", the world's first large (1 MW) solar tower plant to be connected to a national electric grid in Adrano (Catania - Sicily), with the engagement besides Ansaldo of ENEL (the Italian electric utility) and with funds from the European Economic Community.

However, after the completion of the tests in 1985, the "Eurelios" plant was shut down, and it was not better the fortune of the pilot solar station called "La Capanna" (always a tower concentrator plant) installed in 1983 by ENEA at its Casaccia Research Center (near Rome), disassembled a few years later without ever having been used.

Considering that both Ansaldo and ENEA were involved in revamping the peaceful applications of nuclear energy to respond to the oil crisis, it is probably correct to suppose that both the pioneering attempts to develop the CSP technology were driven by the political purpose to contrast the opposition to the nuclear energy and not by the goal to explore the prospected applications of the solar energy.

Unlike this first Italian experience, CSP had a strong development between the 1984 and the 1991 in the USA, where the BrightSource Energy Inc. fulfilled 9 facilities (SEGS, 354 MW total power) that are currently still working. Instead of tower concentrator systems, the choice for the first commercial scale plants in California was of parabolic trough systems, due to the high cost of the heliostats at the time and to the issues on the receiver design. The lower concentration ratio achievable by parabolic trough systems than the level allowed by the tower concept was partially reduced using a novel vacuum type absorber tube.

Afterwards, also because of the changed circumstance with a falling fossil fuel price, the development of the combined cycle technology (characterized by low investment costs and high conversion efficiencies) and the new energy policy of the Reagan time, the building of new CSP plants suffered a break until the early 2000s when first, above all, Spain and immediately later Italy, through the project presented in this case study, give especially rise to new development programs with the aim to bring the technology to an industrial maturity stage.

The re-launch of the Italian CSP technology in 2001 is connected with the Nobel laureate Carlo Rubbia's (at the time President of ENEA) suggestion to use molten salts (a mixture of potassium nitrate and sodium nitrate) as heat transfer fluid, instead of diathermic oil, in the receiver/boiler of a linear parabolic concentrating system. The worldwide prevailing technology at the time was indeed that of the parabolic trough systems, and with a share greater than 90% it is still the current dominant technology.

Concentrated Solar Power (CSP) is going to become a commercial technology able to give a significant contribution to the world energy supply. This technology has many interesting features, particularly the capability:

- to store thermal energy, so to regulate the power production according to the demand of the users (dispatchability);
- to be easily integrated with thermoelectric power stations, so to utilize the same thermal cycle and relating machinery;



- to arrange hybrid systems, with the aim to utilize in the best way the renewable energy sources available locally;
- to utilize profitably arid lands or disused areas.

3. OBJECTIVES

Among the goals of the ENEA's Archimedes experimental project arise two main objectives, one of technical type, the other related to the technological transfer to the Italian industrial system.

From the technological viewpoint, the experimental project was aimed at developing a new generation of solar plants, more efficient and profitable though various innovations relating particularly to:

- the utilization of a mixture of molten salts as heat transfer fluid;
- the improving of the solar concentrators and the sun-tracking system;
- the improving of the receiver tubes.

Since the revamping of the CSP technology, from the beginning of the 2000s, the research in the field of the parabolic trough was mainly focused on the improvement of the performances and the optimization of the manufacturing process of the key-components, as the collector structures, the receiver tube, the selective coating and the reflecting panels. Advanced researches were relating, in particular, to the heat transfer fluids and to the arrangements and materials of the thermal storage system. The aim was to increase the range of the operating temperatures and then the efficiency of the system to, obviously, reduce the costs.

The aim to use molten salts as heat transfer fluid in the Archimedes experimental project was especially critical to make it possible to store solar heat and thereby enable the system to operate more regularly. Mixtures of molten salts were already used in industry and in the half of the 1990s they were also tested as heat transfer fluid in a solar plant in the USA (Solar Two), but of the solar tower type with only a short circuit. The other attempt of using molten salts in a solar plant was made in Spain (Andasol) later, at the end of the 2000s, but it was limited to the thermal storage, going on with the use of oil as heat transfer fluid.

The ENEA's project was, and still is, the only one regarding the molten salts utilization in wide pipe networks, extending for kilometres, where the risk of solidification is very high. It was then necessary to develop special devices and operating procedures to prevent this occurrence.

From the technology transfer standpoint, the objective was to foster the creation of a national supply chain in the rising CSP industrial sector.

The worldwide rising inequality in the distribution of income and the restrictions on the public finance were already at the beginning of 2000s a constraint to the growth of demand, and then of the economic systems, to be loosened. However, looking also at the Italian case, the economic growth is a function of the new markets creation process too. Since the main trouble for an economic system is that of demand expansion in time and since it is possible to observe how the demand growth for some products or services is faster than others, basically the rising sectors and that more broadly involved in product innovation processes,



the differences in the rate of growth among countries of the same per capita income were influenced by their capacity to exploit the opportunities arising from these new markets.

In other words, one of the means to tackle the recurring demand and economic growth slowdown is to pay attention to the "structural change" of demand and production, which is the result of the differentiation strategy of the firms seeking to catch the new demand opportunity stemming from an evolving society. The factors affecting such differentiation strategy are above all the technology and the market structure (current and expected) of these rising sectors. Restricting our attention to the technology factor, if we agree to the assumption that knowledge is largely tacit and implicit in the specific production process and not easy to be spread, the problem is that what firms will be pragmatically able to do in the future is significantly bound to what they did in the past. And this is more true as smaller the firms involved are. Normally, they do not have both the technical and the financial endowment to tackle the uncertainty implied in a pioneering market. On the other side, the public research institutions are endowed with a large technical expertise, but they lack normally any commercial competence, as well as of available financial capitals.

It is well deducible from these considerations which are the reasons at the root of the so called "Valley of Death". Without a strong collaboration between research institutions and firms, and the necessary financial support and strategic direction of the Government, it is hard to overcome one the main barrier to the functioning of the technology transfer process. After all the technology and innovation transfer remains one of the last effective industrial policy lever that countries like the European ones still can activate.

4. **RESPONSIBILITY**

The article n. 111 of the law n. 388 of 2000 (State budget law for the 2001) charged the ENEA with a research and development program aimed at achieving a demonstrating industrial plant to produce electrical energy from the sun as an high temperature heat source.

The research and the development activity till 2004 was managed by the ENEA involving in the program several firms selected through an interest expression announcement. The main program's objective was to come to the development of industrial products suitable to a large diffusion of this technology, therefore a close collaboration with industrial partners was strategic to the identification of the solutions more feasible in the case of a mass production. In 2003, after the signing of a memorandum of understanding, started the collaboration between ENEA and ENEL (Italy's largest power company and one of Europe's biggest utilities) directed to the definition of the needed conditions to integrate the solar power plant to the existing combined cycle plants in the place chosen for the demonstrative plant and to draw up the final project.





5. STRATEGY & ACTIVITIES UNDERTAKEN

The interest of a country such as Italy in the technical and industrial development of the CSP technologies lies in the following strategic objectives:

- to take advantage of a cheap "clean energy" flow in the eventuality of a deeper integration of the Mediterranean area and of a globalization of the environmental issue;
- 2) to take part in the future world CSP market as technology supplier.

In order to make CSP technology competitive, to ensure a more widespread and more significant use of solar energy, it was necessary to overcome several hurdles. Among them, the main issue was that of reducing the costs of electricity generation from the heat of the sun, operating on the lowering of investment costs and on the increasing of the production efficiency. Ensuring "dispatchability" was another key feature to increase the market value of an energy producing method. However, all these aspects were conflicting and a compromise was needed. The attempt pursued by ENEA was therefore to combine several features of the two main CSP technologies, the parabolic trough and the solar tower, working for overcoming the critical issues of both. The innovation effort was directed to:

- the use of linear parabolic trough, a relatively mature technology among the CSP ones;
- 2) the use of molten salts as heat transfer fluid, already tested and used in some tower plants in the USA (Solar Two);
- 3) the development of receiver tubes suitable to functioning at high temperature;
- 4) the presence of a thermal storage capacity, also this already tested and used in the USA.

The linear parabolic collectors were already a relatively mature technology, even if there is still now very significant room for improvement, and were mostly operated with thermal oil. This technical solution didn't allow to reach temperatures higher than 400 °C, since with the increase of temperature over 400°C organic fluids as mineral oil, silicone oil and organic salts cannot be utilised because of the thermal instability of these substances, and therefore the production efficiency was lower than that of the solar tower one, which allow higher concentrator factors. The disadvantage with the latter was, however, in the higher technical complexity. If then in the long term the solar towers could prevail, the option for the parabolic troughs should have been accelerating the improvement time. The choice was then to work for a compromise between thermodynamic efficiency and mature designs for the collector and the thermal storage.

The innovating system pursued by ENEA was using as heat transfer fluid a mixture of salts (a cheap raw material), 60% sodium nitrate and 40% potassium nitrate, that melts down at about 238 °C, remains chemically stable up to about 600 °C and has good performances in heat exchange and transport. This system allows increasing the delivery temperature from the solar field up to 550° C, with a remarkable increase of the thermodynamic cycle



performances for the electric production (42-44 % versus 37-38 % in the case of solar plant operated with thermal oil). Furthermore, differently from the thermal oils, the molten salts would have not given rise to hazards in case of leaking out, because they are not inflammable, quickly become solid in contact with the ground and can be collected without any dispersion with mechanic means and furthermore, being commonly used as fertilizers in the agriculture, they are not environmentally harmful. However, since molten salts begin to solidify at 240°C, they were thought unsuitable for circulation in the receiver of a linear parabolic concentration system (a quite long pipe system), where the maximum temperature that could be reached in the pipe at that time was around 400°C. A drop in the temperature could cause the salts to start solidifying, with all the consequences that would entail. Mixtures of molten salts were already used in industry and tested in solar towers plants as Solar Two, USA, (as heat transfer fluid, but on a short pipe network) and Andasol, Spain, (limited to the heat storage system of a linear parabolic concentration plant); so the ENEA's innovation regards their utilization in wide pipe networks, extending for kilometres, where the risk of solidification is very high and it was necessary to develop special devices and operating procedures to prevent this occurrence. Another problem was related to the corrosion processes which the molten salts may give rise, especially at high temperatures.

The improving of the solar concentrators was, therefore, obtained by the ENEA with a new design of the collector's structure, based on a central bearing pipe and lateral variable profile supports, and the utilization of very thin glass on the reflecting panels. This solution yields high geometrical precision, low manufacturing costs and easy erection. But the more awkward element of the solar plant were the receiver tubes. They were devoted to transfer the concentrated solar energy to the heat transfer fluid that flows inside them, and since the tubes available on the market were designed to operate only up to 400 °C, it was necessary the development of new technical solutions. With the aim to reduce the thermal loss, the metallic tube (a variety with a good corrosion resistance in the range of temperature from 300 up to 600°C) was enclosed in a vacuum air gap, with special sealing between glass and metal and was coated with a special film, a new metallic-ceramic compound (CERMET) planned, realized and characterized at the ENEA's laboratories of Portici (Naples) together with its manufacturing process, able to efficiently absorb the solar radiation while emitting low quantities of infrared radiation to achieve the best performances and full suitability at high temperature and molten salt service.

Another important advantage of the molten salts is that they can be utilised both as heat transfer fluid and heat storage medium, removing the need of an heat exchanger and the associated temperature losses. As already pointed out, an extended energy storage is one of the main strategic choices of the ENEA programme and performs the important function of transforming the intrinsically variable solar energy resource into a fully "dispatchable", smooth energy source. It is interesting to compare the performances of the available different industrial methods for energy storage. From this comparison it was possible to conclude that thermal energy accumulation — in which the energy from the sun is transferred to heat up to high temperature an appropriate, thermally insulated bulk material — appears to be by far the best method. Thermal storage may therefore represent a large volume but not necessarily a large cost, since a part of the initial capital investment the price of such a natural salt, widely used in agriculture, is very low. Moreover, among the available salts suited to the temperature range 400÷600 °C, nitrate salts present convenient thermo-



	Type of storage	Cost for a 200 MW plant (\$/kWhe)	Operation Lifetime (years)	Storage efficiency (%)	Operating temperature (°C)
Molten-salt	HQH	30	30	99	567
Synthetic-Oil	HQH	200	30	95	390
Pumped hydro	ELE	500 to 1600	30	50	N/A
Compressed air	ELE		30	60	N/A
Superconducting	ELE	> 1000	30	90	cryogenic
Battery Storage	ELE	500 to 800	5 to 10	76	N/A

dynamic characteristics and a larger container, as required in our case, offers a better time constant for energy retention.

Table 1: Comparison of solar energy storage systems

The research and development program was operatively structured along three stages:

- 1) the development and the prototyping of the components and the innovative systems for concentrating solar plants;
- 2) the fulfilment of pilot plants for experimental activities;
- 3) the planning of demonstrative concentrating solar plants, to be fulfilled through joint-investment with industrial partners.

As already pointed out, another main strategic choice of the ENEA programme was to foster the creation of a new national supply chain. Since the beginning, therefore, ENEA had developed side by side with several national companies each stage of the programme, caring about to find the best technical solutions suitable to be transferred to a manufacturing mass production. In such a way, apart the single components of the CSP plant, it was also possible to develop and to plan new production plants for the components required. It was the case, e.g., of the special "co-sputtering" device employed in the manufacturing of the new coated receiver tubes.

To perform the experimental activities were furthermore planned and built by the ENEA special facilities:

- a full scale, real condition test facility for solar collectors (PCS system);
- a long term test facility for molten salt pipes and components (MOSE system);
- a laboratory for applied optics with specifically developed instruments;
- -a gathering and modelling system of meteorological and climatic data;
- a manufacturing and testing facility for coating material with special "co-sputtering" devices.




Figure 2: From labs to industrial demonstration (2001-2010)

In September 2003 was signed between the ENEA and ENEL the Memorandum of Understanding to realise the demonstrating facility (named Archimedes) considered in the law n. 388/2000 that charged the ENEA with the project. Between the 2004 and the 2007 was elaborated jointly first a feasibility study and then, on the base of the technical activities carried out, a preliminary plan for the building of a CSP plant integrated to one of the ENEL's two groups of a 760 MW gas fired Combined Cycle Power Station in Priolo Gargallo (Sicily).

A notable step was also the establishment by the Italian Government, after consulting both the ENEA and ENEL during the 2004, of an incentive programme in favour of CSP plants. It became actionable with the Ministerial Decree of the 11th April 2008 and the subsequent changes produced by the Ministerial Decree of the 6th July 2012.

The construction of the demonstrating CSP facility rated at 5 MW electric power was started by ENEL in 2008 and all the special components of the plant were supplied by the Archimedes Solar Energy Consortium, the association of the companies involved with the ENEA in the development of the new CSP technology and whom the ENEA granted the patent licences relative to the achieved innovations.

The Archimedes solar plant was completed in July 2010 and it is presently operated by ENEL that is responsible for the diffusion of the results so far obtained. It is even worth to recall that the solar plant utilizes jointly the steam turbine and the thermal cycle and that this arrangement allowed to concentrate the investment in the innovating components: the solar field, the thermal storage system and specially the molten salt pipe system (presently this is the largest system of this kind in the world with about 6.3 km extension).





Figure 3: Drawing of the integration of the CSP plant into the combined cycle power station planned in the "Archimede Project"

6. MONITORING AND EVALUATION

The same article n. 111 of the law n. 388 of 2000 (State budget law for the 2001) that charged the ENEA with the research and development programme aimed at developing the CSP technology up to the achieving of a demonstrating facility, committed the ENEA to arrange each semester a report to the Economic Development Department of the Italian Government about the evolution of the research and experimental activities, the planning and execution of the project and the costs management.

7. SUSTAINABILITY MEASURES

The ENEA's CSP project ended in 2010 with the finalisation and the activation of the Archimedes demonstrating facility in Sicily. The ENEA's working team was then reallocated on new research lines, also to develop further some of the outcomes of the finished project and to widening the potential application fields of the heat solar concentration technology, such as to produce power and desalinated water or to generate "solar fuels" like hydrogen.

However, the future of the Italian CSP supply chain relies especially on the development of a national and, above all, of an international demand for this kind of facilities. And this latter depends in turn on the Energy Policies prevailing in the next years.

8. COSTS

The total costs incurred from the laboratories R&S to the components test and qualification step in the period 2001-2006 for the ENEA's CSP project amount to 39.5 million of euro. The 54% of this cost was due to the labour costs, and approximately the 56% of the remaining costs was ascribable to the external contracts to the companies and research units involved in the project to realise the experimental facilities and devices.





Figure 4: Allocation of costs to R&D activities – 2001-2006

For the fulfilment of the demonstrating power facility were allocated further 27.5 million of euro aimed at financing a share up to 40% of the final cost of the plant. This amount, however, was not spent by the Government, since the whole realisation of the demonstrating CSP power plant in Sicily was at the expense of ENEL, although for a smaller one (5 MW rather than 28 MW).

9. FUNDING

The ENEA's Concentrating Solar Power (CSP) project benefited from a public funding. The law n. 388 of 2000 (State budget law for the 2001), that charged the ENEA with the research and development programme, at the same time assigned to the ENEA an extra grant of about 103 million euro to perform the tasks committed, distributed as follows:

- > 20.6 million of euro in 2001
- ▶ 36.1 million of euro in 2002
- ▶ 46.5 million of euro in 2003

The State budget law for the 2003 (L. 273/2002, art. 31), however, lowered the second and the third share of the grant in the subsequent manner:

- > 25.8 million of euro in 2002
- > 20.6 million of euro in 2003

Both these tranches of the public funding were further reduced of another 20% by the Decree of the Presidency of the Council of Ministers dated 07th March 2003 (DPCM 07th March 2003 – published on the "Gazzetta Ufficiale" of the 17th April 2003). After further abatements, the funding allocated by the Development Department for the project was of:

- 20.6 million of euro in 2001
- 13.8 million of euro in 2002
- ▶ 13.8 million of euro in 2003

Of the first tranche, only 15.5 million of euro turned out to be paid up to the 2007 against a cost of 18.2 million of euro (excluding labour costs). The other two tranches were dedicated



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to the financing of the 40% of the cost to build the demonstrating facility, but they were never paid.

Nevertheless, downsizing any of the research activity lines initially planned (such as that aimed at using the high solar heat to produce hydrogen), financing directly the labour costs (amounting to 21.2 million of euro for the whole life span of the project), reselling any of the experimental facilities and substituting them with cheaper ones (as in the case of the co-sputter facility), and, finally, counting on the ENEL's initiative of building the demonstrating power plant, the ENEA (thanks to all the people involved in the programme) succeeded in bringing it to an end.

OUTCOMES & IMPACT

10. OUTCOMES

Since the beginning, the ENEA's CSP project was aimed at developing a national supply chain of the sector. The main outcome should then be find, a part in the improvement of the CSP technology, in the growth of an Italian manufacturing capacity to supply the CPS technology to the market. As a consequence of the industrial R&D programme in Italy coordinated by the ENEA, there was:

the birth of Archimede Solar Energy (ASE), a company of the Italian Industrial Group Angelantoni S.p.A. (Massa Martana, in the province of Perugia), now one of the international players in manufacturing receiver tubes, the key components of the solar plant; presently ASE receiver tubes are the only explicitly designed to operate with molten salts at temperatures up to 550 °C..

Moreover, from the ENEA R&D efforts arose:

- the diversification of a the industrial activity of Ronda S.p.A. Group (Vicenza) with the creation of the Ronda High Tech – CSP Division, specialized in the manufacturing of solar collectors; since 2007 it has an on-going collaboration with the ENEA Research Center Casaccia (near Rome) from which has been developed and concretized the industrialization of the production of large reflective panels that are easy to assemble, characterised by high optical performance and new lighter and better performing metal structures panels for the solar industry;
- the widening of the manufacturing supply of Reflex S.p.A. (Treviso), part of a group of companies including Società Vetraria Biancadese, and producing mirrors since 1958. Reflex entered in an high-tech sector after the development with the ENEA researchers of a new generation of ultra-thin mirrors for reflective parabolic panels with an estimated durability over 20 years;
- the development of a new expertise for D.D. s.r.l. (Udine), a company specialised in the manufacture of steel structures and machining, machine final assembly. Since 2003, together with the subsidiary SIFA s.r.l., has a collaboration with the ENEA for the development of the prototype for a CSP plant. The company plans and supplies mechanical components;



the deepening of the technology knowledge of Duplomatic Oleodinamica S.p.A. (Milano), which has realized the sun-tracking collector system, formed by a supporting framework (including shaft and cylinders) and by the hydraulic drive system (including the control panel).

11. IMPACTS

As it was described in the previous paragraph, the main benefit that the program has had on the private stakeholder involved was the opening of a new potential market.

The establishment of a national Consortium "Solare XXI", formed by four sector leading companies, and aimed at continuing in developing a highly technological and innovative product, such as the linear parabolic solar collector with molten salts, has been possible only through the technological leap allowed by the ENEA's CSP research and development program.

Apart from the four companies forming the Consortium "Solare XXI", representing the Italian technological excellence in the sector (Archimede Solar Energy for the production of the receiving pipe, Ronda High Tech for the realization of the reflective panels, Duplomatic for the motion control system and Techint for the design of the supporting frameworks and the component integration), the Italian manufacturing system is able today to produce more than the 90% of the components of a standard scale CSP plant.

As a consequence of the success of the demonstrating CSP plant in Sicily and of the new industrial lobby subsequently established, in July 2012 the Italian Minister of Economic Development and the Minister of Environment approved a new decree for the new renewable energy mix, also in favour of the CSP technology: 600MW are the expected CSP Plant connected to the grid by 2020. But this is only relative to the short-term. To perceive the possible long-term impact of the innovation process triggered, we have to look at the ongoing investment strategies of the new leading companies of the sector.

On the 14th September 2011, Archimede Solar Energy opened in Massa Martana (Perugia) a new manufacturing plant. The amount of the investment has been of 60 million of euro, and has given rise to a fully automated plant area of more than 30,000 sqm, having an expected full capacity of 75,000 receivers per year in 2013, and of 140,000 receivers per year in 2014. Moreover, in 2013, ASE and the japan Chiyoda Corporation have invested 6 million of euro to build the first stand-alone Molten Salt Test Loop in the world, close to the ASE manufacturing plant in Massa Martana (Perugia), to provide a focus for research oriented to the new frontiers of CSP.

In relation to the ENEA, the expertise grown up with the Archimedes project allowed it to acquire a leading position in the research field. In July 2011 ENEA started the MATS project (Multipurpose Applications by Thermodynamic Solar), with a total investment of 22 million Euro, of which 12.5 million funded by the European Union. The aim of this project is the construction in Egypt of a concentrated solar plant based on some new concepts developed by ENEA, relating to the modularity of the solar field, the storage system with only one tank instead of two, the integration of the steam generator inside the storage tank (TREBIOS system). The purpose is the combined production of electric power (1 MW) and heat (4 MW) to be used for air conditioning and water desalination (250 m3 per day).



The project is coordinated by ENEA with the participation of other research organizations (CEA, France - ISE and Fraunhofer, Germany - ASRT and NREA, Egypt - University of Cranfield, UK) and some industrial companies (Tecnimont KT, Ronda Group and Archimede Solar Energy, Italy - Orascom Construction Industries and Delft Environment, Egypt).

The industrial research is also engaged in the development of new application of CSP, such as "small CSP" and "integrated systems". "Small CSP" indicates the utilization of CSP technology in small facilities (about 1 MW) to produce only heat or combined heat and power (CHP); they have small sized collectors, can reach lower operating temperature and can be installed on the roofs of buildings and industrial warehouses. These systems can be convenient in the industrial sector to produce process heat or in the service-producing sector for the space heating and cooling. "Integrated systems" means CSP plants specifically designed and optimized to operate in integrated way with other renewable energy sources, especially biomass, and to produce electric power, process heat, space heating/cooling, desalinated water and so on.

Company	Sector
Angelantoni Industries	Receiver Tubes
Archimede Solar Energy (ASE)	Receiver Tubes
BHT S.r.l.	Reflective Panels
Consortium CSP	Planning
Donati Group	Reflective Panels
Duplomatic Oleodinamica S.p.A.	Trackers
ENEL	Plant realisation and management
Faini Telecommunication Systems	Mirrors
ITIV	Glass Manufacturing
POLO	Components
Ronda High Tech – CSP Division	Mirrors
SIFA S.r.l.	Steel-Structures
Steroglass	Metal-Glass Junctions
Techint S.p.A.	Engineering
Tolo Energia	Engineering

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Table 2: Italian companies involved in the research and development program

One of the most important commitment of ENEA is the knowledge transfer to the industrial sector. Several were then the Italian industries involved in the prototyping of system components and in the design and construction of solar plants in the life span of the project. Among the companies involved in the development activities of the Italian CSP program, several have acquired, in addition to the specialized expertise in one or more stages of the CSP supply chain, intellectual property rights. We can recall, one for all, the case of Archimede Solar Energy, which has a worldwide patent in an innovative CSP technology, the molten salt receivers.

Thanks to the availability of this knowledge and competence, Archimede Solar Energy has planned a challenging national and international expansion program in the new CSP market. The main investment projects located in Italy are 4 new plants in Sardinia, 1 in Sicily and 1 in Basilicata. International projects located in China, California, New Mexico and Egypt.

In September 2012, Chiyoda (a Japanese company engaged in integrated engineering) entered Archimede Solar Energy's share capital with a 15% stake.



However, also collector and mirror manufacturers like Ronda High Tech, Reflex S.r.l., D.D. S.r.l., and collector tracking equipment like Duplomatic Oleomatica S.p.A. could benefit of intellectual property rights arisen from the ENEA's CSP research program and widen their product portfolio.



13. PRIMARY CHALLENGES

From a technological point of view, the main challenge to the program was related to the choice of using molten salt as heat transfer fluid and the scepticism of the scientific community, also for the memory of the past experiences of Adrano and "La Capanna" in the beginning of the 1980s. The use of molten salt in wide pipe networks, extending for kilometres, rise greater technical issues than synthetic oil since they solidify at high temperatures (between 142 and 238 °C, depending on their composition) and they tend to be corrosive.

It was then necessary to develop a whole range of technical solutions to keep the salt fluid and to adopt for pipes and the components suitable materials and building procedures.

The main barrier in the management of the program was, on the other hand, the lack of certainty about the funding and the policy targets of the national authorities.

14. SUCCESS FACTORS

The international prestige of the Nobel laureate Professor Carlo Rubbia and his intuitions were at the beginning of the whole program. However, without the creative capabilities and obstinacy to bring to an end the program available in the ENEA, the availability in Italy of an industrial system of innovative small-medium companies with an high quality standard, the attitude of ENEA researchers and companies to work side by side, the program would be hard accomplished.

We do not have to forget the willingness of ENEL to realize alone the demonstrating CSP plant. And, although all the uncertainty that characterized it, it was essential the public funding of the program. Otherwise, the risk and the uncertainty of the challenging project would have been too high to persuade the national manufacturing system to undertake it.

15. TRANSFERABILITY

The case study of the ENEA development between 2001 and 2010 of a new concept of Concentrating Solar Power (CSP) technology and, therefore, of the opening of a new potential market for the Italian manufacturing system, is a success case that shows how through the public applied research, entailing relevant technology transfer to the productive sector, is it possible to pursue industrial policy objectives.

If it could be possible to increase the awareness of such a potentiality, and consequently to avoid the pitfalls of the uncertainty about the funding and the willingness of the policy authorities, the financing of the technology transfer initiatives that involve industrial



partners since from the beginning of the development process could become a powerful tool to tackle the always threatening slowdown of our economic systems.

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17. LINKS

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- http://www.enel.com/en-GB/innovation/renewable_sources_development/concentrated_solar_power/archi mede/

18. KEYWORDS

Valley of Death, Proof of Concept, Technology Transfer, Concentrating Solar Power

19. PUBLIC CONTACT DETAILS

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TAKING RESPONSIBILITY FOR GROWTH AND JOB Creation:

AN EXAMPLE OF HOW A NETWORK UNIVERSITY TAKES RESPONSIBILITY IN MAINTAINING AND Developing Jobs

By Morten Dahlgaard and Jakob Stolt







CASE STUDY PROFILE

1. SUMMARY

In the light of an unhappy situation – the closing down of Nokia's R&D department in Denmark – Aalborg University and Nokia together thought out a scheme of how to take advantage of the situation and instead try to sustain and create jobs in the ICT sector by forming a coalition of partners that would join forces as to maintain some of the activities and make use of the competencies present and the entrepreneurial spirit following the closing down.

Coincidences, luck and swift acting walked hand in hand as the windows of opportunity only were open for a short while. Due to Aalborg University Copenhagen's rapid growth, the university was looking for new premises, and at the same time Nokia's announcement of laying off approx. 1,000 employees (mainly engineers) made way for discussions of how the university could play a role in the future for the former Nokia-employees. Aalborg University being the biggest ICT-university in Denmark had already strong collaboration with Nokia, so the dialogue was natural and made to secure that competencies present could take advantage of a university and vice versa.

Nokia had an ambitious programme of getting their employees new jobs, but also providing Nokia staff with start-up ambitions substantial aid, support, grants and mentoring. This actually led to a very high amount of start-ups during the period of closing down which ran approximately 18 month until the last Nokia-employee left the buildings in March 2013. Top management at the university and Nokia together with the pension fund owning the buildings came to an agreement that evidently made all three parties content. Aalborg University was getting a new campus, Nokia could be released from their contract of the buildings and the owners of the premises avoided empty buildings in an area that already had many free square meters.

But the real bonus of all parties was to sustain and develop R&D activity with the close collaboration of the university, "Nokia start-ups", and companies offered tenancy at the free spaces at the premises and the public and private innovation and start-up support schemes and entities.

Co-location for co-creation

The idea was to create an environment of trust, collaboration and closeness to each other. It was crucial that the normal way of locating companies and start-up decoupled from the university was to be avoided. The general idea was literally to have researchers, students and companies living next door to each other. The connection points were to be very physical and apparent, so that the mere moving around the campus would make way for planned and unplanned meetings between the entities present. This had of course also to be connected with formal structures of collaboration and exposure to one another.



The philosophy is that relationship building, common areas of academic and professional interest along with physical possibilities to live out these ambitions make way for new ways of collaboration taking advantage of all knowledge and competencies present. Sharing labs, use students for projects and as interns, form research projects and joint funding are all ways to create innovation faster when all are located where knowledge is created.

2. BACKGROUND

In April 2011 Nokia Denmark presented their plans for shutting down operations in Denmark with the potential loss of 1,100 jobs within mobile R&D and the effective closing of that Danish industry. Aalborg University (AAU) approached Nokia with the intention of helping out Nokia employees with whatever means available in hand of the university, AAU being the biggest ICT university in Denmark. Today, AAU Copenhagen campus is building on the legacy of Nokia, and has actually moved into the former Nokia headquarters, as the Copenhagen campus was growing rapidly and was looking for new premises.

Aalborg University had similar experience from Aalborg when two other major employers shut down their operations in the city. At that time Aalborg University also was in close contact with management of the corporations as to see how collaboration could help create futures and possibilities for the laid off employees. AAU has always been taking responsibility for the university's engagement and role in the society as to engage in whatever scheme that will make society benefit for university involvement.

The shutting down of Nokia was a big issue in Denmark in sign of the times, thus many parties – public and private – took part in the project of getting as many of the former Nokia employees in employment again as soon as possible.

3. OBJECTIVES

The main objectives of the initiative are to further build on collaborations between the university and its surrounding in taking part in regional and economic development;

- Further enhancing 3rd Mission activities;
- Creating stronger and better ties to industry;
- Develop and sustain entrepreneurship and start-up activities;
- Co-location for co-creation;
- Easier access to knowledge and facilities (shared labs, premises, equipment etc.);
- Using students as innovation resources (building on Aalborg University's pedagogy of Problem Based Learning);
- The creation of the network university.

4. **RESPONSIBILITY**

As mentioned above, both luck and swift decision making by top management at both Aalborg University and Nokia made way for the actions leading to Aalborg University moving into the Nokia buildings creating this campus consisting of both university and businesses.



In Denmark universities do not own their own buildings so an agreement with the Government also had to be made. In the end, the coalition of the three parties (Aalborg University, Nokia and the pension fund owning the buildings) together made it possible that trying out this form of university campus would lead to sustaining and creating jobs in the long run, thus convincing the politicians of allowing this set-up.

Once the decision was made and contracts were signed, a steering committee was made to secure to make the ambitions come true. Moving a university is one thing; another is to include private companies and organizations at the premises. This included close collaboration between the university's innovation department and the Technical Services Unit; the first one being responsible for university-business collaboration and the latter with the responsibility of subleasing and the buildings in general.

M M

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The strategy behind the case was to build a university-industry setting that provided stronger business-university cooperation through the implementation of co-location of companies and start-ups on campus, thus providing fundamental facilities and services for both companies/start-ups and the university (researchers, students and innovation staff). Genuine co-location as opposed to silo-based science parks that are often decoupled both physically and mentally from the nearness to the university's knowledge creation – this would call for new structures and models for cooperation.

As Nokia was moving out of the buildings in stages, they had the possibilities of attracting external companies and provide them with housing, and by that starting the pool of colocated companies along with their "own" start-ups coming out of the shutting down. At the same time the academic domains at Aalborg University were to expose the possibility of colocating for their collaborators and research partners/organizations, thus making way for a diverse gathering of companies within the academic domains of Aalborg University and also with a certain ICT-focus. It has to be emphasized that the criteria of co-location is:

- 1) Alignment with Aalborg University's academic domains;
- 2) Having high academic and professional standard as well as R&D;
- 3) Having ambitions of growth;
- 4) Willing to engage and develop the innovation community, participate in joint activities and go into collaboration with the university.

Activities

One of the core issues of a set-up like this is to expose the partners to each other, i.e. getting the companies to get an understanding of the university's specialties and mode of working as well as having the researchers to identify ways of collaborating with the companies and by that putting extra dimensions to research and lectures.



This is done in many ways, but it is important to mention that even though the university is well-acknowledged within university-business collaboration, and many companies have experience in working together with HEIs, much of the work dealing with new ways of collaborate begins with relationship building. Thus many of the activities taking place consist of both bilateral meetings and collaboration (and therefore more "non-controllable") as well as joint and shared activities such as workshops, seminars etc. The range of activities goes from one-to-one meeting among university and companies (and between companies) to more formalized events;

- One-to-one meetings between companies and the university's researchers, the innovations department, students, other companies etc.;
- Pitch & Match; co-located companies presenting themselves for students in a dialogue based workshop to engage into student projects, master's thesis, internships, student work (and possible later full recruiting);
- Companies presentations at lecturers presenting student projects;
- Company employees acting as guest teachers;
- Company employees attending relevant classes and courses (further education);
- Seminars exposing and presenting different aspects of AAU's areas of expertise and research – this is also intended to break down silos internally at AAU and having different domains work together in new constellations;
- Presentations of labs, equipment etc.;
- Joint workshops and information meetings regarding EU and other funding possibilities with AAU's Fundraising department;
- Ad hoc meeting to identify new radical ways of interaction to foster innovation (including external partners and industry);
- Joint research applications;
- (Industrial) PhD projects;
- Possibilities for participation at AAU's Career Days for students;

6. MONITORING AND EVALUATION

Creating a structure of co-location at the Aalborg University Copenhagen campus is very much depending on the active and joint engagement of the university's researchers and the companies present. Openness and commitment to identify and taking advantage of the possibilities for collaboration are prerequisites for success and development. There hasn't as such been set up measures for evaluation, but the actual collaboration and dialogue between university and businesses are being followed and registered as to look into how the development is shaped. The attraction of companies is still in its building, and new ways of mutual exposure and communication are adding to the already existing ways of "getting to know each other better".

All kinds of collaboration (student project work, master's thesis, internships, student employees, research collaboration, joint funding, guest teachers, participating and developing joint workshops, seminars etc., collaboration between the business, innovation camps etc.) are being registered by the innovation department, and this will hopefully serve as indicators of how the co-location works on a daily basis.



7. SUSTAINABILITY MEASURES

In the long term the sustainability of the "co-location for co-location"-set-up should be an integrated part of the university's way of engaging with external partners and enhancing its normal collaboration with companies and thus contribute to the university's 3rd Mission. In fact, as long as the companies are paying the rent, the researchers and students of the university are taking advantage of the possibility of working together with companies, and structures and organization of the university should see to that frames for collaboration are carried out. But due to the some way new set-up for co-location, initial development and framing of the cooperation has to be taken care of and implemented into the organization (the university).

The attracting of new companies and start-ups are also a task for the existing frames of the operation of a university, i.e. the researchers have to be proactive in exposing the possibility of co-locating their collaborators, as well as the innovation department has tasks of co-developing the "community of innovation and knowledge sharing" at the premises. After all resources for this cannot all be integrated in basis funding for university entities involved, so additional funding schemes are still to be identified and implemented, so that the sustainability of the effort of co-location is secured in the long run. The true value of this co-location for involved partners can hopefully be a lever for financial good solutions for such endeavors.

8. COSTS

Some of the major areas of costs are the resources put into co-location and the resources going into maintaining and building trust based relationships to the industrial partners present at the university. The strategy builds on the companies to be at the campuses and paying their rent in something else than money, but by monetizing the value they provide as external lecturers, company equipment to the disposition of others, research time and other.

So far the main expenses and activities are being carried out by existing resources allocated to the different entities at the university (mainly the Innovation department and the research groups) in times of man hours and within the working areas that already has to be carried out by the single entity, especially the Innovation department that is currently working with university-industry collaboration.

9. FUNDING

As indicated in the two paragraphs above, the main funding has been self-funding from the university and the concerned companies present, but efforts are taken into gaining more external funding for refining the structures, as the schemes is hopefully to be seen as best practice in university-industry interaction.



OUTCOMES & IMPACT

10. OUTCOMES

18 month into the moving of the university and implementation of the co-location, one thing is very clear, and that is that the proximity of the present entities has great effect in the relationship building and the possibilities to act swift on potential for collaboration. The fact is that an appointment can be issued within even minutes agreeing of having a cup of coffee right away by just going up to floors to the concerned partner, or agreeing of meeting for lunch the next day in the shared canteen has proved to be a great lever of the enhanced effort to create active connections points at campus. In that matter much of the desired way of interacting has been gained.

This has lead to multiple ways of interacting, many of these the same as listed under "5. Strategy and activities undertaken":

- One-to-one meetings between companies and the university's researchers, the innovations department, students, other companies etc.;
- Pitch & Match; co-located companies presenting themselves for students in a dialogue based workshop to engage into student projects, master's thesis, internships, student work (and possible later full recruiting);
- Companies presentations at lecturers presenting student projects;
- Company employees acting as guest teachers;
- Company employees attending relevant classes and courses (further education);
- Seminars exposing and presenting different aspects of AAU's areas of expertise and research;
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- Joint workshops and information meetings regarding EU and other funding possibilities with AAU's Fundraising department;
- Ad hoc meeting to identify new radical ways of interaction to foster innovation (including external partners and industry);
- Joint research applications;
- (Industrial) PhD projects;
- Participation at AAU's Career Days for students.

11. IMPACTS

A great impact on Aalborg University has been the branding of the university as an interesting and pro-active institution with great connection to the outside world. Aalborg University was already acclaimed for being well connected to industry but this has further underlined this statement.



On a larger scale, the impact of the initiative has been a strengthening of the entrepreneurial eco-system in Copenhagen to the benefit of knowledge based startup. The focus of the universities part in the entrepreneurship ecosystem has been highlighted and the opportunities that lie herein has been demonstrated to a greater audience, why the biggest impact of the initiative has been to demonstrate that universities somehow should be incentivized to play a more active role in knowledge transfer and collaboration with industry.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

A cornerstone of Aalborg University is that we are an integrated part of the innovation system and to further strengthen the innovation system, we need to become a stronger university. Thus a major part of the initiative had the aim of strengthening the university by supporting start up and industry that could benefit from working with our researchers and lab equipment. Therefore the biggest benefit is obtained by Aalborg University, who can brand itself as an interesting place to work, study and place a company. Besides from this the following stakeholders take benefit from the initiative;

- The regional innovation system obtains a systematic setup for connecting industry and academia.
- The region obtains an initiative that's supports job creation and skills development through lifelong learning opportunities.
- Former Nokia staff benefits from a partner that supports their learning and start up needs.
- Startups benefit from having an easy and affordable access to a university and it's infrastructure
- Industry benefits from the opportunity of being able to place the company directly into the university, co-located with relevant researchers, students and companies.

In order to fully integrate this initiative into the regional innovation system, continuous dialogue is maintained with business support units from the municipality, the entrepreneurship ecosystem and other universities.

13. AWARDS / RECOGNITION

The co-location has been widely reported through different media and platforms, but so far the scheme is still in its developing thus not having found its final form. Therefore the results are still on their way and have not been accounted for in a form that entitles them to be recognized on a broader scheme, but this is hopefully soon on its way, as the collaboration produces more tangible results and effects.





14. PRIMARY CHALLENGES

A major challenge has been to undertake a university – industry collaboration not seen before, and with a business model that is difficult to handle within the framework of a public university. As the university (of course) does not have rental as one of its core products, there has been some challenges as getting alignment of the main reasons for renting out square meters to companies among the Innovation department, the academic staff, the Technical Services unit and management, especially within the question of state-subsidized efforts within the scheme securing that the university wasn't doing anything illegal or doubtful.

On the collaboration side it has proved difficult to get a formalized and smooth collaboration running between companies, start-ups, students and researchers, even though the results and activities mentioned in the paragraphs above do prove that this is accomplished to a certain degree. The overall challenges is to create ownership for the joint efforts for the university as a whole to develop this co-location, because to this point is has been a minority of academic staff being involved in the collaboration, so there is a great need to expose the successes and good case stories internally to the researchers at the university to expand the possibilities for collaboration – also internally between the departments to enhance further cross-disciplinary activities.

15. SUCCESS FACTORS

The full success of the initiative still needs to be fully realized as this is a rather young initiative, but a strong focus on the legal framework of industry-university collaboration needs to be maintained, as long with a continuous evaluation of whether such an initiative pays off to the university when measuring one of our bottom lines. Key factors here will be to look at the financial implications of such an initiative, but it will also be important to measure whether the presence of an interesting and attractive study environment will attract more students and staff, or i.e. research funding from co-located companies.

16. TRANSFERABILITY

The case will have elements that are hard to transfer, but a key element here will be transferable and useful to other institutions; how do we as universities take responsibility in times of instability and crisis? For Aalborg University it has always been a mission to support the regional economic development, but in this case it has also meant investments and activities that should be undertaken on a very short notice, and from time and again to the wonder of some of our key stakeholders. Therefore a key learning point has been, that it is important for the universities to work with our part in economic development, and to take action when it is called upon, and in order to do this, it is important to be well integrated into the regional innovation system and to be flexible.





17. PUBLICATIONS / ARTICLES

None available.

18. LINKS

So far external exposure is not yet implemented, as the scheme has so far merely been mouth-to-mouth and internal communication and notices on the university intranet and direct contact between partners, but as the co-location is getting more substantial with critical mass of companies, the external communication will be developed and prioritized.

19. KEYWORDS

Co-location, job creation, start-ups, knowledge sharing, shared facilities, student projects, practical experience, community building.

20. PUBLIC CONTACT DETAILS

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THE AARHUS UNIVERSITY STUDENT INCUBATOR Experience: A student incubator with equal emphasis on Individual development and program design

By Mia Louise Justesen and Rajiv Vaid Basaiawmoit





TITLE OF THE CASE	The Aarhus University Student Incubator Experience
SALES PITCH	A student incubator with equal emphasis on individual development and program design – an example
ORGANISATION	AU Centre for Entrepreneurship and Innovation, Aarhus University
COUNTRY	Denmark
DATE	February 2014
AUTHORS	Mia Louise Justesen Rajiv Vaid Basaiawmoit
NATURE OF INTERACTION	 □ Collaboration in R&D □ Academic mobility ☑ Student mobility □ Commercialisation of R&D results in science □ Lifelong learning □ Curriculum development and delivery ☑ Entrepreneurship □ Governance □ Other
SUPPORTING MECHANISM	 □ Strategic instrument ☑ Structural instrument or approach ☑ Operational activity □ Framework condition





1. SUMMARY

The aim of this case study is to describe an approach employed by the Student Incubator at Aarhus University (SIAU) to develop students' ability to transform knowledge into value and establish business and/or other entrepreneurial activities. In 2010, Aarhus University was awarded 'Denmark's Entrepreneurial University' and since then SIAU has strategically designed several programs to meet the students' different needs concerning entrepreneurship. The programs range from courses targeting students without a business idea who find entrepreneurship interesting, through concept development and start-ups to businesses focusing on growth. The result of this strategic design is a progression-based framework that is flexible enough to accommodate students' diverse entrepreneurial ambitions. So far SIAU has supported more than 500 students in their entrepreneurial activities, and more than 120 businesses have been established. Currently, SIAU is fully occupied with 75 concepts/businesses and an active waiting list and has over the last couple of years seen an exponential increase in interest. The case documents our strategic emphasis on individual development and its interplay with program design. Furthermore, the simultaneous use of evidence-based and experience-based knowledge has allowed SIAU to be prepared for the emerging entrepreneurship wave while also creating entrepreneurial self-efficacy in its participants. The lessons to be learnt are that student incubators and others working with knowledge entrepreneurs should focus on the entrepreneurs as individuals having different personal and academic means as well as needs depending on where they are in their entrepreneurial journey. Furthermore, student incubators should create and nurture an open and creative culture where student entrepreneurs share visions, mistakes, and successes in order to learn and act. The knowledge presented herein is relevant for researchers, coaches, and consultants who work with knowledge based entrepreneurship and want to target a broad group of students with successful programs.

2. BACKGROUND

Empowering students with entrepreneurship skills and creating an entrepreneurial ecosystem in which students can safely learn "about", "through" and more importantly "for/in" entrepreneurship (Heinonen and Hytti, 2010) has been the overarching goal of the Student Incubator at Aarhus University (SIAU). This has been a goal that we have been continuously striving for and is the one that has gone through multiple stages of evolution based on both planned monitoring and evaluation approaches and responsiveness to feedback from the students but also "market" changes and evolution of the environment in which we operate.

SIAU had its beginnings in late 2009 – for purposes of differentiation we call it SIAU 1.0. The goal of SIAU 1.0 was primarily to establish a scientifically founded student incubator where students from all across Aarhus University (AU) had the opportunity to work with entrepreneurship through two focused programs (with or without an idea) based in their own personal and academic means and at a pace that suited them the best.



The aforementioned focus thus already highlights that individual development was at center of attention right from SIAU's humble origins.

In late 2010, AU Centre for Entrepreneurship and Innovation was awarded 'Denmark's Entrepreneurial University' (DEU) in light of our early work and future plans for establishing an entrepreneurial culture and simultaneously building an entrepreneurial ecosystem, . The award was given by the Danish Business Authority to acknowledge the work that the center had already done within entrepreneurship. Along with the award came a large infrastructure project grant of \leq 1.34 million1 to support our future ambitions within a) entrepreneurial education, b) entrepreneurial research, and c) entrepreneurship and business collaboration. This initiated the creation of SIAU 2.0 as a part of the entrepreneurship and business collaboration, and this version of SIAU will be the focus of this case study. Furthermore, the plans for SIAU 3.0 will also be touched upon, as this is the natural evolution of SIAU and the DEU award and support run out in 2014.

For SIAU, the focus is not only on academic knowledge and business skills – but also in particular on the individuals, their means, and their ability to act upon opportunities: We develop the individual to develop the business; we then work with students at different stages of their entrepreneurial growth.

Definitions

Before we proceed with the case study, we would like to highlight some definitions of the terms and concepts.

Entrepreneur: We have primarily used the definition of a nascent entrepreneur by Davidsson (2006) as one who initiates serious activities or is actively involved in the creation of a startup. However, we realize that there is a continuum in the types of students at a university who approach entrepreneurship – ranging from those who are plain curious to those with some intent of entrepreneurship and to those who already see themselves as entrepreneurs and are actively engaged. We therefore use two other definitions apart from nascent:

Entrepreneurial Curiosity: For those who are curious (which in our experience at SIAU has been a rather large component, we use the definition of Entrepreneurial Curiosity. Here, the students are curious (from slight to very) about entrepreneurship in general and what it entails but are also curious about information that could motivate them towards entrepreneurship (and thus different from simple or general curiosity) (Jeraj & Antoncic, 2013).

Entrepreneurial Intent: Finally, we also use the well-defined construct of Entrepreneurial Intent (Davidsson, 1995) where students coming to SIAU have a conviction that starting a firm might be a suitable alternative for them.

Intrapreneur: We also encounter and encourage the development of intrapreneurs – defined as entrepreneurs, or working entrepreneurially, within a pre-existing organization.

¹ The total amount of funding is approx. \in 6 million. For more information see section 9.



Start-ups: We use the definition of Start-up as that of an early-stage company or organization that is searching for a scalable and repeatable business model (Blank, 2012).

Individual development: We work with the concept of individual development by focusing on developing the entrepreneurs so that they can further develop their entrepreneurial opportunity. Thus, the definition encompasses our focus on personal development improving entrepreneurial self-efficacy in an iterative process throughout one's entrepreneurial journey irrespective of the length of the journey.

3. OBJECTIVES

As mentioned earlier SIAU is part of the larger project, DEU. According to the DEU project the overall objective of SIAU is to provide students with flexible opportunities for trying out entrepreneurship – and if/when the student decides that entrepreneurship is for him/her, to then support the actions towards a start-up. We thus provide entrepreneurial offers adjusted to the individual student. More specifically the objectives are to:

- Accommodate a gross group of students without clear idea about entrepreneurship
- Create focused programs for starting up a company
- Secure connection between SIAU and theory
- Establish cooperation between students and established companies
- Nurture synergies between central stakeholders in the region

4. **RESPONSIBILITY**

AU Centre for Entrepreneurship and Innovation, Aarhus University



IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The overall strategy of SIAU has been both to allow for an entrepreneurial culture to take root within a university setting and then spread out all over the university. This happens in parallel with establishment of infrastructure that supports and drives a thriving entrepreneurial ecosystem. One of the primary focal points that we work with in SIAU is individual development so that the students can develop their entrepreneurial ability using their academic means. This could then translate into start-ups, intrapreneurs or individuals with enhanced entrepreneurial mindsets.

The activities that we undertake are both for establishing the aforementioned entrepreneurial culture and individual development and using information/experience from these activities to design strategies and programs that support the overall strategy of simultaneous culture and ecosystem development. We will therefore divide this section into



two main sub-sections that highlight the core of SIAU – a) Individual Development; and b) Program Design.

a) INDIVIDUAL DEVELOPMENT

We continuously work with developing the student's competences within three specific areas:

- The person/team
- The idea/product
- The business

Working with these specific areas indicates that we also meet the student at each of the aforementioned stages. Having such multiple interface points has been critical in the strategic direction of SIAU towards establishing a broad-based entrepreneurship culture with easily accessible entry points. It also indicates our focus on individual development and that we are able to meet the students dependent on where they are in their entrepreneurial journey.

That being said, all students (be they entrepreneurially inclined, curious or active) are in the beginning met with questions regarding understanding of their own means through a mapping of academic and personal competences. Furthermore, whether the student has an idea or concept when we meet them or not, we have programs supporting both starting points. This will be elaborated below. The business knowledge is also added when needed for the specific person and concept.

Connecting this to our theoretical starting point, we see entrepreneurship as a discipline where personal and social competences such as creativity, openness, and the ability to act are developed. At SIAU these competences are spurred through a evidence-based approach with grounds in Effectuation Logic (Sarasvathy, 2009) and the Push-method (Kirketerp, 2010). Effectuation Logic focuses on the next, best action; and through small steps with full control, the enterprising behavior becomes manageable and possible. The Push-method describes the importance of pushing theory towards action in order to internalize enterprising behaviour and – vice versa – pushing action via reflection so that the action is made conscious and, therefore, can be improved.

At SIAU we perform this interplay between action and reflection through one-to-one sessions with the students, sessions between groups of students, and joint sessions through workshops. Furthermore, we also apply specific tools such as the Business Model Canvas (Osterwalder and Pigneur, 2010) and Learning Logs that both improve entrepreneurial self-efficacy and independence of the student/entrepreneurial team.

One thing that probably distinguishes SIAU from other student incubators is our recognition of the fact that a student that contacting with us is already at some stage of an entrepreneurial journey. Having structured this into our program design thus allows us to meet, via the multiple entry points of the program, the student by acknowledging the stage in which the student is at. We consider it important to showcase our understanding of the entrepreneurial journey (which is both evidence- and experience-based) via a flowchart that depicts the process and the entry points that the students have access to. This flowchart (Figure 1) serves as a precursor to our program design (Figure 2) and also emphasizes our focus on individual development as a feeder into the program design strategy.





Figure 1: Flowchart of a student's entrepreneurial journey and choices that a student makes while interacting with SIAU.

A first-time encounter with SIAU for students generally happens at events, fairs, marketing materials or through other students and it is here that they consider entrepreneurship and show interest in SIAU's offers relating to entrepreneurship. As figure 1 depicts, the relation/contact with the student can end even at this first encounter. At this stage, one of the two things happen: a) the student does not make contact anymore with SIAU (this does not necessarily translate to an end of his/her entrepreneurial ambitions but just that the student may be considering other options and not the path offered by SIAU), or b) the student prefers to be inspired through a one-time event (Entrepreneurial Awareness Activity or EAA) with a business or motivational theme. If the student shows interest at the first meeting alone, the one-time event is still a good starting point. These one-time events (EAA) also act in a cyclical manner to orient the student back towards SIAU for a further, normally much more serious, consideration of embarkation on his/her entrepreneurial journey.

The next phase of the journey normally entails development of entrepreneurial intent through a series of clarification workshops (bearing in mind that we are using multiple entry points where the students can choose the entry point/option). At the end of the course, the students again can opt out of their entrepreneurial journey. Generally, the reasons the students cite for opting-out at this stage of the journey are for example: the idea is not feasible; entrepreneurship is not for me <u>right now</u> (citing study or other concerns); or entrepreneurship <u>in general</u> is not for me. Again, the fact that they opt-out here does not necessarily translate to an end of journey as we have seen cases of students returning after a break to resume their journey at SIAU. They may still use their entrepreneurial learning thus far to apply it in their lives and/or become intrapreneurs.

For those who continue, i.e. those who still find entrepreneurship interesting and have a concept (for a start-up) under development, we support their further development into nascent entrepreneurs and provide them with a relevant program (see more in the program design section). Again, as with the earlier stages, even during this development towards a start-up, the students can still opt-out of the entrepreneurial activity; however, they will have gained significant knowledge about entrepreneurial methods and may start something later on in life or work as an intrapreneur. These are, however, still assumptions and ones that we



have not investigated yet. As the figure shows, the assumptions include future start-ups, intrapreneurs, higher self-aware individuals and of course those that opt-out of entrepreneurship and have no intentions of starting up in the future.

The successful completion of this phase is finally the creation and running of a start-up (the entrepreneurs are allowed to be housed in SIAU as long as they remain students and are continuously developing their start-up). Here, they also plan an "Exit-Strategy" of how to exit SIAU. Potential exit strategies include plans for new entrepreneurial environments, creating advisory boards and formal organization structures, other state-sponsored infrastructures such as SpinIN (see section 12), etc.

Furthermore, it should be stressed that many students already are – or know that they want to become – a nascent entrepreneur when we meet them for the first time. These students are not required to go through all the preliminary steps mentioned above. We meet them at the stage they are at and provide the program that best suits their needs (see entry points in Figure 2).

b) PROGRAM DESIGN

The aforementioned process (figure 1) indicates an entrepreneurial journey that is both evidence- and practice-based and in which "Individual Development" runs as a pervasive theme. This knowledge coupled with the multiple points of entry logic thus feeds into SIAU's overall program design. The result of this strategic design is a progression-based framework that is flexible enough to accommodate students' diverse entrepreneurial ambitions and one that also illustrates the degree of involvement or demands put on the students. The framework is illustrated as Figure 2 below:



Figure 2: SIAU's Program Design

Figure 2 description:

Stage 1 - The first stage of the framework we use at SIAU is 'Inspiration' where the student is introduced to entrepreneurship through a one-time meeting and there are no specific demands. There are two programs within this area: *Open Events and Entrepreneurship 1:1.* Stage 2 - The second stage '*Clarification*' also consists of two programs, *Entrepreneur's Workshop* and *Sand Box*, each containing 6 workshops. Students entering *Entrepreneur's*



Workshop are in general further in their entrepreneurial intent as they already have an idea they want to test during the program.

Stage 3 - The third stage is '*Developing business*' where the students work towards developing their concept into a start-up in *Take Off.* This third stage works with nascent entrepreneurs, potential intrapreneurs, and full-blown entrepreneurs focusing on establishing start-ups with an aim to turn them into high-growth companies.

SIAU program design considerations:

Theoretical: In terms of evidence-based design it is evident that the first two stages focus primarily on developing and screening for entrepreneurial intent whereas the third stage develops nascent entrepreneurs. Stage 1 is also involved in the exploration and development of entrepreneurial curiosity. All of these are well established theoretical constructs that we also observe in practice at SIAU.

Practical: In terms of experience-based design the above framework also showcases how it is bound with the entrepreneurial journey that a student experiences. Furthermore, even though there is a clear progression visible in the 3 stages, it is possible for the student to choose a program best suited for the situation at any given time.

Infrastructure: It should also be noted that SIAU as a whole consists of an open office space with 23 desks, 15 smaller offices, 5 meeting rooms, and a workshop area that can accommodate up-to 50 people. *The Open events, Sand Box*, and *Entrepreneur's Workshop* are all conducted in the workshop area whereas students who are developing start-ups primarily occupy the office spaces and meeting rooms.

SIAU program design details:

Each stage will now be described briefly below through the specific programs.

a) Inspiration

The *Open Events* are carried out at SIAU. There are two events each semester where a business related topic is presented and discussed by a researcher and a well-known person. The objectives of the *Open Events* are branding at social media such as twitter and Facebook – and to invite the students to SIAU in order to experience the entrepreneurial environment and thereby initiate entrepreneurial intent.

The objective of *Entrepreneurship 1:1* is to give students easy access to information about entrepreneurship and SIAU's programs. The student merely has to send an email or make a call to a SIAU consultant asking for clarification regarding student incubator activities or courses. Sometimes the student actually already has a well-defined idea and seeks specific business advice and in these cases the student is offered a meeting with a consultant. The result of this meeting can be that the student now has sufficient knowledge to continue on his/her own – or becomes interested in one of the other programs that SIAU offers.

b) Clarification

The programs within this stage target students who are already interested in entrepreneurship and seek clarification regarding their entrepreneurial endeavors. The programs are designed to further develop the entrepreneurial intent. There are two different programs, each consisting of 6 workshops (3 hours) spread out during a 6 week period.



Students entering *Entrepreneur's Workshop* already have a business idea. They want to develop the idea into a business concept and figure out if there are grounds for creating a start-up. *Sand Box* is targeted at students who find entrepreneurship interesting but do not have a preliminary business idea. During this program ideas are developed through the students' own means; their distinctive, academic competences as well as personal preferences and interests. As mentioned earlier, students entering *Entrepreneur's Workshop* are in general further in their entrepreneurial intent and are more focused on testing the feasibility of the idea.

Both programs are designed to accommodate a large group of participants and roughly 40 students participate in each course. The facilitators of the programs are focused on creating a certain culture with a joint, personal space where ideas and thoughts are spoken out loud. Besides working with an idea the students gain a network with the same interests and start forming an entrepreneurial identity.

During both programs it is made explicit that entrepreneurship is a method and mindset that you can train and master. Often participants alter their ideas during the programs for example based on feedback from surroundings or because they combine ideas with others. This is fully accepted and the goal is to enable the participants to master this entrepreneurial method. Furthermore, during both programs the facilitator is highly aware of adjusting the content to the specific participants. It is important to signal that SIAU is a practice lab for business ideas and not an academic exercise.

c) Developing business

Within this stage all students are engaged in developing a start-up of some form. The core of SIAU is *Take Off* where all students are either nascent entrepreneurs developing a start-up (Explore and *Incubator*), or full-blown entrepreneurs earning profits and focusing on developing the start-up into an established company with employees (*Growth*).

Another way to work with developing business is *Corporate Take Off*. Here, students work with an idea formed by an established company instead of their own business idea. The objective of this program is to develop either a spin-off or a new business area within the established company.2

The fact that there is a physical office space to go to gives the advantage of being able to gather a large amount of individuals all interested in the same topic: entrepreneurship; and thus form an entrepreneurial culture. Whenever designing new activities within SIAU it is always taken into consideration how to make use of the office and workshop space and the entrepreneurial culture within SIAU is at the staff's center of attention. An important aspect here is visibility of staff. By experience it is recognized that being present at SIAU often gives rise to several business related – and personal – discussions.

Other factors defining SIAU are:

• Entrepreneurs as active players: the articulation that the entrepreneurs themselves are creators of SIAU. They assist each other with their own specific knowledge and experience and are required to be at disposal for questions and advice 1-2 hours/month

² Corporate Take Off will not be elaborated further as it focuses mostly on intrapreneurs and therefore does not fit into the context of the rest of the paper.



- Role models: the entrepreneurs function as role models for each other, which theory states as important
- Network: networking between start-ups and sometimes establishment of new start-ups or external partners that assist each other in solving tasks
- Seriousness and demands: the entrepreneurs call for demands, which helps push them towards action
- Interdisciplinary: all students at Aarhus University can join SIAU

During the lifespan of SIAU different degrees of demands put on the entrepreneurs have been tried out. This balance between assistance and independence is continuously challenged and adjusted responsive to feedback and results of the developing start-ups.

6. MONITORING AND EVALUATION

Setting up quantitative measures such as number of participants and start-ups is an easy way of measuring entrepreneurial activities; however measuring for more qualitative outcomes such as enhanced self-efficacy or enterprising behavior poses a bigger challenge. We are working towards these qualitative outcomes (SIAU 3.0) but these will not be documented in this case description.

As SIAU 2.0 evolves it becomes possible to see some more long-term effects such as: Do start-ups still exist when they are not part of SIAU anymore? Are start-ups participating in the Growth Program creating new jobs? Etc.

Listed below are the measures for monitoring and evaluation of SIAU 2.0:

- Participants in programs without entrance barriers
- Applicants for Take Off Explore
- Participants in Take Off (Explore, Incubator, and Growth)
- Start-ups (defined by CVR registrations)
- For start-ups participating in the Growth program:
 - Annual turnover
 - Number of jobs created
- Applicants for Corporate Take Off
 - Matches made
- For former SIAU-participants
 - Percentage, still an entrepreneur
 - Percentage with entrepreneurial intent

7. SUSTAINABILITY MEASURES

SIAU has produced great results and is therefore included in the basic funding of AU Centre for Entrepreneurship and Innovation from July 2014. The basic funding covers the core of SIAU and in addition new projects are continuously sought. At this point we are applying for project funding in order to develop a program into a credit-bearing course. Other future project opportunities could be for example development of Alumni Association and academic research on SIAU activities.



8. COSTS

During the period of DEU, the majority of the costs of SIAU have been:

- ▶ Rent of the physical space: € 308,000
- ▶ External consultants advising the entrepreneurs: € 335,000
- Staff: € 670,000

It is important to recognize that costs of staff and external consultants primarily have been used for activities within the programs described in section 5. Regarding staff, the activities are for example reflection meetings with the entrepreneurs, general presence at SIAU, workshops, and continuous development of the programs and other activities. External consultants have been offered to the start-ups when expert advice has been needed.

9. FUNDING

Since April 2011 SIAU has been funded through the DEU project. The percentage of funding is divided as follows:

- Aarhus University: 9%
- Danish Business Authority: 22.2 %
- The European Social Fund: 49 %
- Other national funding: 19.8%



10. OUTCOMES

Relating to the measures for monitoring and evaluation listed above in section 6, the most important concrete outcomes of the case (April '11-February '14) are:

- Participants in programs without entrance barriers
 - Sand Box: 198 students (8 courses in total)
 - Entrepreneur's workshop: 72 students (2 courses in total)
- Applicants for Take Off Explore: 296 students
- Participants in Take Off (Explore, Incubator, and Growth): 208 concepts/start-ups (329 students)
- Number of start-ups (defined by CVR registrations): 124 CVR numbers
- For start-ups participating in the Growth program
 - Annual turnover (2013): € 460,400 (based on the 14 start-ups presently in Growth)
 - Number of jobs created 25 partners/owners, 11 full-time employees, 41 part-time employees = 77 in total (based on 21 start-ups in Growth during 2013)



- Applicants for Corporate Take Off: 99 students and 22 established companies
 - Matches made: 20 (58 students and 16 companies)
- For former SIAU-participants (response rate: 64.4%)
 - Percentage, still an entrepreneur: 53.1%
 - Percentage with entrepreneurial intent (no start-up at this point): 35.4%

11. IMPACTS

The impact of the various programs within the overall strategic framework, that SIAU 2.0 has worked with, is multi-faceted i.e., the programs have both direct and indirect impacts at various levels and stages of the primary stakeholders – the university and its students. Here we document some of the most important impacts, especially direct impacts, of our strategy and approach (as mentioned in section 5) and conclude with a brief overview of the indirect impacts on the overall entrepreneurial ecosystem at AU as a whole. We describe this at the level of the stakeholders as follows:

- Students: Our focus on individual development and its interplay with program design has first and foremost had an impact on the appeal of entrepreneurship to university students. We can say without a doubt that this rise in the appeal is almost exponential (measured from increasing number of applications at SIAU and positive feedback from the students). We, of course, do not take all credit for this increased interest as "market conditions" such as increasing trends, positive media coverage and overall easier communication and internet tools have certainly also impacted this exponential rise. However, we can safely say that our initial work with SIAU 1.0 in establishing and spreading an entrepreneurial culture at AU coupled with a flexible broad-based program design with multiple entry points (SIAU 2.0) allowed us to be "market-ready". This implies that when students now actively search for entrepreneurial opportunities they are more aware of our presence as opposed to during the time of SIAU 1.0 where extra efforts were required on the part of SIAU to make its presence felt. Our direct impacts on the students can also be seen from the statistical data showcased in the previous section of outcomes (section 10) and the impact of the numbers is even more relevant if one correlates the data with the entrepreneurial journey flowchart (fig. 1).
- University: The direct impact to AU can also be seen via outcomes (section 10) but more importantly, the positive movement of entrepreneurship into the mainstream has translated into increased support from the university leadership towards entrepreneurial activities and learning. This in turn has translated to more entrepreneurship courses along with toning courses (more traditional courses but with an entrepreneurial orientation), which allow for a broader uptake of entrepreneurship. This then directly leads to an increased number of applications to SIAU. The effects of increased entrepreneurial education in the university are still being measured but the evidence behind the fact that: "Entrepreneurship has moved from whether it can be taught to how it should be taught" (Mwasalwiba, 2010) is clearly visible at AU. Furthermore, the university has now taken a more active interest and stake in the establishment of an entrepreneurial ecosystem both within and around the university. The best example of this support is the fact that SIAU's funding will, come summer 2014, be moved from project financing (DEU) to basic funding from the university. This move, in essence, frees SIAU to focus on our core activities that generate value both for the students and the university as opposed to the limitations that a time-limited project financing infrastructure imposes.



Apart from the direct impacts into our primary stakeholders, there are several other impacts on both students and their learning which are clearly a little difficult to measure. However, the premise of an increased entrepreneurial mindset and its spillover effects towards development of the regional innovation and entrepreneurial ecosystem cannot be discounted. Furthermore, the development of intrapreneurs is also necessary for growth and innovation of SMEs – a regional force that both creates jobs and develops the region. This impact we have also evidenced in collaboration with another parallel activity at AU called SpinIN. SpinIN, a project financed by the Danish Industry Foundation, matches student entrepreneurs with established companies and in general leads to both personal development of the entrepreneurs and drives entrepreneurial innovation within the SMEs. This project has been a hit with both the SME sector and SIAU entrepreneurs and/or startups.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Stakeholder	Benefits
AU Centre for	- Assistance in qualifying activities regarding student entrepreneurs
Entrepreneurship and	through application of evidence-based foundation
Innovation	- Potential financial benefits through funding that support student
	entrepreneurship
	- Potential business partners for other projects within the centre;
	specifically SpinIN (a project that matches start-ups with established
	companies) as SIAU feeds in students to this project. With the same
	evidence-based foundation, we have used earlier, SIAU prepares future
	entrepreneurs to projects such as SpinIN
	- Support of the centre's responsibilities for institutes at Aarhus University
	(for example interdisciplinarity)
Aarhus University	- Branding as an entrepreneurial university with attractive offers; in relation
	to this, attracting new students to Aarhus University
	- The possibility of offering a practice lab for applying knowledge
	- Interdisciplinarity
	- Entrepreneurship is increasingly noticed as a potential career opportunity
	- With the increasing amount of start-ups in the area, potential business
	partners for the university will increase
Students	- The possibility of creating a start-up in a 'safe' environment while
	studying
	- Learning now to create value with one's own knowledge and thereby be
	Networking and intendiographics
Student ergenizations	- Networking and interdisciplinanty
with entrepreneurial	Access to a joint mass of potential 'sustamere' for the organizations
intent	- Access to a joint mass of potential customers for the organizations
Control Donmark Region	Creation of ontropropourial activities in local areas
Central Denmark Region	The signal as a region with focus on ontropropourchin
	Attraction and retention of students to the region

Apart from the stakeholders mentioned above, we also have other associate partners, such as Business Development Centre Central Region, Venture Cup, Incuba Science Park, and other student incubators that interact with us on a regular basis. In this way our participation feeds into the regional innovation system.



13. AWARDS / RECOGNITION

SIAU has been recognized through a couple of awards as well as an honorable visit by the Minister for Research, Innovation and Higher Education.

- Aarhus University was awarded Denmark's Entrepreneurial University in 2010 (with an infrastructure grant of € 1.34 million).
- SIAU has also been awarded with 'Nordeas Push-Award' in 2012. This award was given to SIAU as recognition of establishing good conditions for student entrepreneurship in Aarhus and was followed by a grant of € 3,400.
- In context of development of Denmark's National Innovation Strategy, the Minister for Research, Innovation and Higher Education visited SIAU in April 2012. The minister was impressed with SIAU's strategic program design coupled with individual development. Special mention was made towards the evidence-based approach, interdisciplinarity, and content within the different programs as crucial factors for the students' success with their start-ups.

LESSONS LEARNED

14. PRIMARY CHALLENGES

Through the evolution of SIAU (SIAU 1.0 \rightarrow SIAU 2.0) which we have documented and the general experience with SIAU 2.0, we have learnt several things; one of these being how expectations towards entrepreneurship change with time and that managing expectations leads to a better outcome for all concerned. While our experience has been majorly positive there are still a lot of lessons to be learnt and incorporated in the natural evolution of SIAU 2.0 \rightarrow SIAU 3.0. We will summarize some of the important learning points/challenges in the following section:

• Assistance vs. Independence: One of the most critical learning points is that it is important to strike a balance between assistance and independence. We have clearly articulated that one of the USPs of SIAU is its interplay of targeted individual development with a flexible program design. This means that we largely have to perform a tough, but nevertheless necessary, balancing act. We have to ensure that we are providing the students the necessary push without going overboard to impede their independence and analytical skills which will be required in the post-SIAU world. On the other hand, giving them too much independence (like some other student incubators function upon) can lead to either not enough action or chaotic choices (which in essence violate the premise of a safe-environment that an incubator should provide). While we have by no means perfected this balance yet, we continuously strive to seek this balance through reflection sessions and workshops involving the entrepreneurs, as well as outlooks towards best practices and theoretical evidence. Although we realize that this bottom-up approach is not conclusive in the short-term, this should yield itself to better practices within SIAU in the long-term. By then we would have better insight from "big data" and "strength in numbers" perspective that would allow us to modulate this balance according the individual needs of the entrepreneurs.



- Universal acceptance in an academic environment: As banal as this may sound, our experience has shown that universal acceptance in an academic environment is critical for success. While this is a barrier that entrepreneurship as a scientific field of study has itself faced over the last decade, the last few years have been transformational for the field and its universal acceptance in general. This in itself has also helped SIAU directly (refer to section 11 on Impacts) whereby the university has decided to take over the financing of SIAU, but it has been a challenge unto this phase. It is the "market conditions" combined with the visible success of the student start-ups, the efforts of SIAU, and the resulting positive feedback from the students that has helped us overcome this barrier. That being said, one of the learnings from this experience is that for a successful student incubator to thrive in a university setting, acceptance from the academic environment is critical. This is not only for the sake of achieving acceptance of entrepreneurship in general but also due to the fact that SIAU has always encouraged the use of one's means and competences (incl. specific domain knowledge) as a pre-requisite to the start of an entrepreneurial journey. This is also correlated with evidence from effectuation theory where exploring one's means) is a necessary ingredient. We have, especially in the last couple of years, learnt that anchoring a student to his domain brings knowledge while being at SIAU helps lower the threshold barrier of entering entrepreneurship. We have thus encouraged this by stating very clearly at the interface points that the students should use their science-based knowledge actively in the process.
- Student's limitations: Another learning point that has come out of the SIAU experience has to do with recognition of a student's limitations. While overlapping with both academic environment condition and the assistance vs. independence sections, this section is different because at the end of the day the student is in a rather artificial environment which is "safe(r)" than the real worldand the student is also mostly in an explorative phase of their entrepreneurial journey. Secondly, we also have to realize that there are additional factors such as other courses, study jobs and other requirements that the university itself places on the student. This means that time is a very limited resource for them. Additionally they are also at the university to hone their domain knowledge, which itself will feed into their entrepreneurial process and should not be diluted by extensive demands on their time at the incubator.

15. SUCCESS FACTORS

A number of important factors have led to SIAU's success within student entrepreneurship:

- Commitment from the region and university
- > Staff engagement, which is highly dedicated necessary
- Evidence-based foundation common to entrepreneurship course
- Focus on the individual, which makes the programs highly flexible
- Construction of entrepreneurial environment and culture at SIAU
- Specific tools and easily communicated process at SIAU complicated academic knowledge becomes operational and directly applicable to the entrepreneurs
- The use of role models
- Articulating that being an entrepreneur can take many forms
- Continuous responsiveness to feedback from our customers (= the entrepreneurs)


16. TRANSFERABILITY

The case of SIAU is highly transferable because of its evidence-based foundation and transparent progression-based framework. Furthermore, the case is relevant to researchers, coaches, and consultants who work with nascent entrepreneurs and want to target a broad group of students with successful programs.



FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

- Aggeboe, Josefine & Rasmussen, Lauge Vagner: 'From Knowledge to Value The Student Incubator at Aarhus University', 2010 (SIAU 1.0)
- Hessel, Niklas S: 'Det Entreprenørielle Universitet', 2011, Weekendavisen (DEU)
- ▶ Kristiansen, Cecilie Lund: 'Vi skal "vækste" meget det næste år', 2012, Politiken (SIAU 2.0)
- Various other articles published in Danish newspaper and other media
- In the making right now are 6 books about SIAU 2.0 (expected publication in June 2014)

18. LINKS

- http://studentervaeksthus.au.dk/en/
- http://cei.au.dk/en/

19. KEYWORDS

Student incubators, nascent entrepreneurs, individual development, entrepreneurial intent, start-ups, entrepreneurship programs, Aarhus University

20. PUBLIC CONTACT DETAILS

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CASE KYMENLAAKSO UNIVERSITY OF APPLIED SCIENCES:

AN EXAMPLE OF HOLISTIC INSTITUTIONAL DEVELOPMENT TOWARDS ENTREPRENEURIAL UNIVERSITY DURING RAPID STRUCTURAL CHANGE

By Ari Lindeman



DEVELOPING ENTREPRENEURIAL UNIVERSITY DURING RAPID STRUCTURAL CHANGE: CASE KYMENLAAKSO UNIVERSITY OF APPLIED SCIENCES



TITLE OF THE CASE	Developing Entrepreneurial University During Rapid Structural Change: Case Kymenlaakso University of Applied Sciences
SALES PITCH	An example of holistic institutional development towards entrepreneurial university during rapid structural change.
ORGANISATION	Kymenlaakso University of Applied Sciences (Kyamk)
COUNTRY	Finland
DATE	February 2014
AUTHOR	Ari Lindeman
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 ☑ Strategic instrument ☑ Structural instrument or approach ☑ Operational activity □ Framework condition



DEVELOPING ENTREPRENEURIAL UNIVERSITY DURING RAPID STRUCTURAL CHANGE: CASE KYMENLAAKSO UNIVERSITY OF APPLIED SCIENCES

CASE STUDY PROFILE

1. SUMMARY

The Kyamk case describes the holistic institutional development of a regional university of applied sciences towards entrepreneurial university. The uniqueness of the case stems from its historical perspective and wide scope. The case covers the whole 16 years history of the institution since the formation of the Finnish system of universities of applied sciences. The case deals with issues of leadership, structural transformation, pedagogical renewal, evolving approaches to entrepreneurship education in particular, entrepreneurial culture, and the reconfiguration of the institution's role within the innovation ecosystem. Instead of illuminating a single initiative the Kyamk case seeks a holistic understanding of a complex series of strategic moves and accompanied organisational and pedagogical initiatives.

Kyamk's situation is special as it is located in South-East of Finland between the capital Helsinki, Finland, and Saint Petersburg, Russia. The region has suffered from massive paper industry closures during the past decade. The region's GDP per capita has plummeted, and subsequently, its place in the national ranking has dropped from the 2nd to 11th in just ten years 2000-2010 (Statistics Finland, www.kymenlaakso.fi). The early phase of the institution covered by the case thus coincides with an interesting period of the region struggling with sudden structural change, and subsequent oscillation between forces of industrial society, on the one hand, and service and information society, on the other. One can view the case also as an example of the regenerative relationship between an institution and its environment.

2. BACKGROUND

Kyamk was formed in 1996 from several vocational colleges with altogether nine locations in Kymenlaakso region. The formation of the institution was part of an institutional reform to create the system of universities of applied sciences in Finland. The circa 4.200 students of the new institution studied in departments of engineering, maritime, forestry, business, nursing, social services, design & media. The university had a total of 28 bachelor degree programmes, each 3,5 to 4,5 years in length. The first master degree programme was launched 2002. The same structure was in place until the first major reorganization began in 2004-2005. Annual turnover of Kyamk exceeds 30 million euros of which c. 13% is spent on RDI projects.

The Kymenlaakso region is one of 19 regions in Finland. It is located in the south-east of Finland, about 100 kilometers from Finland's capitol city Helsinki. The region borders with Russia, and Saint Petersburg can be reached by train in just two hours. The population of the region is small, 182.000 inhabitants. Kymenlaakso (literally Valley of Kymi) is intersected by Kymi river which is one of the grandest rivers in Finland. In several occasions in history, long before Finland's independence as a nation, Kymi river marked the border of Kingdom of Sweden and Russia. The river has also been the natural birthplace and location of the oldest and greatest Finnish paper and board mills which today are operated by world leaders in



UIIN GOOD PRACTICE SERIES Case study written by Ari Lindeman www.uiin.org paper industry, UPM and StoraEnso. Kymi river enters the Baltic Sea, Gulf of Finland, in Kotka in which Port of HaminaKotka, Finland's largest cargo port, is located.

Due to very large export driven paper industry operations, Kymenlaakso was a very well-todo-region for the latter half of the 20th century. GDP per capita was for decades among the top three of the regions in Finland. Average salaries of workers have also been high due to secured and high paying jobs at paper factories. Public sector spending and growth was steady for a long time as both income and corporate tax payments remained high. All this started to change drastically when the first large paper mill closure came in 2006 in the North of Kymenlaakso, in Voikkaa. Since then several paper lines have been shut down. Overall some 6000 jobs have disappeared from the region in just half a decade.

3. OBJECTIVES

- Structural transformation of the institution both in terms of locations and organisation
- Enhancement of entrepreneurship education competencies and entrepreneurial culture among faculty members
- Introduction of an entrepreneurial curriculum for all students that it is integrated into all degree programmes, including increased attention to personal study planning for students with real venture creation potential
- Revitalization of institution's relationship with other regional actors, industry and other working life partners, according to the concept of innovation ecosystem
- Redesign of students' learning experience through proactive engagement with innovation ecosystem partners from early on in the studies

4. **RESPONSIBILITY**

Board of directors and rectors have been responsible for strategies for leadership and structural change. Their role has been supportive of initiatives aimed at pedagogical renewal for which the main responsibility has been carried by directors of education. In addition, project managers of externally funded projects and personnel of entrepreneurship education initiatives have had major responsibilities for specific actions and activities.



5. STRATEGY & ACTIVITIES UNDERTAKEN

Leadership strategies:

- transactional leadership to execute basic structural changes during initial phases of transformation (2005-2011)
- transformative leadership to facilitate team-based organisation and entrepreneurial working culture after the basic structure was in place (2012-)



Strategies to induce structural change:

- new locational architecture, from nine locations to two (2004-2013)
- organisational changes (2004, 2006, 2013)
- strategic investments in new facilities (2009, 20 million euro Paja Design Studio)

Renewal of pedagogical culture:

- experiments with learning environments (2000-2008)
- sponsored fixed term entrepreneurship research director (2004-2008)
- development of the LCCE entrepreneurship process (2009-2013)
- development of the Learning and Competence Creating Ecosystem LCCE model (2007-2012)
- leveraging the LCCE model university-wide (2011-2013)
- systematic publishing on the learning environment experiments, the LCCE model, and the new pedagogics (2006-2013)
- participation in international comparative FORFI research on academic entrepreneurship (2012-2014)

Systems upgrade:

• transparency enhancing IT, improved monitoring of results

6. MONITORING AND EVALUATION

Progression of the institution towards entrepreneurial university is monitored and evaluated with following measures:

- number of RDI-driven student projects with industry/working life partners and number of ECTS credits completed in these projects
- share of students setting up a company within one year from graduation
- participation in international comparative studies on entrepreneurship education and innovation ecosystem (e.g. FORFI project 2012-2014)
- participation (2008-2013) in the national Entre Intentio entrepreneurship education survey conducted be a research group at Seinäjoki University of Applied Sciences
- participation (2013-) in the online entrepreneurship education competence survey www.lut.fi/mittaristo administered by LUT Lappeenranta University of Technology
- annual internal review of strategy of the institution and by-annual top management reviews with the Ministry of Education and Culture
- participation in quality audits of the Finnish Higher Education Evaluation Council (latest audit of Kyamk FINHEEC publications 10:2012)

7. SUSTAINABILITY MEASURES

The new team-based organisation with its new university-wide Leadership and entrepreneurship team (started spring 2013) institutionalizes entrepreneurship education inside the university. This is manifested in the new curricula starting fall 2014 which



leverages entrepreneurship education in social and health care as well and engineering curricula in the way so far has been the case for in media, design, and business programmes.

The sustainability of the team-based organisation depends, of course, a lot on the consistent execution of transformational leadership put in place in 2012, and the current visionary work on "the future agenda" of the institution.

The sustainability of the continuous evolution of the entrepreneurial university is enhanced by the completion of the two-campus structure in summer 2014 allowing effective interdisciplinary course delivery. This more interdisciplinary campus structure allows also spontaneous student movements to emerge around entrepreneurially minded people regardless of discipline as has been marked during 2013-2014 with the establishment of the Kouvola Entrepreneurship Society and PatteriNetwork around the northern campus and the activities of game cluster around both campuses.

External forces still support the described direction as the region, although getting new investments such as Google's major data center, has certainly not regained its economic position nor overcame its need to overhaul its public service structures. Sustainability of the development described in the case hinges very much on Kyamk's – and regional authorities and funding agencies' – ability to network internationally in order to tap into bigger research and development funds. This would be needed to connect the regional innovation ecosystem more tightly with progressive actors in the nearby St. Petersburg, the Baltic States, and the other Nordic countries, for instance. In this respect, the new EU funding period 2014-2020 presents a major opportunity.

8. COSTS

All the costs of the holistic institutional development described in the case are difficult to calculate. The costs incurred in the projects listed in the next section (9.) are obvious. Their main source is labour costs.

Many case activities involve, of course, participation of numerous members of staff whose working hours are not included in the project costs. The estimation of these costs is very difficult for which it is left out from the case. The same is with staff time and expert services used for structural changes for which, as indicated in the end of section 9 below, some financial support has been obtained from the Ministry of Education and Culture according to the progress.

9. FUNDING

The case activities towards the entrepreneurial university and innovation ecosystem model with closer university-industry interaction were supported mainly by seven externally funded projects during 2000-2013. The main funding source of these projects was European Social Fund. Additional funds were obtained from companies, local government, Ministry of education and Culture, and the university itself.

Combined budgets of these seven projects: c. 1,9 million euros 100 %

• of which EU funding: c. 1,1 million euros (58%)



- of which private, local government, and university funding: c. 0,58 million euros (31%)
- of which Ministry of Education and Culture: c. 0,22 million euros (11%)

In addition to these projects, some externally funded more discipline-based projects have had secondary or tertiary goals that have effectively supported the same strategic direction as the above mentioned projects. Moreover, the holistic institutional development, as it has related to the structural transformation of the institution, has been supported by structural development grants awarded by the Ministry of Education and Culture on the basis of demonstrated structural change during the latter part of the case period.

OUTCOMES & IMPACT

10. OUTCOMES

- Condensed campus structure to facilitate innovation and creation of new competences at the intersections of disciplines: From nine discipline-based locations to vibrant interdisciplinary two-campus structure
- ▶ Team-based organisation: From seven larger disciplinary departments to 13 relatively small disciplinary teams in multidisciplinary sectors and campuses plus three new university-wide interdisciplinary teams.
- Entrepreneurial curriculum for all students: Students from all disciplines take at least From idea to innovation course in their second semester. Subsequent entrepreneurial education designed through personal study plans on three phases: innovation track, entrepreneurship track, and individual/team business sparring. All courses in entrepreneurial path are delivered in interdisciplinary groups or teams.
- Numerous articles and publications about the development of aspects of entrepreneurship education, and pedagogical and curricular models related to the Learning and Competence Creating Ecosystem LCCE model.

11. IMPACTS

Kyamk has become the third best among 26 Finnish universities of applied sciences in producing entrepreneurs after graduation with 5% of graduates setting up a company within one year from graduation according to the big university of applied sciences review by Finland's most influential business weekly Talouselämä 33/2013.

Kyamk has become a sought after partner for university-industry learning projects: over 300 RDI-driven student projects with industry partners in 2012. This is manifested on a curricular level in a steady increase of ECTS credits completed through such RDI projects as indicated in the Figure 1 below.



DEVELOPING ENTREPRENEURIAL UNIVERSITY DURING RAPID STRUCTURAL CHANGE: CASE KYMENLAAKSO UNIVERSITY OF APPLIED SCIENCES



Figure 1: Number of ECTS credits completed in RDI-driven university-industry learning projects. Key in English: blue = course credits; orange = thesis credits; grey = internship credits. For 2013, figure shows only first quarter results.

The rapid and comprehensive transformation of the institution impacts its members in many ways. Number of staff has been reduced as the structural changes have progressed. This causes some stress among personnel. People need to develop new competences and acquire new roles as well as to learn to use new software to keep up continuous process development. Teacher identity is changing.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

The case is inherently integrated into the regional innovation ecosystem as it reforms the role of the institution to act as a part of innovation and venture creation processes rather than being just a producer of graduates to existing jobs and professions. The case tells a story of an institution which takes greater responsibility for leading the way during rapid structural change of the region as a whole.

Industry and other working life partners benefit from the case in the form of creative energy of students in joint RDI-driven projects. They also benefit from graduating students who are readier to challenge the status quo.

Students benefit in the form of employability skills that they accrue from their interaction with working life throughout their studies rather than just towards the end of the studies. Students with entrepreneurial potential also benefit from the possibility to develop their business ideas and thus realize their passion.

Local government, particularly regions' main cities being also owners of the institution, benefits from structural changes of the institution in the form of healthier finances of the university. University makes profit and can continue to invest in the revitalization of the region through its strategic initiatives and RDI activities. The local government also benefits from the holistic institutional development described in the case in the form of additional funding from the Ministry of Education and Culture that has been granted on the basis of successful structural reforms unlike many other similar institutions which have been more reluctant in such reforms.



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13. AWARDS / RECOGNITION

Center of Excellence 2010-2012, awarded by the Ministry of Education and Culture, Finland to.Kymenlaakso University of Applied Sciences, Faculty of International Business and Culture, for its concept of Learning and Competence Creating Ecosystem LCCE.

Kymenlaakso Chamber of Commerce, Entrepreneurship Initiative Prize in fall 2013.

LESSONS LEARNED

14. PRIMARY CHALLENGES

- Further clarification of strategic direction and simplification of strategic message
- Consistency of leadership between successive leaders
- Balancing regional forces and global perspectives, in particular, with respect to regional partners (co-development of regional players)
- Coordinated and concerted use of externally funded initiatives in line with the intended strategy
- Integration of externally funded development initiatives with the ongoing curriculum development and operational/teaching practice
- Timing of structural changes vis-à-vis development of intended entrepreneurial behaviours and culture
- Sustained strategic development of entrepreneurial culture amidst the buildup of new agreed strategic alliances
- Effective leverage of entrepreneurship education/entrepreneurial competences among teaching staff beyond the initial critical mass of engaged faculty as well as beyond forerunner faculties and campuses

15. SUCCESS FACTORS

- Consistent and visionary enough leadership during the most critical phases of structural change
- Continuing access to regional, governmental, and EU funding to support sometimes fragile development of entrepreneurial agenda
- Critical mass of entrepreneurially engaged teachers who have nurtured and carried the entrepreneurial agenda throughout changes in leadership and structures
- Experimentation with various kinds of initiatives to enhance entrepreneurship education - > repository of experiences of grassroots pedagogical experiments, curricular experiments, experiments with entrepreneurship competitions, institutional experiments,
- Self-reflective research interest in entrepreneurship education and strategic development of the institution's entrepreneurial agenda -> manifested in



systematic publishing on the development of the LCCE model and participation in international comparative research, for instance.

- Participation in national Center of Excellence competitions and success in them
- Outside pressure to take a more entrepreneurial and leading role among regional and national players

16. TRANSFERABILITY

Top management of similar higher education institutions can draw strategic lesson from the case.

Regional authorities and their leadership in hard-hit regions get a point of comparison to suggest changes in higher education institutions in their area as and if needed.

Members of staff in any higher education institution can put their teaching and research work into a larger picture, and see how grassroots engagement can play a key role in sustaining a strategic development agenda, in this case entrepreneurship education, during changes in leadership and organisation structure.



17. PUBLICATIONS / ARTICLES

- Mäkelä-Marttinen Leena, Hartikainen Nina (eds.) (2013) Kasvun Voimaa Oppimisen ja osaamisen ekosysteemissä - Learning and Competence Creating Ecosystem -LCCE® (only in Finnish, Power from Growth in the Learning and Competence Creating Ecosystem). Kouvola: Publications of Kymenlaakso University of Applied Sciences. Series A. No 42.
- Pelli Raimo, Ruohonen Sinikka (eds.) (2012) Learning and Competence Creating Ecosystem – LCCE. Kotka: Publications of Kymenlaakso University of Applied Sciences. Series A. No 33.
- Pelli Raimo, Mäkelä-Marttinen Leena (eds.) (2010) Towards Learning and Competence Creating Ecosystem – LCCE). Kotka: Publications of Kymenlaakso University of Applied Sciences. Series A. No 28.
- Ala-Uotila H., Frilander-Paavilainen E-L., Lindeman A., Tulkki P. (eds.) 2007. Oppimisympäristöistä innovaatioiden ekosysteemiin (only in Finnish, From learning environments to an innovation ecosystem). Kymenlaakso University of Applied Sciences publications, B Series N:o 46.

18. LINKS

▶ www.kyamk.fi



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19. KEYWORDS

Strategic development, entrepreneurial university, structural change, innovation ecosystem, EU funding

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INNOVATION LABS: A COLLABORATIVE TOOL BETWEEN HIGHER EDUCATION INSTITUTES AND SMES IN INNOVATION PROCESSES

By Robrecht van Goolen, Hilde Evers and Christel Lammens



INTERNATIONAL INNOVATION LABS AS A COLLABORATIVE TOOL BETWEEN HIGHER EDUCATION INSTITUTES AND SMES IN INNOVATION PROCESSES



TITLE OF THE CASE	Innovation Labs as Collaborative Tool between Higher Education Institutes and SMEs in Innovation Processes
SALES PITCH	International Innovation Labs are collaborative platforms between higher education institutes and SMEs to stimulate business model innovation. Creative solutions for real-life business problems elaborated by international student teams resulted in an innovation manual with practical guidelines for innovation processes, suited to the limited financial and marketing resources of SMEs.
ORGANISATIONS	Leuven University College, Belgium Province of Vlaams-Brabant, Belgium Innovation Centre Vlaams-Brabant, Belgium Laurea University of Applied Sciences, Finland BA School of Business and Finance, Latvia
COUNTRIES	Belgium Finland Latvia
DATE	February 2014
AUTHORS	Robrecht Van Goolen, Hilde Evers Christel Lammens
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 ☑ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition



CASE STUDY PROFILE

1. SUMMARY

Europe's future economic growth and jobs will increasingly have to come from innovation in products, services and business models in order to cope with the changing world. However, Europe has an innovation lag with respect to other economies in the world (Cornell University, INSEAD & WIPO, 2013) due to, amongst others, lower levels of investment in innovation and an insufficient use of communication technologies (VRWI, 2013). This lag in innovation is not gained upon. The gap between businesses, SMEs in particular, and knowledge institutes is significant. Especially for SMEs the access to knowledge currently available in higher education institutes (HEIs) is lacking. Moreover, most national initiatives stimulating innovation are technology-oriented and aimed at big companies.

International Innovation Labs (IILs) are organized in order to bridge the gap between HEIs and SMEs to stimulate business innovation. International student teams from three HEIs are formed to elaborate creative solutions for genuine business problems. Innovations are focused on business model innovations i.e. online communication strategies and new markets approaches (Van Wulfen, 2013).

The methodology used within IILs is case based: a 'lab situation' inside the HEIs and outside the SMEs is created to favor creative solutions to business innovation problems. The treatment of 10 cases has led to a systematic approach following five steps:

- 1) Generate and collect as much innovative ideas as possible (Byttebier, 2008; Kleon, 2012);
- 2) Orientate: identifying challenges and opportunities (Osterwalder & Pigneur, 2010);
- 3) Select and choose: pick out the best ideas;
- 4) Activate: translate innovative ideas into feasible innovation projects;
- 5) Implement the projects and manage the impact (Ries, 2011).

This approach, called the International Innovation Labs Innovation Roadmap, has been written down in an innovation manual with practical guidelines for innovation processes within SMEs.

The IILs create an environment where creative and innovative thinking is stimulated. The IILs are grounded on a close collaboration between HEIs and SMEs, which is profitable for both parties: the former offer authentic business problems to their students, where students learn by working at genuine problems rather than solving textbook exercises; the latter receive innovative solutions to improve their business performance. Students improve their employability by acquiring profound business knowledge and entrepreneurial thinking. Given the international dimension of the project, students' intercultural competences are enhanced. This project has been awarded by VISIR as top 20 practice in innovative learning methods, focusing on dimensions as creativity, impact and potential for scalability (Visir, s.d.).



2. BACKGROUND

Europe's future economic growth and jobs will increasingly have to come from innovation in products, services and business models in order to cope with the changing world. However, Europe has an innovation lag with respect to other economies in the world (Cornell University, INSEAD & WIPO, 2013) due to, amongst others, lower levels of investment in innovation and an insufficient use of communication technologies (VRWI, 2013). The EU growth strategy for the coming decades focuses on Smart Growth. In particular, the EU has set 5 ambitious objectives in the Europe 2020 Strategy: employment, innovation, education, social inclusion and climate/energy, whereby ideas are turned into jobs, social progress and a greener economy (European Commission, 2013). The 5 headline objectives have been agreed for the whole EU by the Council in July 2012 and translated into national targets in each EU country. In Flanders (a region of Belgium) innovation is one of the seven breakthrough actions of Vlaanderen in Actie 2020 (Vlaanderen in Actie, s.d.), the long term policy plan to protect and improve Flanders' leading position amongst the best performing European regions. At a lower level, the Province of Vlaams-Brabant considers innovation as a strategic goal in order to create extra employment. As an active partner in regional development, Leuven University College considers innovation as one of its strategic goals. In research as well as education, innovative thinking is actively stimulated amongst staff and students.

Smart growth not only implies an increasing economic growth but also highly qualified employees who constantly update their skills. HEIs have to collaborate more intensively with businesses. Most national initiatives stimulating innovation are technology-oriented and aimed at big companies. However, the transfer of knowledge of innovative and creative thinking towards SMEs is lacking. Even so for non-technological innovation (i.e. business model innovation, innovative communication strategies, service innovation,...), the knowledge gap between HEIs and SMEs is still existing. Especially for SMEs the access to knowledge currently available in HEIs is missing and a stimulating innovation environment to apply knowledge in the economy and society should be installed (Swan, 2011).

The lack of the current knowledge transfer concerning innovation was the cause of the establishment of the provincial Innovation Centres (Innovatiecentrum). Innovation Centres were created to encourage innovation in SMEs and guide them in their innovation processes. They focus on the analysis of a business problem and mostly on a short period of auditing and counseling. For in-depth support concerning innovation projects the Innovation Centres refers to third parties. These may be companies or organizations within the Flemish Innovation Network including Leuven University College.

Qualifications delivered by (higher) education often fail to match the labor market needs. This is partially due to study programs in HEIs which are often academically conceived with a clear focus on theoretical development and too little attention for practice-oriented applications. This also applies to business schools, which are expected to train future business people. Moreover, students will have to face an increasingly competitive and globalized market in their future career. A continuous adaptation and the acquisition of lifelong learning skills are therefore essential.



Leuven University College, department of Business Management, has gained expertise in non-technological innovation, especially business model innovation, new markets approaches and innovative (online) communication strategies. With support of the Province of Vlaams-Brabant and Innovation Centre Vlaams-Brabant, Leuven University College developed the project IILs to close the knowledge gap in non-technological innovation between HEIs and SMEs. In collaboration with Laurea University of Applied Sciences, Finland, and BA School of Business and Finance, Latvia, international student teams are (virtually) brought together to elaborate creative business plans for authentic business problems.

The activities of IILs are centered on two pillars: [1] collaborative and demand-driven research, in close collaboration with SMEs, and [2] to foster entrepreneurial behavior amongst researchers, students and external companies to stimulate innovation and creative thinking in order to create an innovative region.

3. OBJECTIVES

- 1. Developing innovative solutions for SMEs by solving real business cases. We have put the following emphasis in the cases:
 - Business model innovation by acquiring a better knowledge of the market segments and target groups
 - Business model innovation by acquiring a better knowledge about value propositions for the target groups (marketing mix)
 - Business model innovation by strengthening the positioning against competitors
 - Business model innovation by situating the partners within the value chain
 - Working out new (online) communication strategies by introducing new media (such as social media) in the communication mix of the companies.
 - 2. Guiding companies in their innovative and creative processes and making them more innovation-minded by introducing the following tools and routes:
 - A roadmap to innovation with guidelines suited for SMEs
 - Several creative techniques (e.g. GPS-brainstorming method, mind mapping)
 - Interactive digital platform with information on business innovation
 - Learning activities for businesses (e.g. seminars built around best practices)
 - 3. Stimulating the cooperation between HEIs, students as well as lecturers, and SMEs. This cooperation creates innovative business knowledge, models and activities. In this way we contribute to the image of the European Union as a creative and innovative region.
 - 4. Stimulating and improving international and intercultural competences of business students and lecturers. By collaborating with international colleagues, cultural gaps will be bridged. Given the international dimension of the present project, students' intercultural competences will be enhanced. Furthermore, the international dimension of this project is genuine and not just a mere exchange practice.
 - 5. Stimulating and improving virtual communication skills of business students and lecturers in an international environment.



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4. **RESPONSIBILITY**

The coordinating role is played by Leuven University College (Belgium) in close collaboration with partnering university colleges: Laurea University of Applied Sciences (Finland) and BA School of Business and Finance (Latvia) who can introduce their own focuses.

In several activities a number of important stakeholders contribute:

Activity	Key partners	Partner Responsibility
Management	University colleges in the 3 participating countries	Reporting to funding authorities and SMEs
		Contracting the SMEs
		Quality control by sending out standardized questionnaires which measure the satisfaction levels
		Organizational aspects such as recruiting students, (international) planning, booking rooms,
Looking for business cases	Intermediaries in each of the partnering countries. For Belgium this role is played by Innovation Centre Vlaams-Brabant	These intermediaries act as matchmaker between the business world and university colleges. They transfer business cases to the university colleges.
Intensive bootcamp at the start of a lab	Innovation Centre Vlaams-Brabant	Organizing innovation training for students and lecturers
		Facilitating brainstorm sessions
		Access to local events and
		networking opportunities
Solving business cases	Students from university colleges in the 3 participating countries coaches by lecturers	Lecturers intensively coach the students on a daily basis
Dissemination activities: educating	Lecturers from the university colleges in the 3 participating	Writing manual about innovation processes
other SMEs	countries	Creating website
		Organizing seminars and presenting on conferences



INTERNATIONAL INNOVATION LABS AS A COLLABORATIVE TOOL BETWEEN HIGHER EDUCATION INSTITUTES AND SMES IN INNOVATION PROCESSES



5. STRATEGY & ACTIVITIES UNDERTAKEN

Innovation Centre Vlaams-Brabant analyses business models of companies and sends these analyzes to one of the knowledge partners of the Flemish Innovation Network including Leuven University College. For Leuven University College the IILs student teams execute a more detailed study of the business models and develop creative and innovative solutions for the SMEs. This project is executed in close collaboration with partnering HEIs from Finland and Latvia that are also running local cases with students.

Lecturers guiding the ILLs translated the acquired expertise about the innovation process into a systematic and practical approach. An innovation roadmap was developed with tools geared with the specific challenges SMEs have to deal with (step (De Hertogh, S., Evers, H., Lammens, C. & Van Goolen, R., 2013). The roadmap is conceived in such a way that SME managers and innovation managers can easily progress through the different stages of an innovation process. In management literature, various best-practice models for stimulating and managing innovation can be found. They mostly cover tales of break-through innovations by well-known companies such as Amazon, Apple, Google, Apple, etc. However, it became apparent over the course of the different IILs that the ambition level concerning innovation in SMEs is more modest. Consequently, in each lab a rigorous selection of these models was needed to offer viable solutions to SMEs, generally after being adjusted to their specific needs. Although each lab had its own specific requests, it was clear that the innovation challenges experienced by SMEs were associated with at least one or more of five distinct innovation activities.

In Figure 1, the relations between the different activities have been visualized in an iterative process model: The International Innovation Labs SME Innovation Roadmap.



Figure 1: The International Innovation Labs Innovation Roadmap



To assist individual SME managers and business leaders in pinpointing the activities in the model which are the most helpful to their own innovation challenges, a key question (Q) has been associated with each innovation activity, as shown in table 1.

Table 1: Activity selection procedure

Q: Are you having problems collecting enough and/or valuable ideas?

⇒ Activity 1: Mobilization and collection (see section 5.1)

Q: Are you in need of developing a sense of direction for what you want your company to stand for and determining a corresponding strategy?

 \Rightarrow Activity 2: Orientation (see section 5.2)

Q: Does your innovation process stop because you cannot choose the well-advised and mature ideas out of a list of ideas?

⇒ Activity 3: Cluster and choose (see section 5.3)

Q: Does it remain difficult to turn innovative ideas into concrete plans for innovation projects?

⇒ Activity 4: Activation (see section 5.4)

Q: Do you encounter unwelcome surprises in the implementation of your project?

⇒ Activity 5: Implementation (see section 5.5)

5.1. Activity 1: Mobilization and collection

SMEs are facing a lack of sufficient capacity to innovate. This lack results not only from the limited number of people who can contribute to the innovation process but also from the restricted resources they can allocate (to external consultants, for instance). Consequently, the first activity consists optimizing the internal and external sources for the generation of new ideas. Some tools within the International Innovation Labs SME Innovation Roadmap consist of surveying, listing and assessing the ideas of existing customers and internal stakeholders, involving prosumers, crowdsourcing on social media, co-branding and co-opetition with competitors.

To add additional brainstorming capacity, a close collaboration between government, knowledge centers and companies (which is known as the knowledge triangle) can yield creative ideas for SMEs. Brainstorming is an insuperable activity for idea generation where the quantity of ideas prevails over the quality in order to generate as many ideas as possible. When organizing a brainstorm session, possible tools are flower associations, determining megatrends in the society, empathy and superheroes (Byttebier, 2008; Kleon, 2012).

5.2. Activity 2: Orientation

After the first activity of uncurbed idea generation, it is indispensable to check whether the creative outputs match with the business goals of the company by:

- ▶ mapping the business model and the external environment (Osterwalder & Pigneur, 2010);
- establishing a clear and consistent direction for the innovation process through a company mission statement, vision, values and strategy.



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5.3. Activity 3: Cluster and choose

The first two activities enable SMEs to crystalize the multitude of ideas into a limited number of clear suggestions on how to innovate their business model. During the third activity, all those options will be evaluated whether they are a viable starting point of an innovation process.

At the end of this activity, the quality of the previously generated ideas will be increased. The tasks are twofold: labeling and selecting. After labeling and clustering the ideas to achieve a higher internal homogeneity and concreteness by mind mapping techniques, it is essential to take a decision in this so-called diverging phase. The tools most suited to SMEs are hits per target group, Dr. Love and the COCD-matrix (Byttebier, 2008; Huizingh, 2013; Van Thiel, 2009; Van Wulfen, 2010).

5.4. Activity 4: Activation

In activity four, various techniques enable SMEs to reach a higher level of concreteness for the ideas selected at the outcome of activity three. The MBA technique developed by Byttebier (2008) is a low-level estimation methodology suited for SMEs, especially when some minor adaptations are made to that method to fit on the SME context. With Byttebier's technique, the motivation for the project, the specific objectives, the action paths and the main problem areas to be dealt with can be worked out in further detail.

5.5. Activity 5: Implementation

Once the concrete ideas have been developed, project plans are made, preparations are set up, etc. In this final stage, guidelines are presented to SMEs to help them realizing the innovations that will have the best chances of success. Finally, attention should be paid to the team management, the follow-up of the project, the protection of the innovation and the change management (Ries, 2011).

6. MONITORING AND EVALUATION

Monitoring and evaluating the quality and the outcomes of this project is a continuous effort. Several measurements (quantitative as well as qualitative) should assure the continuous quality and success:

Quantitative KPIs:

- Number of innovation problems from SMEs solved during the project time
- Number of trainings organized for SMEs
- Number of students involved in IILs
- Number of foreign HEIs involved in IILs
- Number of coaches of HEIs involved in IILs

Qualitative KPIs:

- Manual for innovation process and creative techniques
- Interactive website to communicate with the SMEs
- > Satisfaction surveys completed by the involved SMEs
- Satisfaction surveys completed by the Innovation Centre Vlaams-Brabant



- Satisfaction surveys completed by the participants of the training sessions
- Student research papers
- Long-term valorization of the project by implementing the IILs in the curriculum of the participating HEIs

7. SUSTAINABILITY MEASURES

The project IILs for the funding institution Province of Vlaams-Brabant finished in December 2013 and now the initiative forms part of SME routes, which is a payable package of services offered to SMEs (http://www.kmo-routes.be). SMEs will pay for the lecturer guidance of the students team. IILs is now open for all SMEs in Belgium and we committed ourselves to continue the initiative for at least 5 years. ILLs are implemented within the curriculum of the department of Business Studies of the Leuven University Studies. Each year at least 20 Belgian students can take part in this alternative of a work placement.

The methodology about non-technological aspects of innovation and service innovation is described in the manual which is made and freely publicly available as a download on the interactive website http://www.innovatielab.be. This website also allows companies to apply for innovation guidance within the IILs.

IILs will contribute to removing the barriers to establish innovative actions and share the knowledge present in Leuven University College. This process contributes to the realization of the sustainable open innovation model, i.e. an innovation model based on cooperation between governments, university colleges, intermediaries and companies (called the knowledge triangle).

8. COSTS

The costs were oriented towards obtaining the project and research results. The main costs were associated to the salaries of the employees dealing with innovation activities of SMEs. They were used on management, reporting to SMEs, quality control and guidance of students. One of the main activities of the researchers was building an innovation roadmap and writing up the results in an innovation manual. Costs were also made for the dissemination activities such as developing a website, organizing seminars with key note speakers and printing of the manual. Next to this, a basic working budget was provided for visiting of the companies and networking costs. International visits to the partner universities were funded with a budget of 500 EUR/stay (Erasmus mobility). Roughly, the budget was about 100.000 EUR for 2 years.

9. FUNDING

This entire project (2012-2013) was jointly funded by the Innovation Fund of Province Vlaams-Brabant and the Research Fund of Leuven University College. In Belgium, half of the budget came from the funding received from the provincial government. The HEIs partners from Finland and Latvia are financing their participation themselves. Innovation Centre Vlaams-Brabant is funded by the Flemish government.



Travel costs for lecturers came from EU funding out of Erasmus mobility grants. Travel expenses of students were self-funded (flights, short-term housing and staying costs for one week abroad).

In the future (2014-...), IILs aim to be financed partially by the participating SMEs in a privatepublic partnership (mixed budget out of educational and private funding). Costs concerning teacher mobility will continue to come from Erasmus+ (Key action 1). Students will pay the travel expenses for a short-term stay themselves.



OUTCOMES & IMPACT

10. OUTCOMES

1. Innovative solutions for 10 SMEs.

We emphasized the followings outcomes:

- Business model innovation by a better knowledge of the market segments and target groups
- Business model innovation by a better knowledge about value propositions for the target groups (marketing mix)
- Business model innovation by a better positioning against competitors
- Business model innovation by situating the partners within the value chain
- Working out new (online) communication strategies by introducing new media (such as social media) in the communication mix of the companies.

Participating SMEs:

- *Heart Link Online*: A company specialized in tele-health care. It commercializes an on-line monitoring service for heart patients and diabetics. (http://www.heart-link-online-halo.be)
 - Optimization of the website with special focus on the target group
 - Search Engine Marketing
 - Introducing Google Analytics
 - Introducing social media in the communication mix
- *Uitgeverij Averbode* is a Belgian editor of educative magazines for children. They distribute their magazines mainly through schools. (http://www.averbode.be)
 - Analysis of the target groups by market surveys
 - Development of innovative communication plan for target groups
 - Introduction of new media in the communication mix
- *Oud-Heverlee Leuven* is a Belgian first division football club. (http://www.ohl.be)
 - Analysis of the target groups by a market survey
 - Development of innovative communication plans for target groups
- *Musa Lova* : A company that produces a local liquor made of bananas. (http://www.musalova.be)
 - Market survey to analyze the brand awareness of Musa Lova
 - Create an experience marketing campaign
 - Search for a coherent value proposition for the target group



- Analysis of new distribution and communication channels
- *Universal Music* is the Belgian division of the Universal Music group, market leader in the music industry. (http://www.universalmusic.be)
 - Develop a new communication strategy, including social media, to promote the use of the Digster application which allows users to create playlists in Spotify
- *JCW* offers activities for youngsters. They try to stimulate the interest of young people in science and culture (http://www.jcw.be)
 - Market survey to analyze the target group
 - Improve the brand awareness of JCW
 - Create an innovative branding and communication plan
 - Use of social media to reach the target group
- *Noiselle by EH* is an exclusive brand of women shoes. Their mission is to combine comfort and high heels. (http://www.noiselle.com)
 - Market survey to analyze the target group
 - Develop new communication strategies to increase the visibility of the website and enhance the sales of the web shop
 - Examine the possibilities to patent the design of the shoes
- *Phidan:* a consulting company in supply chain management. (http://www.phidan.com)
 - Market survey for innovative communication channels
 - Develop a new communication strategy
- *Sylvitis* is a company specialized in vinotherapy: beauty treatments with products made of grape seed oil. (http://www.sylvitis.be)
 - Market surveys to find new distribution channels
 - Develop new communication strategies and sales approach
 - Introduce experience marketing in the existing marketing mix
- *Wolf* is a Belgian brewery that markets 3 beers. Their partner company Wolfnjoy creates unique experiences to promote the beer Wolf. (http://www.brouwerijwolf.be)
 - Market research of the actual distribution channels
 - Develop new creative experiences to increase the sales of Wolf
- 2. Guiding companies in their innovative and creative processes and making them more innovation-minded by introducing the following tools and routes:
 - Guidelines for innovation processes: the International Innovation Labs Innovation Roadmap
 - Several creative techniques

This resulted in a printed innovation manual which describes important steps in the innovation process together with the latest creative techniques useful in each step (De Hertogh, S., Evers, H., Lammens, C. & Van Goolen, R., 2013).

Next to that, we developed:

- Interactive digital platform with information on business innovation
- Digital forum for SMEs wishing to tackle business problems



This digital platform is also a way to distribute the innovation manual to SMEs.

Furthermore, we organized:

- Learning activities for businesses (e.g. seminars built around best practices)
- 3. Enhanced cooperation between HEIs and SMEs in authentic business cases. This resulted in a two-way knowledge exchange.
- 4. Improved international and intercultural competences of business students and lecturers. Student teams from the partner institutions regularly met virtually and in real-life to discuss their input in the cases. Students therefore practiced their language skills, intercultural competences and civic competences, while actively becoming European citizens.
- 5. Cooperation with foreign colleagues enhanced the knowledge and use of virtual tools.

11. IMPACTS

Taking into consideration the proposed solutions, the SMEs involved in the IILs were generally very satisfied, as shown by the results in table 2 (mean scores on a 10-point scale). The figures in table 2 show that the SMEs were satisfied about their participation in the ILL with mostly a score of 8/10. The criteria with a score of 7 will be used to improve the future organization of IILs.

Table 2: Satisfaction of SMEs on a 10-point scale

Evaluation of the process	Mean score
The in-between meetings were efficiently	8
In the final communication SMEs received interesting solutions to	8
their problems	
Evaluation of the results	Mean score
International Innovation Labs deliver innovative solutions	7
The result was of a high quality level	7
The report was clear	7
The closing presentation was grounded with new scientific results	8
General satisfaction level	8

The International Innovation Labs SME Innovation Roadmap offers a systematic and pragmatic approach to business innovation.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

ILLs are a dynamic platform where creative thinking and working out innovative ideas is stimulated. The IILs are grounded on a close collaboration between HEIs and SMEs, which is profitable for both parties: the former offer authentic business problems to their student as cases, where students learn by working at genuine problems rather than solving textbook exercises; the latter receive innovative solutions to improve their business performance. The innovation roadmap is based on a limited amount of case studies, but show interesting tools adapted to the specific problems faced by SMEs. Students improve their employability by acquiring profound business knowledge and entrepreneurial thinking. Given the international dimension of the project, students' intercultural competences are enhanced.



13. AWARDS / RECOGNITION

This project has been awarded by VISIR as top 20 practice in innovative learning methods, focusing on dimensions as creativity, impact and potential for scalability.

LESSONS LEARNED

14. PRIMARY CHALLENGES

The most important challenge is to find companies who are willing to cooperate in this project. Not every company is suitable to participate. Companies need to be open to work with outsiders and to share their internal information with the students. Moreover, it is important that they are willing to implement innovative solutions elaborated by students.

Another challenge is to select the right student profiles for the project. They need to be able to work independently: execute market research and analyze the results, create innovative solutions, work out concrete actions and develop implementation plans.

Furthermore, it is essential to compose coherent student teams. As they need to collaborate in this team for 3 months, the composition of the team will determine the outcome of their work. Therefore we use an online tool competence indicator to compose the teams and we periodically evaluate the cooperation in the team by peer assessments.

Finally, the success of the project depends on the coaches involved. HEIs need to provide an adequate framework for successful coaching. It demands a lot of time and energy to coach and to motivate the student teams.

15. SUCCESS FACTORS

The key factors that led to success are:

- Genuine business cases
- International collaboration with foreign HEIs
- Collaboration with Province of Vlaams-Brabant: financial support and network of regional SMEs
- Collaboration with Innovation Centre Vlaams-Brabant: network of regional SMEs and expertise in innovation tools and techniques
- Intense cooperation between the coaches
- Good selection of motivated students who are able to work independently
- Weekly common coaching moments enhanced the creative process
- The use of virtual tools to communicate with foreign partners



Factors that have prevented success are mainly linked to the participating SMEs. Lack of confidence and/or involvement sometimes led to slowing down the innovative process and was demotivating for the students. In these cases, there was little implementation of the developed plans. Not only students from Business Studies can benefit from this approach as an alternative for an internship, but also students from other study fields.

16. TRANSFERABILITY

This innovation project is a good example of how collaboration between HEIs and SMEs has advantages for both parties. It is also a good example of integration of innovation, virtual tools and internationalization in the curriculum of HEIs. The project can easily be transferred to other HEIs in Belgium as well as in other countries.

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19. KEYWORDS

Business model innovation, creativity and idea generation, knowledge transfer, SMEs, higher education institutes, innovation tools and methods

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RULES OF ENGAGEMENT: EXAMPLES OF THE DEVELOPMENT OF UNIVERSITY BASED COLLABORATIONS BETWEEN CANALSIDE STUDIOS, INDUSTRY AND SOCIAL ENTERPRISE

By Damian De Luca, Ruth Taylor and Martyn Prigmore



EXAMPLES OF THE DEVELOPMENT OF UNIVERSITY BASED COLLABORATIONS BETWEEN CANALSIDE STUDIOS, INDUSTRY AND SOCIAL ENTERPRISE

GENERAL INFORMATION

TITLE OF THE CASE	Rules of engagement: understanding the dynamics of social enterprise and business requirements on academic collaboration
SALES PITCH	Examples of the development of University based collaborations between Canalside studios, industry and social enterprise.
ORGANISATIONS	Canalside Studios University of Huddersfield
COUNTRY	United Kingdom
DATE	February 2014
AUTHORS	Damian De Luca Ruth Taylor Martyn Prigmore
NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
SUPPORTING MECHANISM	 ☑ Strategic instrument □ Structural instrument or approach ☑ Operational activity □ Framework condition



CASE STUDY PROFILE

1. SUMMARY

As part of its remit to support University Business Collaboration the University of Huddersfield provides seed funding for collaborative ventures between academic and industry partners to initiate small-scale projects that have the potential for growth. (This is trickle down funding from the UK government Higher Education Innovation Fund). This case study explores the experience of University-Business Collaboration of Canalside Studios, the University of Huddersfield's in-house games research and development studio.

Individuals and companies seeking help and advice to develop business products frequently approach the University with business ideas but matching the needs and expectations of both University and business can be difficult. This paper provides a reflective case study account of the experiences of one academic team working with different external partners on serious games and software development projects. The partners range from a fire service requiring a training command simulator to a reading game to encourage elementary stage learners for use in the classroom and at home.

The findings show that managing relationships between the University and external partners is time consuming with a great deal of effort needed, particularly in the early stages of a project, to achieve shared understanding of goals and outcomes. Partnerships with smaller organisations or individuals often require more intensive management than those with larger organisations who are more familiar and may have prior experience or existing mechanisms to support this. Collaborations with partners who value the research and educational values of the University are likely to result in mutually agreed success and are more valued by academics as these lead to publication of the product and the dissemination of the learning. Collaborations with partners with purely business-oriented goals or who are not perceived to understand academic values are more likely to falter; academics can see these relationships as "time theft". Seed funding for this type of project is valuable and tempting but can attract interest from individuals and organisations who are looking for a way of off-setting costs rather than seeking a genuine University-Business partnership, with benefits for all.

As a continuing study, we suggest strategies gained through the initial 8 years' experience of University-Business Collaborations through Canalside Studios. Our experience suggests that universities can and should adopt filtering techniques with potential business collaborators, to match expectations and ensure higher chances of project success for all stakeholders and a better focus on relationships with potential for long term partnership and mutual success.

2. BACKGROUND

In 2006 the University of Huddersfield launched an in-house computer games studio, Canalside Studios. The Studio was initially created to provide work placement opportunities for students studying computer games (programming and design). The early teams were made up of undergraduates and two members of academic staff.



After delivering successful entertainment games for Microsoft Xbox (YoHo Kablammo and Missing Reel) this success of the studio delivering commercial software raised the profile of the studio team and highlighted its potential for other types of project including those with a more academic focus. Colleagues approached the Canalside Studio team from the Arms and Armour Research Institute to work with The Royal Armouries museum in Leeds to develop digital interactive museum displays that would appeal to the Xbox generation. The studio went from strength to strength, many projects were undertaken with various commercial and social enterprise partners.

External Part	iners		Internal Partners			
Organisati	Project	Business	Organisation	Project	Business	
Microsoft Xbox	YoHo Kablammo	Commercial Game	University of Huddersfield / European Union	EU Researcher Night	Game	
Microsoft Xbox	Missing Real	Commercial Game	History Department UoH*	Tudor Trumps	Serious Game (Education)	
Royal Armouries (Leeds)	Gun Viewer & Digital Interactive	Serious Games (Public engagement)	History Department UoH*	Social identity and class	Serious Game (Education)	
Frazier Internation al Museum	Digital Interactives	Serious Games (Public engagement)	Podiatry Department UoH*	Orthopaedic (podiatry) surgery simulator	Serious Game Simulation (Educational training)	
Blue Chair Creative	Prototype	Serious Game (Education early readers)	Child Nursing Department UoH*	Huddle street	Serious Game (Virtual learning environment)	
Castle Hill School (special educationa l needs)	Prototype	Serious Game (Accessible Education)	Nursing Department UoH*	Human heart anatomy	Serious Game (Education training)	
Apple Inc. & Google play	Smart phone games Katu Toka & Lapsus	Commercial Game	Music Department UoH*	Stonehenge visualisation	Serious Games (Public engagement)	
Mold Green School	Reading application Prototype	Serious Game (Education training)	Music & History Departments UoH*	Aural History application	Serious Games (Public engagement)	
West Yorkshire Fire Service	Driving Simulator	Serious Games (Public engagement)	Arms and Armour Research Institute UoH*	Various Digital Interactives	Serious Games (Education & Public engagement)	
West Yorkshire Fire	Command simulator	Serious Games (training)				



UIIN GOOD PRACTICE SERIES

Service			
West	Student	Serious Games	
Yorkshire	awareness	(Public	
Police	game /	engagement)	
Commissio	application		
n			

* UoH University of Huddersfield

The above table highlights the projects undertaken since 2006 by the two key members of staff and the wealth of experience gained. The students involved in the enterprise are placed from their undergraduate bachelors degree after two years of study. The students spend a single year in the studio on work placement and then return to their studies.

3. OBJECTIVES

The studio has four main stakeholders in the relationship; the studio, academic staff, business partners and the students. As can be seen from the table above the business partners ranged from commercial platform holders, social enterprises to internal University partners. The table below lays out the key objectives of the initiative and highlights stakeholder criteria.

Objective	Studio	Staff	Partner	Student
Objective	outcome	outcome	outcome	outcome
Work Placements				
Enterprise				
Education				
Research				
Curriculum Development				
Entrepreneurial mind-set				
Esteem				
Impact				
Community				
Ecosystem				
Sustainability				
Financial income				

4. **RESPONSIBILITY**

The projects table indicates the studio is a route for both commercially aware partners and also charitable and social enterprises to engage the University. The responsibility for the various projects is shared between the two key members of studio staff and the support structures within the University. A typical route for a client to the studio could be through the University Enterprise office; the contact is passed on to the studio, which, after consultation with the client determine if the project is feasible, given the capabilities of the studio and a match to the studio strategy. After the initial years the studio formed networks within the working partnerships and through both the game and academic publications, leading to word of mouth referrals from existing partners. The responsibility for the management of the



studios is with the two core academics and the responsibility for the successful implementations of the project lies with the entire stakeholder team.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

Universities are now being asked to fulfil an economic role outside of providing highly educated workers. Government policy now requires universities to become more self sustaining through student fees and more enterprising through the exploitation of their intellectual property and research and enterprise activities. The policy makers see the modern university as an entrepreneurial establishment; a partnership between government, industry and universities, 'The Triple Helix' creating innovation, wealth and economic prosperity.

The University and School strategic plans emphasise the move by UK Universities to engage in the wider economic and enterprise direction of government policy. The studio model has allowed the government policies on placements, research and enterprise to be partly fulfilled.

Commercial and research projects

- 5 Commercial games
- 7 Public engagement serious games
- 5 Educational serious games
- 4 Simulation / training serious games

The studio's strategy initially to develop knowledge of computer video games practice and to provide staff authenticity and student placement opportunities was successful. Over the eight years of projects the studio has moved from a commercial games studio manned by academic staff and placement students to a hybrid video games studio and serious games research facility. This shift in focus is aligned to the developments and strategy of the University. In 2006 the university of Huddersfield was a mainly teaching led institution, by 2014 it is a research led institution, Times Higher Education (THE) Entrepreneurial University of the Year 2012 and THE University of the year 2013. The studio has mirrored the University strategy and has moved from students being exclusively from the University undergraduate taught programmes to a combination of postgraduate research (PGR) and undergraduate students. This shift in strategy and focus can be seen in the profile of projects undertaken, initially being commercial game focused to a serious game visualisation focus.

6. MONITORING AND EVALUATION

The studio monitors it outputs based on the deliverables for any given project and the satisfaction of the stakeholders and clients concerned. The studio uses both qualitative and quantitative methods to determine the Cost Benefit Analysis (CBA) of the studio projects and



the appropriate outputs as the benefits to the various stakeholder are numerous and complex.

The following lable is an example of benefits to stakeholders.	The following table is an	example of benefits to stakeholders.
--	---------------------------	--------------------------------------

Benefits	Studio	Staff	Partner	Student
Placements				
Enterprise Projects / Software Research Consultancy Spin out				
Education				
Research Journal papers Conference presentations Masters by Research awards 				
Curriculum Development Currency Feed in Authenticity 				
Entrepreneurial mind-set				
Esteem Industry value Research esteem Recruitment 				
Impact Research impact Software impact 				
Community				
Ecosystem				
Sustainability Stakeholder value Student recruitment 				
Financial income				

The table above are not the full benefits of the studio and it is not always possible to translate benefits into straightforward monetary value.

Through CBA we attempt to measure the positive or negative consequences of a project:

- a. Value and effects on users or participants
- b. Value and effects on non-users or non-participants
- c. Internal effects
- d. External effects
- e. Social benefits

7. SUSTAINABILITY MEASURES

The establishment of Canalside studios back in 2006 and the initial seed funding of \pounds 200,000 led to a successful first title and subsequent commercial games releases. The


studio model is not simply based on income generation. As can be seen from this case study, stakeholders derive different value through the outputs of the studio. The main output that benefits teaching is increased student entry profile and sustainability in student numbers recruited to the games degrees. Through questionnaire and empirical evidence we found students chose to study at Huddersfield because we do not just teach games we make games. Therefore the University selects to annually fund the studio bursaries and on-going costs. The additional income through sales, grants and venture funds is used to purchase project specific equipment, fund PGR students and to fund dissemination of the studio good practice through events such as UIIC.

Prior to the change in UK University funding (2011) the Higher Education Funding Council for England (HEFCE) provided funding to universities for students on a placement year. The HEFCE pro rata contribution was allocated by the school to cover over 50% of costs of student bursaries in the Studio.

8. COSTS

Item	Cost
Student Bursaries	£8,000 per student (typically 8)
Equipment maintenance	£2,000
New equipment	£3,000
Travel	£2,000
Miscellaneous	£1,000
Total costs	£72,000

The table below indicates running costs.

NB. All indirect costs i.e. room, heating, internet and telephone are covered by the School.

9. FUNDING

The studio was initially seed funded through an internal University strategic grant of $\pm 200,000$. The studio used the money to establish a studio environment; desks, equipment, licences and student bursaries. The University provides annual funding as described above and subsequent additional case-by-case project funds have been sought through various means.

- 1. Research council bids (research)
- 2. European Grants (ERDF) funds, i.e. to support University outreach programmes.
- 3. Higher Education Innovation Funds (HEIF)
- 4. Collaborative Venture Funds (CVF) Designed to inject initial funding into a project. These funds are small pockets of money design to rapidly develop an idea to see if any future potential value exists
- 5. Self funded projects
- 6. Regional development grants
- 7. Combinations of the above



OUTCOMES & IMPACT

10. OUTCOMES

Outcomes of the case study include:

- Student placements
- Masters by Research awards (PGR)
- Staff authenticity
- Staff publications
- Studio publications (games)
- Contract research
- Consultancy
- Joint funding applications
- Research software
- Heritage tools
- Educational tools
- Intellectual property (research)
- Collaborative networks
- Ecosystem (Research & Enterprise)

11. IMPACTS

Studio activities help to inform teaching and curriculum and add authenticity to the studio academic team. The studio is an interface with industry partners from the both the video game and other industry partners. The studio allows external facing interdisciplinary cross-university working, supporting diverse industry / academia networks. These have culminated in an ecosystem being developed around the University Innovation centre with three games companies taking up residence within the first year of the centre opening. The advantages for the companies involved are numerous, with access to academic staff and the ability to recruit from the current student base.

Short-term impacts

- Access to CVF funding
- Authenticity
- Industry recognition
- ► Awareness

Long-term impacts

Proven track record in development



EXAMPLES OF THE DEVELOPMENT OF UNIVERSITY BASED COLLABORATIONS BETWEEN CANALSIDE STUDIOS, INDUSTRY AND SOCIAL ENTERPRISE

- Access to higher level funding
- Academic & Industry recognition
- Diverse partnerships
- Video / Serious Games ecosystem

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Student Perspective		
	Computer Games Development and knowledge transfer.	
Goals	A good work place experience.	
	Esteem, publication of their work	
Method and	Student attendance.	
measurement	Suitable and completed projects.	
medbarement	Improving and developing knowledge	
	100 % of students successfully complete work placement.	
C 1 1 1	Publication and recognition of their work.	
Success indicator	Clear knowledge increase.	
	Increase in maturity.	
	Inprovement in their social networking skills.	
	Lack of management.	
Risk	Disappearance of early management enthusiasm Instructor ability to	
	maintain the motivations	
A sector in Decreased		
Academic Perspecti	ve	
	Academic authenticity.	
Goal	Esteem, publication of project and dissemination of research findings.	
	Increased social capital.	
Matha dau d	Recognition by students, colleagues and industry colleagues.	
Method and	Publication of project outputs.	
measurement	Increased access to notential collaborators	
	Increase in course and studio recognition	
	Increase in capabilities	
	Studio outputs	
Success indicator	Research outputs	
	Increase in potential projects and their scope in terms of size and	
	complexity, multi disciplinary nature	
	Lack of personal commitment	
Risk	Lack of management support and commitment.	
	Lack of focus on project objectives and or stakeholder outcomes.	
Industry Perspective		
	Project is delivered to brief.	
Caal	Access to social capital and knowledge.	
Goal	Access to funding.	
	Access to future employees and their education.	
	Milestones hit and project delivered on time and within budget.	
Method and	Increased company knowledge and potential projects.	
measurement	Increase in co-funded projects and R&D.	
	Growth and capable employees.	
Success indicator	Published projects yielding an income stream.	
	Increase in project type and scope.	
	Strong growth and future potential	
	Strong growth and rulide potential.	
Risk	delivering to brief	
	Lack of commitment from management and staff	



	Over reliance on co funded income streams. Lack of market take up and resulting growth.	
University Management Perspective		
Goal	Student satisfaction. Staff satisfaction. Improved research and teaching. Institutional esteem.	
Method and measurement	National Student Survey. Well being at work survey. Student recruitment metrics; quantity and quality. University league tables.	
Success indicator	Top 10% for student satisfaction. Top 10% for staff wellbeing. Higher entry profile students, while maintaining or improving student intake. Continuous improvement in league table position.	
Risk	Student satisfaction drops due to focus on enterprise and research. Staff work-life balance, leading to key staff leaving the institution. Insufficient students to make a course of study viable. Drop in league table and esteem, leading to reduced income.	

13. AWARDS / RECOGNITION

The studio has been recognised as an area of best practice by the UK computer games industry and regionally by Game Republic. The studio has won awards from Microsoft for games design. The University of Huddersfield has awarded a member of studio staff an enterprise merit.

Both academic staff are Fellows of The Royal Society of the Arts (FRSA) due to the studios achievements.

Other UK universities have now implemented a similar studio model on their games and multimedia departments.



14. PRIMARY CHALLENGES

The academic staff leading the project had no commercial video games development experience and limited research and enterprise experience. The studio is an alternative to the more traditional research led activities, however the University had no formal mechanism for training and development of academic staff that wished to engage in these types of enterprise activities.

The initial development of working relationships between academia and the computer video games industry was not easy; the 'Industry' perception of the Studio was 'a foolhardy endeavour' with 'limited chances of success' given the inexperience of the team involved.



Interactions between industry and the University needed to be moved from mainly curriculum based to 'How to make a game'. It was clear that the staff team would need developing, the Studio students having limited knowledge would need developing and industry help and guidance would be required to ensure that the first game development project succeeded.

The initial publishing contract from Microsoft Xbox required business approval and was unfamiliar to both the University and the School senior staff; involving American contract law, American tax system and indemnity insurance. This unfamiliarity meant senior staff were reluctant to sign the contract until approved by the University legal team. The lack of knowledge around indemnity insurance for computer games initially led to long delays until total liability per case had been explained.

Problems arose between the working practices of the University and the games industry, for example in arranging suitable security both physical and for computer networks. Suitable levels for both had to be implemented and the studio required a separate network to the academic network provided through JANET the UK government computer network for research centres and universities. The video games industry (Microsoft Xbox team) were timely in their responses and precise in their details; having a multinational partner was initially intimidating for the staff involved, however the Xbox team were always understanding, business like, friendly and supportive removing any anxieties. The University moved at a somewhat slower pace on decision-making and could be vague when presented with these non-traditional commercial activities.

The School initially labelled the studio as a teaching activity and not as an enterprise activity leading to issues with budget control and access to further funding. The problems encountered highlighted the lack of commercial awareness in this sector and for enterprising staff the lack of understanding and agility in University administrative practices in supporting this type of activity. Staff needed a greater understanding of how the University operated and a change in ways of working in order to facilitate the projects. A shift in culture was required from teaching related values; 'individual learning', 'experience', 'process' in a safe environment where failure has value to practical industry values like 'time', 'cost', 'quality' and 'team work'.

Key stakeholders in the studio had different notions of success and the outputs from a single project varied. Academics needed to produce strong research focused outputs together with providing a sound studio base to feed into the curriculum. Students required a valid placement experience. The games industry and project partners required a fully tested and polished final software solution, which adhered to technical and design requirements.

15. SUCCESS FACTORS

Success factor from social enterprise collaborations

Collaborations between universities and social enterprise organisations often encounter issues that can impede or challenge the undertaking. Many of these issues are predictable and can be alleviated to an acceptable level for all concerned once precise goals are determined and the scope and limits of a project are agreed.

Because universities in the UK are publicly funded, and as educational establishments are broadly perceived as working for the benefit of the public and therefore for 'public good', it



could be argued that there is a natural affiliation between universities and social enterprises based on values. However changes to funding in UK universities and the move to more corporate forms of management and organisation in the sector, including issues around diversification of income and industry engagement, means that there have been significant shifts in the culture and governance of universities making them more business like and less philanthropic than in the past.

Social enterprises seeking to work with universities may not fully understand the changing nature of the university and how a university conducts research and enterprise. Whilst collaborations between universities and external partners may not always be revenue generating for the university there is an expectation of alternate quantifiable value in order to justify the effort, for example in the form of research outputs or 'impact'.

Our own experiences through the Studio found that partnerships with social enterprises were often complicated by the many voices represented within the organisation and that the problem or project being proposed was not quite resolved enough to be worked on effectively leading to different ideas and approaches on how resource should be employed, and the major direction in which the collaboration should go. This is highlighted when a single organisation commissions a piece of software many competing interests are brought to the fore and have to be resolved before priorities can be established and design work begun.

Social enterprises have knowledge and expertise of their own domain and understanding of the business world in general, however a software studio can seem quite alien as the processes and complexity of making even a small piece of software are often poorly understood and the amount of work involved frequently underestimated. This can lead to embarrassing requests and awkward moments as it becomes necessary to explain that although software, games and apps are everywhere in our society they are seldom quick or cheap to make. This in-turn can lead to emergent goals and a reduction of scope for the project. Clear, measurable goals and objectives need to be tied down from the outset. Even with these in place, interpretation of the deliverables can be mismatched; partners need to be in constant consultation over the early stages of the project, with regular updates and discussions on the project flow. A clear lesson on what each partner requires and how often partners input into the project needs to be defined, in terms of human input, time, complexity and deliverables.

To avoid misunderstandings a clear time line needs to be established and knowledge transferred between the parties on working practices of their respective organisations. All parties must understand their input in the costs and benefits from the project. Typical not for profit budgets have many competing interests, and many have experienced projects where minimal deliverables were achieved. Social enterprises tend to have limited financial resources and are likely to be risk averse and they will understandably be concerned with their responsibility to their own stakeholders. This conservatism can impact on their activities and ventures with new partners where too little risk and initiative translates into fewer benefits, both parties must ensure their skills and resources are complementary. Social enterprises may not fully appreciate the value their brand can bring to a product and esteem attached to working for the enterprise; they may not understand the value created through their partnerships and visa-versa. As the project moves forward parties must maintain focus



and not become complacent with their new partners and the responsibilities each has. Communication and sharing knowledge is important to prevent uncertainty and this must be consistent for the duration of any project.

The structure and the culture can be a major source of mismatch, reflected in their working practices, from decision making to availability, the hierarchical nature of the university is in contrast to the consensus driven approach of the social enterprise partner.

Conclusion

Social enterprise and university relationships need to be carefully planned, structured, nurtured, maintained and developed in a synergistic nature that enables all to contribute to the undertaking. Fulfilling objectives for the university and the social enterprise and generating value and outputs for all. Recognising and realising the benefits is not straightforward and requires commitment in terms of resources and skills for both parties. There is no simple solution or single best practice to ensure success, certain problems are foreseeable and can be avoided, however some difficulties inevitably arise and effective communication and a willingness to learn is necessary on both sides. Projects are most effective where a team comes together and understanding, forming, norming and performing are developed together with a shared determination to overcome any obstacles.

Principals from both require a full and rich understanding of the factors and processes that drive, sustain, and support their partners' organisations and the rich crossover that these partnerships may bring. Universities are ideally placed to ensure the social enterprise opportunities are developed and theories, concepts and frameworks disseminated, ensuring future success for all.

16. TRANSFERABILITY

The above case study is broadly transferable and the lessons applied to any university and industry projects. A technology studio capable of producing or prototyping software has multiple applications and provides opportunities for working with diverse partners.

Industry benefits

- Universities can provide bespoke software solutions and training solutions with ongoing, results driven, cost effective solutions.
- With collaboration in place, organisations can access a wealth of cross-disciplinary knowledge and consultancy. Within the Universities, organisations can also access academic social capital.
- Access to this social capital creates the opportunity for organisations to access open research throughout the university, with the potential to apply developments in technology or research to practical or industry problems.
- Organisations with good working relationships with a university are in a position to contribute to courses and curriculum development by providing advice on current industry needs and practice. Industry relevant curricula are important for graduate employability as this gives employers confidence in the university and its students and helps students develop and demonstrate appropriate skills.
- Organisations with close relationships with a university or course (particularly where they contribute to teaching through occasional studio support, guest lecturing etc.)



can get early indication of high performing individuals and therefore 'cherry pick' students, and a type of pre-interview can be established.

- Larger organisations can collaborate and then influence the software requirements of a course within the University and influence the direction of the curriculum and tools used to deliver it. This has huge advantages once the students who experience these tools graduate and influence their new organisations technology choices.
- Continuing and professional development for the partner organisations can be assessed and appropriate training courses designed and delivered.
- Partners can access University research and innovation funding streams through these collaborations; these can be joint ventures in either the universities core business of education and or enterprise/research activities.

Academic benefits

- Placement of students within partner organisations provides employment opportunities and intern opportunities.
- Industry input into the curriculum and it's delivery through shared experiences and projects. This will enhance the curriculum and in turn maintain curriculum currency. Industry provides feedback on the skills and competencies required.
- Working with industry allows partners to recognise future projects and collaborations. These can take the form of commercial work or research or continuing education.
- Strategic partnerships between a particular industry or organisation and a university allow for longer term planning and help to develop centres of excellence and local clusters of specialist knowledge and expertise.
- Working with industry opens up new funding streams; research councils are increasingly interested in the commercialisation of research and therefore look favourably on joint bids.
- Credibility with industry gives recruitment advantages with future students. maintains the scholarly knowledge of the academics involved.
- Industry–university cooperation is very effective in generating innovation.
- Economic advantage benefits the local community.

Conclusion

This case study has examined and discussed the main issues and important success factors to emerge from empirical evidence from two academics involved in industry-university collaboration across eight years of study. Common themes have emerged through the investigation and good practice models have emerged providing a useful tool that could be applied to future collaborative projects thereby improving the success of the project and stakeholder outcomes.

Essential to the success of any project is strong project management, a shared vision and agreed objective set. Milestones are set and achieved with strong management and monitoring of the project. Good communication with the project manager and stakeholders ensures no misunderstanding of the brief agreed.



Both unidentified external and internal factors such as corporate strategies and changes in management mean the collaboration and management of such activities needs to be flexible enough to cope with unforeseen change.

Successful collaboration is based on a clear set of objectives and deliverables, with a relationship based on trust, commitment, knowledge and skill transfer. Benefits to collaboration must include measures that maintain the commitment and interest of all parties; these should be clearly defined and revisited during the course of the relationship. A good relationship will ensure a balance of benefits.

The issues in this case study have wide relevance. This research needs to be taken forward with colleagues from across academia and industry to further validate the existing success factors and models and identify others. Future research will concentrate on the validation of these findings and models through additional cases involving other academics and industries engaged in similar collaborative projects. This work will enable further testing and refinement of the good practice models as a tool for future collaborations.

FURTHER INFORMATION

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18. LINKS

http://www.canalsidestudios.com



UIIN GOOD PRACTICE SERIES

EXAMPLES OF THE DEVELOPMENT OF UNIVERSITY BASED COLLABORATIONS BETWEEN CANALSIDE STUDIOS, INDUSTRY AND SOCIAL ENTERPRISE

- http://www.hud.ac.uk
- http://gamerepublic.net/

19. KEYWORDS

Innovation, academic, industry, partnership, collaboration, enterprise, social enterprise, values

20. PUBLIC CONTACT DETAILS

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FROM UNIVERSITY TECHNOLOGY TRANSFER TO REGIONAL INNOVATION GATEWAY:

HOW TO TRANSFORM A UNIVERSITY TECHNOLOGY Commercialization office into an innovation Engine for the University and the region

By Ivelina Metcheva, Nicole Colomb and Allen Morris









1. SUMMARY

VCU's technology commercialization office has made a strategic decision to broaden its mission and activities and position itself as an innovation engine for the university and the region. The office has transformed itself from transactions-centered to focus on building strategic relationships. In addition to facilitating the commercialization of university inventions, our functions also include supporting university research through industry collaborations; fostering a culture of innovation and entrepreneurship at the university; and promoting regional economic development and new venture creation. To reflect this broader role, we rebranded from VCU Tech Transfer to VCU Innovation Gateway that will provide an easy-to-use "front door" into VCU. This front door allows our partners to access important information on our capabilities and expertise, which could be leveraged by prospective or local businesses. By assisting regional innovation and economic development groups the attraction/retention process, VCU can tell its own story and identify points of potential collaboration across the broader university.

- Resulting collaborations can include sponsored research, internships, student projects, utilization of faculty expertise or core facilities, etc.
- Industry sponsored research is increasingly important with diminishing federal funding.
- Industry sponsored research also helps to ensure research is focused on applications that have relevance in the marketplace.
- Prospective and expanding businesses create new jobs for our students/alumni and can contribute to culture changes in the region.
- VCU is committed to supporting the growth of greater Richmond's innovative and entrepreneurial ecosystem. With over 31,000 students and ~\$250 million in funded research, VCU represents an important catalyst for that ecosystem's growth.

2. BACKGROUND

VCU's technology commercialization office was established in 1995. Traditionally, its focus was on the protection and commercialization of university inventions through licensing to the private sector. This has been the established model for technology transfer in the US for the past 25 years. Previously, our functions included technologies protection, marketing and licensing and simple research support agreements such as MTAs and NDAs to facilitate research at the university.

3. OBJECTIVES

- To enhance the culture of innovation and entrepreneurship at VCU
- To foster industry collaborations with local and international companies
- To mature and de-risk inventions to make them more attractive to licensees or investors



- To support new venture creation
- To foster the regional innovation ecosystem
- To position VCU as true regional innovation engine.

4. **RESPONSIBILITY**

VCU Innovation Gateway



5. STRATEGY & ACTIVITIES UNDERTAKEN

VCU is a major research university and the VCU Innovation Gateway is responsible for translating this research into the market place. Commercialization of research provides ROI on taxpayers dollars- innovations from universities are developed and advanced to market to cure diseases and improve quality of life.

Traditionally, VCU Innovation Gateway was focused on protection and commercialization of intellectual property developed at VCU. This has been the established model for technology transfer in the US for the past 25 years. To support the implementation of VCU strategic plan, we made a strategic decision to broaden our mission and activities and position our self as an innovation engine for the university and the region. From being transactions-centered, we are now focused on building strategic relationships. In addition to facilitating the commercialization of university inventions, our functions now also include supporting university research through industry collaborations; fostering a culture of innovation and entrepreneurship at the university; and promoting regional economic development and new venture creation. To reflect this broader role, we have rebranded from VCU Tech Transfer to VCU Innovation Gateway.

The main functions of Innovation Gateway are:

- 1) Technology Commercialization Includes: Activities from invention disclosure to IP protection, marketing and licensing
- Contracts & Agreements in Support of Research Includes: Agreements and contracts that allow research to take place and advance further
- Industry Collaborations and Partnerships
 Includes: Building targeted research relationships with industry
- 4) Entrepreneurship & New Ventures Includes: Enhancing entrepreneurial culture at VCU and supporting new venture creation
- 5) Economic Development Includes: Supporting regional job creation



To support our extended mission and functions, we have developed and launched the following programs:

- Strategic Industry Relations program aimed to foster industry collaborations with local and international companies;
- Pre-license Value Creation Program, which purpose is to mature and de-risk inventions to make them more attractive to potential licensees or investors. A part of this program, we have established a Commercialization Advisory Panel of industry experts, early-stage investors and experienced entrepreneurs. The panel meets quarterly and helps us evaluate technologies and commercialization strategies. These meetings provide a forum to showcase VCU's areas of research excellence and to create opportunity for local industry collaborations and starting new ventures.
- Proof-of-Concept Funding. We are also focused on securing proof-of-concept funding from internal and externals sources. Our team supported the applications and had hands on involvement in securing outside Proof-of-Concept funding.
- VCU Squared. Innovation Gateway has lead and coordinated the creation of university-wide strategy for Innovation/Entrepreneurship and has launched a university-wide innovation & entrepreneurship initiative dubbed VCU Squared (VCU Venture Creation University). The activities included:
- Organized and held internal VCU Innovation summit.
- Formed university-wide innovation / entrepreneurship steering committee.
- Developed and secured Quest for Innovation Fund for the implementation of short term initiatives outlined by steering committee.
- Performed assessment of I&E activities internally (at the university) and external activities (in the region)
- Initial implementation of strategy & related programs

6. MONITORING AND EVALUATION

The traditional performance metrics have been expanded to include metrics reflecting our expanded mission to include the following:

Commercialization	
IP Management	
Invention disclosures	
Patents filed	
Patents issued	
Copyrights	
Agreements	
Licenses/Options	
Research Support Agreements	
Service Agreements	
MTAs	
NDAs	
Targeted Industry Relationships	New Metrics
Sponsored Research Agreements (initiated and facilitated)	



Research and Technologies Showcase Meetings (Companies' Visits and Presentations)	
Faculty presentations to Industry, Entrepreneurs and Investors	
Entrepreneurship and Economic Development	New Metrics
Prospect companies supported	
Facilitated student internships in companies	
Advised entrepreneurial faculty on start-ups	
Advised entrepreneurial students on start-ups	
Development of commercialization plans	
Facilitated pitches to venture conferences	
Facilitated Proof-of-Concept grants	
Start-ups (based on VCU licenses)	
Finances	
Licensing Revenues	
Sponsored Research by Licensees	New Metrics
Proof-of-Concept Funding	New Metrics

7. SUSTAINABILITY MEASURES

A new Enterprise and Economic development position was opened and a person with experience in both new ventures and economic development was recruited. We have also hired an industry liaison/marketing associate with significant experience creating industry collaborations and extensive industry contacts list. In addition, we have developed a social media marketing strategy, which has generated significant interest in our organization among local industry, entrepreneurs and economic development partners.

8. COSTS

The major cost is in terms of overhead. The two new positions reflect a significant long-term commitment by the university to support innovation and entrepreneurship. In addition, the industry relations and entrepreneurship programs required funding that goes beyond the budget for traditional commercialization activities.

9. FUNDING

Only university funds have been utilized so far for salaries for the new positions and to support the new programs. Opportunities for state funds and philanthropic donations are being currently explored.







Below is a table with the metrics for the last year

Commercialization	2012-13
IP Management	
Invention disclosures	103
Patents filed	150
Patents issued	6
Copyrights	7
Agreements	
Licenses/Options	11
Research Support Agreements	16
Service Agreements	
MTAs	272
NDAs	103
Industry Relations- New Metrics	
Sponsored Research Agreements (initiated and facilitated)	5
Research and Technologies Showcase Meetings (Companies' Visits and Presentations)	6
Faculty presentations to Industry, Entrepreneurs and Investors	3
Enterprise and Econ Development - New Metrics	
Prospect companies supported	6
Facilitated student internships in companies	12
Advised entrepreneurial faculty on start-ups	3
Advised entrepreneurial students on start-ups	4
Development of commercialization plans	2
Facilitated pitches to venture conferences	2
Facilitated Proof-of-Concept grants	5
Start-ups (based on VCU licenses)	3
Finances	
Licensing Revenues	\$1,344,410
Sponsored Research by Licensees	\$1,037,133
Proof-of-Concept Funding	\$ 258,000
Number of FTE	5

MTA- Material Transfer Agreement

NDA- Non-Disclosure Agreement



11. IMPACTS

Pre-license value creation program:

- During the last year we facilitated external proof-of-concept funding applications. As a result, we helped our faculty secured 5 proof-of-concept funding awards and \$258,000, the highest amount awarded to one university from a state-wide fund that year.
- Facilitated two technologies to reach the final four Bio/Plan competition at SEBIO Investors Forum.
- Spun off 3 new companies based on VCU inventions in comparison to 1/year on average.

Strategic industry engagement program:

This program was launched one year ago and in this short period has generated new industry collaborations, sponsored research for faculty and licensing activity.

- Organized 6 research and technologies showcase meetings/companies visits to campus.
- Initiated and facilitated 5 sponsored research agreements.
- Secured more than \$1 Million in sponsored research support.

Entrepreneurship and new ventures (in one semester time):

Faculty Events:

- ✓ Faculty Workshops Held: 3
- ✓ Post doc Workshops Held: 1
- ✓ Faculty / Post doc Participation: 150+
- ✓ Faculty Start-up Ideas Assisted: 6

Student Events

- ✓ Student Workshops Held: 4
- ✓ Student Seminars Held: 1
- ✓ Student Participation: 450+
- ✓ Companies Ideas Pitched: 55
- ✓ Company Ideas "Incubated": 7
- ✓ Companies formed: 1

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

University as a whole, faculty, post-docs and students; regional innovation partners. The programs involve and leverage heavily the regional innovation ecosystem. Expansion of programs and investment in specific opportunities will lead to significant outcomes for VCU and the region.

13. AWARDS / RECOGNITION

We have earned media in the local newspaper and other publications.





14. PRIMARY CHALLENGES

Pilot programs indicate that we are addressing an unmet need and significant opportunity. Additional funding for more personnel and establishment of internal Proof-of-Concept fund will be critical for the long-term success of the programs.

15. SUCCESS FACTORS

The support of the university leadership was a paramount for the establishment and successful launch of these programs.

16. TRANSFERABILITY

This is a model that could be transferred easily to other state or private universities in the US or worldwide. The case is useful for offices involved in technology commercialization or industry collaborations.



17. PUBLICATIONS / ARTICLES

http://www.timesdispatch.com/workitrichmond/news/vcu-advocatingentrepreneurship/article_b717afcd-0bd5-538b-aae8-c00af1c324c1.html

18. LINKS

www.vcu.edu/ott

19. KEYWORDS

Innovation, commercialization, new ventures, entrepreneurships, industry collaborations, innovation ecosystem, technology transfer, proof-of-concept funding

20. PUBLIC CONTACT DETAILS

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THE CASE OF THE CITY OF VITORIA, ESPIRITO SANTO State- Brazil:

AN EXAMPLE OF THE CREATION OF A FAVORABLE Environment to Engage Stakeholder in the Innovation process

By Cecilia Hasner, Araken Lima, Douglas Santos, Vinicius Barbosa, Kátia Cunha and Francisco Rapchan









1. SUMMARY

TecVitoria became a key asset to achieving a Local Innovation System by creating a favorable environment for networking and stakeholder engagement in the innovation process. In addition, changes in the Brazilian regulatory framework in recent years have collaborated for the development of local innovation policies, culminating with the institutionalization of a Technological Park. TecVitoria has a role that goes beyond a business incubator, it represents a step forward in stimulating entrepreneurship and it is also a reference for other regions that intend to encourage innovation and the local economy.

2. BACKGROUND

TecVitoria is a non-profit association created in 1995 in Vitoria, ten years before the Innovation Act being enacted in the country, as a result of mobilization of different local stakeholders with the goal of supporting the emergence and consolidation of innovative projects and technological content. Despite this, only after the changes in the national regulatory framework on innovation, the environment became conducive to the creation of business incubators and intellectual property management. The major changes were:

1996	Industrial Property Act No 9.279
1998	Software Act No 9.609
2000	Municipal Act of economic incentive to certified companies on Information
	Technology (IT) No 5145
2001	Computers Act No 10.176
2002	Review of the Municipal Act
2004	Review of Computers Act
	Innovation Act No 10.973
	Industrial, Technological and Foreign Trade Policy (PITCE)
2005	Economic Incentive Act No 11.196, named "Lei do Bem"
2006	Academy of Intellectual Property, Innovation and Development at the
	National Institute of Industrial Property - INPI

Along these twenty years, different institutions became part of a vast network to support the innovation process in Vitoria, like government and funding institutions, as well as private firms. The most relevant are: the Municipality of Vitoria through the Development Company of Vitoria (CDV), the State Secretariat of Science, Technology, Innovation, Business and Labor Education (Sectti) and the Incubator of the Federal Institute of Education, Science and Technology of Espirito Santo (Ifes), as shown in Chart 1:





Chart 1: Representing of the Innovation Process environment to the Technological Park in Vitoria.

The Sectti and the Research Support Foundation of Espirito Santo State (FAPES) were created in 2004. Furthermore, the Institute of Technological Innovation (INIT) of Federal University of Espírito Santo (Ufes) and Innovation Agency (Agifes) of the Federal Institute of Education, Science and Technology of Espirito Santo (Ifes) were created in 2008. In the same year, the IFES's Business Incubator was established with support from TecVitória technical expertise and FAPES financial resources.

The different collaborative agreements between the State of Espirito Santo and INPI (National Institute of Industrial Property) were fundamental to disseminate intellectual property knowledge as well as to train professionals to work in the several Institutes of Technological Innovation. Furthermore, the Federation of the Industries of the State of Espirito Santo (Findes) has an important role in disseminating the culture of innovation and entrepreneurship.

3. OBJECTIVES

Even though the Technological Park of Vitoria is in implementation phase, the innovation process environment is carried out with the technical assistance of TecVitoria, that has supported the creation of new incubators around the state of Espirito Santo, and dissemination of entrepreneurship as well.

The main objectives of TecVitoria are the following:

i.Establishment of connection with the government, academy and private companies;

ii.Support companies to raise funds to boost the innovative process;

iii.Support the companies to become World Class Companies;

iv.Disseminate the culture of innovation and entrepreneurship;



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v.Incubate business and give support through an internally developed methodology;

- vi.Give support to the creation of new incubators around the State, acting as an anchor;
- vii.Stimulate the growth of local economy through development of technology based companies;
- viii.Prospect demands to enable the creation of new businesses;
 - ix.Execute the three fundamental powers that characterize the technological center and influence the decision-making processes: meeting's agenda, convocation and connection;

4. **RESPONSIBILITY**

TecVitoria is responsible for establishing connections between the innovation agents, support the networking and facilitate the creation and development of World-Class Companies to provide goods and services on information and communication technology (ICT). Its main focus is on companies with competitive characteristics and high technical quality to meet the demands of local, national and international markets, and able to contribute in increasing the added value of production and generation of employment and income in the region. The organogram of TecVitoria is showed in Chart 2 and describes the main Support Activities: Operation Management (Administration and Finance, Project Office), Softex Agent, Entrepreneurship, Software Hub, Knowledge Transfer Platform, which includes Capixaba Network of Incubators and the Ground Zero of the Technological Park (capixaba means born in Espirito Santo).



Chart 2: TecVitoria Organogram.



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5. STRATEGY & ACTIVITIES UNDERTAKEN

The main strategy is to keep networking with several government institutions, funding sources, private firms and the academic community. Moreover, TecVitoria does the current activities related to the Incubator while being an anchor for the creation of others incubators in the State. The main activities undertaken are:

1) Knowledge Transfer Platform.

This Platform has the goal of stimulating the formation of a pre-technological park environment, called Ground Zero of the Technological Park, by articulating the knowledge transfer among entrepreneurs, enterprises and scientific and technological communities to foster the local innovation.

2) Institutional Coordination - networking.

This strategy consists of keeping the greater position of TecVitoria in developing tools to support the local economic development. These are the main activities: participation in the intersections of the government procurement process, the intersections in different forums like the Espirito Santo Business Movement in Action, the ANPROTEC (National Association of Promoters of Innovative Projects), the Softex Society, the RECIN and meetings with the committee of the Technological Park.

3) Entrepreneurship in the Incubator: pre-incubation and incubation.

The differential of the TecVitoria as an Incubator is to keep the focus in the entrepreneur and not only in the product of the business, as well as to implement an innovative Strategic Planning Methodology, establishing the capability for innovation by linking strategic and operational leadership into management and performance routines.

This methodology is conducted annually by the incubator management and generates indicators that enable immediate perception of the economic course of the business. The methodology is divided in four different phases:

i) Implantation – it is a short-term phase that takes from 3 to 6 months. The focus is in the internal diagnostics (weaknesses) of a Business Plan, where all new concepts are widely debated;

ii) Growth - it is a medium term phase that takes around a year. All the concepts are already established and its applicability is debated with a strong focus on the external environment (pressures and R&D&I projects). The goals are monitored monthly;

iii) Release - it is a long term phase that takes around two years. The results are monitored focusing on the internal diagnostics and external environment (strengths and opportunities) and sedimentation of culture planning, using the PDCA system (Plan, Do, Check and Act);

iv) Consolidation – it is a long term phase that takes from 12 to 18 months. The work continues based on indicators, but with greater focus on consolidation of the market (customers, billing and R&D&I).



4) Entrepreneurship in the academic community: "Uniempreendedor" Iniciative.

This initiative has the goal to stimulate the entrepreneurship in the academic community, mainly between students. The idea is to generate a business plan and award the best projects a prize consisting of the participation on a national event of entrepreneurs;

5) Project Office.

The Project Office formally began to operate in early 2005 and has an objective to raise funds from the National System of Science and Technology for the development of new products or processes to improve the performance of business companies as well as the management of approved projects.

6) Software Hub.

TecVitoria is responsible for the executive management of the Software Hub. The principle that governs all actions of the Software Hub is in the alignment of the various actors of the Information and Communication Technology (ICT) sector aiming at developing, strengthening and expanding its products and services. This program includes the preparation of mature businesses to evolution in revenues through training, quality management and generating business opportunities. Yet directly linked to this program, is the process of globalization of local businesses, facing their preparation to meet the world's major requirements for the certification, localization and marketing of technology products, and the availability of infrastructure for the realization of events.

7) Strategies to Exploit Innovation

Endeavour to identify and exploit opportunities from the Oil&Gas Industry to small and medium-sized enterprises (SMEs) to break through in innovation and local economic growth;

6. MONITORING AND EVALUATION

The monitoring and evaluating system adopted by TecVitoria is based on the accomplishment of the goals, following-up the achievements of the strategic plan of each incubated companies, which is reviewed each year. The reports are released monthly and it is monitoring a pattern of indicators to the Incubator and the general performance of the Innovation Environment Process to a Technological Park.

The Incubator indicators are:

i.Income of the incubated companies,

ii.Number of customers,

iii.Number of employees,

iv.Taxes paid by incubated companies;

The indicator of the Innovation Environment Process to a Technological Park are:

i.Non-refundable resources for R&D&I for the local companies;

ii.Development of new products and the number of patent applicantions;

7. SUSTAINABILITY MEASURES

The results shown by TecVitoria in terms of new products and fundraising encourage local governments to maintain cash available, which facilitates the funding organization.



8. COSTS

The cost of the administration services of TecVitoria is estimated in an amount of US \$ 20.170 monthly, fully covered by incomes.

9. FUNDING

The TecVitória receives financial, technical and structural support mainly from its founders Municipal Government of Vitoria through FACITEC. The financial institutions that support the projects of TecVitória are: FAPES, SEBRAE-ES, FINEP, CNPq, CDV, Inter-American Development Bank (IDB) and Softex Society.

OUTCOMES & IMPACT

10. OUTCOMES

The outcomes are expressed in terms of fundraising, number of projects submitted and number of projects approved, as well as the number of associated companies in the Software Hub, the income of the incubated companies and the jobs created by them, as well as the number of graduated companies per year and their average stay in the incubator.

In terms of fundraising, Tecvitoria managed to collect along time increasingly larger sums that despite fluctuations, reached record highs in 2012, more than three times the amount rose in 2009 (Chart 3). In the chart above the majority of resources are nonrefundable (yellow) and a small quantity of them is the counterparts (orange) that are financial and/or economic commitments contributed by the candidates or their stakeholders.



Chart 3: Fundraising made by the TecVitoria's Project Office since December 2004.



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The percentage of proposals approved show an increase along the years, with an average around 49,5% of success in the approval of the submitted projects in the last 10 years (Chart 4). Moreover, TecVitoria has promoted different events to attract angel's investments and, as a consequence, there are two companies with venture capital in the Incubator



Chart 4. Percentage of Proposals Approved by TecVitoria's Project Office since December 2004.

The Software Hub has shown an increase in the number of associated companies in the beginning and since then it remains around 70 companies with a little decrease in the last 3 years as a consequence of the global economic crisis (Chart 5). Around 10 companies are certified by MPS.BR, Brazilian CMMI (Capability Maturity Model Integration), permitting to achieve the Global Certification on IT.



Chart 5: Number of associated companies in the Software Hub of Vitoria



In terms of the Incubator results, there is a significant contribution in the local economy, not only by the employment, but also by their income (Chart 6). The average length of stay in the Incubator is around 30 months and since 2002 there are 16 graduated companies.



Chart 6: The monthly income (a) and jobs created by the incubated companies (b), as well the average length of stay (c) and the number of graduated companies in the Incubator (d) between May and November of 2013

11. IMPACTS

The main impacts are:

i.Entrepreneurial culture of innovation;

ii.Innovative methodology developed at the Incubator;

iii.Networking action;

iv.Qualification and certification of the ICT companies;

It is also possible to observe the remarkable impact on the patent applications associated with the fundraising and also followed by the changes in the regulatory framework and the seven courses of capacity building on intellectual property rights carried out by the INPI in collaboration with the Government of Espriito Santo between 2005 and 2012 (Chart 7). Before 2005, there was no registration of patent application in the local universities neither in the incubated companies.





Chart 7: Number of Patent Application by the federal universities (Ufes and Ifes) and the incubated companies since 2005.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

The following entities are founding partners of TecVitória:

- Federal University of Espirito Santo UFES,
- Development Bank of Espirito Santo State-BANDES, ▶
- Government of Espirito Santo State GES,
- Municipality of Vitória PMV, ۲
- Enterprise Technology Park EFA ▶
- Federation of Industries of Espirito Santo State FINDES,
- Institute Euvaldo Lodi IEL-ES.
- Secretary of State For Science, Technology, Innovation, Education And Professional • Work - SECTTI.
- Federal Institute of Education, Science and Technology of Espirito Santo State- IFES

Companies that are collaborative partners:

- Arcelor Mittal Tubarão,
- VALE
- PETROBRAS,

Executive partners:

- Agent Softex ES,
- National Association of Informatics Companies ASSESPRO-ES,
- Incubated companies in TecVitoria •

13. AWARDS / RECOGNITION



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TecVitoria has won recognition by the ANPROTEC (National Association of Promoters of Innovative Projects) twice for "Best Practices" and also has received from Espirito Santo Government a recognition as the "Science&Technology&Innovation Private Entity of the Year" in 2012.



14. PRIMARY CHALLENGES

The main barrier to achieve better results is the lack of idealism and entrepreneurial culture caused by the preference in employment instead of starting a new business. Another barrier is the lack of habit in developing projects for fundraising as well as the fear of facing the bureaucracy. The major challenge is to implement the Technological Park and put it to work.

15. SUCCESS FACTORS

The key factor lies in:

- Exercise the three fundamental powers of the technology center, which is summarized on Meeting Agenda, Convocation and Connection (or Networking).
- The formation of the network with various partnerships that have the same focus;
- The management of the incubator is performed independently of government interference, which ensures the continuity of actions.
- The highly committed team of TecVitoria, essential to reach a favorable innovation environment and to develop the Local Innovation System.

16. TRANSFERABILITY

TecVitoria is an anchor to stimulate and create new incubators in Espirito Santo State and to support the generation of business models to enable new technology centers. Nowadays, there are 3 incubators that receive the technical support of TecVitoria.



17. PUBLICATIONS / ARTICLES

 Barbosa, V.C. & Cunha, K. R. Planejamento estratégico para empresas incubadas. In: Caminhos para o sucesso em incubadoras e parques tecnológicos: um guia de boas práticas / Organização Josealdo Tonholo, Sheila Oliveira Pires. - Brasília: ANPROTEC & SEBRAE, 2008, pp 55-57.



 Barbosa, V.C. & Cunha, K. R. Concurso Universitário Empreendedor – UNIEMPREENDEDOR. In: Caminhos para o sucesso em incubadoras e parques tecnológicos: um guia de boas práticas / Organização Josealdo Tonholo, Sheila Oliveira Pires. - Brasília: ANPROTEC & SEBRAE, 2008, pp 77-79

18. LINKS

- www.tecvitoria.com.br
- www.inpi.gov.br
- www.incubadoraifes.com.br

19. KEYWORDS

Incubator, innovation, technological park, local innovation system.

20. PUBLIC CONTACT DETAILS

Academy of Intellectual Property, Innovation and Devolopment Brazilian National Institute of Industrial Property - INPI Araken Lima Rua Mayrink Veiga, 09 – 18° andar, centro 20081-240, Rio de Janeiro Brazil Phone: 55(21)30373713 E-mail: araken@inpi.gov.br Web: www.inpi.gov.br



FROM TRIPLE HELIX TOWARDS INNOHUB NETWORK In Practice: Developing sustainable solutions for Tomorrow and applying them today

By Tarja Meristö and Jukka Laitinen









1. SUMMARY

The aim of our case study is to introduce how successful innovation environment has carried out in Western Uusimaa, Finland. Our case study is based on the triple helix model which suggests that the dynamic cooperation between companies, universities and the government is the key for successful cooperation. Also, the open innovation paradigm, which suggests that the information flows between different actors improve the preconditions for the innovations, is taken into account. Western Uusimaa region is one of the innovation network pilots in Finland called InnoHub. It aims to promote innovation activity and support developing regional innovation environments. As a hub space we have a Business Lohja, which is a campus combining actors from public administration, education/university and companies. The core actors of the InnoHub in Western Uusimaa are Novago Business Development and Laurea University of Applied Sciences which are operating in close cooperation with other regional actors including companies, associations, individuals and society.

2. BACKGROUND

According to the triple helix model the successful innovation environment requires dynamic cooperation between companies, universities and the government. Also, the open innovation paradigm suggests that the information flows between different actors improve the preconditions for the innovations. The Finnish Ministry of Employment and the Economy has started an innovation network pilot called InnoHub which aims to promote innovation activity and support developing regional innovation environments. Western Uusimaa region is one of the InnoHub pilot regions. As a solution for the regional innovation cooperation we suggest project based thematic work. In this research we introduce how we have applied it in Western Uusimaa region.

As a hub space we have a Business Lohja, which is a campus combining actors from public administration, education/university and companies. The history of the Business Lohja originates to the year 2006 when city of Lohja together with Laurea UAS started to plan a building which would collect all the required resources for the regional development of Western Uusimaa under the same roof. With the interest of the entrepreneurs of the region, the project was profiled to be an entrepreneurship building which would offer services especially for the entrepreneurs. During the planning process the vision of the Business Lohja was also defined. According to the vision the building would combine different time frames when offering services to the companies (Figure 1).




Figure 1. The vision of Business Lohja

The illustration pictures and plans of building were presented to the city council of Lohja in 2008. Also open briefing events to the public audience were arranged. The building was ready in 2013 and it was named as Business Lohja.

3. OBJECTIVES

The primary objectives of the InnoHub network is to promote innovation activities in the region and to support developing regional innovation environment.

InnoHub procudes several various outcomes which benefit different actors, especially companies, public actors and educational institutions.

Desired outcomes for companies

- all needed services "under the same roof"
- speed and effectiveness for renewing/ innovation activities
- functional premises for own operation and cooperation
- additional resources through cooperation, new know-how flexibly into use
- ▶ financing know-how and partners for creation of r&d projects, also internationally

Desired outcomes for public actors

- landmark which creates positive images
- new companies and to educational institution of the stronger foundation/company cooperation
- long-range thinking for the developing of the area
- new premises and to cooperation of the network
- shared vision to the region



Desired outcomes for educational institutions

- competitive infrastructure
- attractiveness in the eyes of students
- attractiveness in the eyes of partner companies
- channel for the regional influencing
- ▶ foundation for the long-range r&d operation

4. **RESPONSIBILITY**

The main actors in InnoHub are Laurea University of Applied Sciences and Novago Business Development which both have office premises in Business Lohja building.

- Laurea University of Applied Sciences / Lohja Unit: Laurea produces new competences in the field of service innovations and carries out professionally orientated education, regional development and R&D activities by following the Learning by Developing (LbD) operational model. Laurea operates in the Greater Helsinki Region in seven unit. Laurea's Lohja Unit offers education in the fields of wellbeing and business. Laurea's Lohja Unit participates actively also to the R&D and regional development activities. The Lohja unit includes also FuturesLab CoFi, which is a research group with a focus on futures research, foresight and scenario approach.

- Novago Business Development: Novago is a business advisory service for those looking into starting up a business and for those already operating a business in Western Uusimaa (including Hanko, Ingå, Lohja, Raseborg and Siuntio). They offer a range of services from developing business ideas to finding the right contact networks. In addition to business advice services, Novago manages the regional development of trade and industry.

Also other companies in Business Lohja as well as partners from the whole Western Uusimaa region are part of the InnoHub network.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The strategy behind InnoHub can be summarized in a platform that we have developed and applied in the Innohub network in Western Uusimaa (Figure 2). Our platform takes into account different actors' perspectives (individuals, companies, institutions/organisation, society) and it combines different levels (EU, regional, local) research themes to a practical project work in the spirit of the open innovation paradigm. Research themes have been picked up from the EU's Horizon 2020's strategic focus areas, Uusimaa Regional Council's strategy program and from regional strategy program in Western Uusimaa.





Figure 2. InnoHub platform takes into account different actors' perspectives ((individuals, companies, institutions/organisations, society) and combines different levels (EU, regional, local).

Actions / activities undertaken during InnoHub pilot:

- Developing InnoHub platform (autumn 2013)
- Wellbeing Forum (November 7th 2013)
- InnoHub Kick-off event (November 30th 2013)
- Interviews of companies about sustainable development (autumn 2013)
- Workshops with case company / visionary concept design (workshops September 24th 2013, October 10th 2013, November 12th 2013, company's feedback session December 3rd 2013)
- Joint seminar and benchmarking workshop with other InnoHub regions (January 22nd - 23rd 2014)

6. MONITORING AND EVALUATION

Benchmarking with other InnoHub pilot regions in Finland have been made in a joint workshop held in January 2014. Feedback from the company representatives have been received in the result seminar of the case study.

7. SUSTAINABILITY MEASURES

The sustainability is one of the key themes in InnoHub network. In the InnoHub work we are applying the broad definition of the sustainable development so that is includes economic, ecological and social dimensions. The economic sustainability means the profitability and continuity of the entrepreneurship but also e.g. that the money stays in the area. The



ecological sustainability is connected to all operation which has environmental effects. The social sustainability takes the social effects of the operation into consideration, e.g. personnel practices, working conditions and human rights.

One of the ongoing projects related to the InnoHub is "Sustainable Business Cluster in Western Uusimaa" which aims to figure out the key actors in the field of sustainable business and to build up their ecosystem in the form of cluster in Western Uusimaa region. The motivation for the project is that Western Uusimaa region and its business structure is in transition: many of the traditional industries do not operate there anymore and new businesses are more than welcome. Green industry, cleantech and responsible business models are the elements of the renewal needed for the future. During the project companies have been interviewed about the sustainability theme and they have been informed about the subject. Also the students of Laurea UAS have interviewed companies from the different sectors (welfare, trade, construction, technology).

8. COSTS

The costs of the InnoHub consist mainly of salary costs, travel costs and workshop costs including materials and services.

9. FUNDING

The funding of InnoHub activities is coming from different sources and it is related to the projects which are running in Western Uusimaa region by Novago and/or Laurea UAS. The following projects have been part on InnoHub: BOAT (funded by European Social Fund), Sustainable Business Cluster (funded by Uusimaa Regional Council) and Pumppu (funded by European Regional Development Fund).

OUTCOMES & IMPACT

10. OUTCOMES

As concrete outcomes companies now receive various services from the Business Lohja building which helps them to speed up their innovation activities. There they can also arrange meetings and network with other regional actors. Companies have had also increased opportunities to participate different kind of r&d projects.

Public actors have received a functional place where different actors can meet and thus create local buzz. Business Lohja is a platform to attract new companies and entrepreneurs to the region.

Laurea UAS has received new premises from Business Lohja which makes cooperation and networking with other regional actors easier. The students have better opportunities to participate into different kind of real-life R&D projects with companies. The new premises



have added to the attractiveness of Laurea UAS in the eyes of students as a study place. The InnoHub network has also enhanced the regional forum activities.

11. IMPACTS

The InnoHub has many positive impacts to the Western Uusimaa region and to the local actors, e.g. it enhances possibilities to carry out large multi-actor projects, supports innovative start-ups, entices new entrants to the region, promotes regular forum activities and networking in the region, creates positive spirit and culture towards entrepreneurship and enables students participation to the projects with real-life actors.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

The benefits for the stakeholders have mainly been mentioned in the paragraphs 10 and 11. To sum up, the InnoHub network enhances the opportunities to cooperation both in business and regional development. Beneficiaries are core actors (Laurea UAS and Novago Business Development, municipalities in the region), long term partners (companies in the Business Lohja, regional organisations) as well as need based partners and other cooperation networks. The case is deeply integrated to the regional innovations system because one of the main goals of InnoHub is to develop business opportunities in the region.

13. AWARDS / RECOGNITION

InnoHub is an ongoing projects and official awards and recognitions have not been given yet. However, the fact that the Business Lohja building has been built and is existing can be considered as a recognition of some sort.



14. PRIMARY CHALLENGES

The primary challenges of InnoHub network are related to geography and various interests of different actors. Geographically Western Uusimaa is a wide area and therefore long distances can be problematic to actors locating remotely from Lohja. A language problems can also be seen as a challenge because two official languages are spoken in the area, with Finnish being the major language and Swedish the minor language. Additionally, there might be challenges to fit all actors' (individuals, companies, associations and society) interests together because their interest might sometimes differ from each other.

15. SUCCESS FACTORS

There are several factors which have promoted the success of InnoHub network. One success factor has been the triple helix model that has been applied in the InnoHub network, i.e. there have been active participants from business, education and policy makers side. Laurea UAS's Learning by Developing (LbD) approach has been applied successfully in the project



with a case company. LbD is a pedagogical approach in which learning is linked to applied research & development projects and regional development. The emphasis is given to the social interaction, knowledge and competence sharing, researching and problem solving.

Future-orientation which is applied in the projects related to InnoHub has promoted the proactive attitudes and created visionary ideas in development projects. Also a sustainable development as a cross-sectional theme has enhanced the cooperation of different business sectors and industries.

One factor which might have prevented the success of InnoHub activities is the location of Business Lohja building. It is easy to reach for actors who are located in Lohja but for those coming elsewhere from Western Uusimaa the location might be difficult.

16. TRANSFERABILITY

The InnoHub case study is transferable to the regions which don't have own university but only filial of the University. The case would be useful for regions having a vision of "green future" and who want be proactive in their operation.

FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

E.g. the following articles have written in the projects related to InnoHub.

- Meristö, T., Bergman, J. & Laitinen, J.(2013) Future energy scenarios locally from local sources. In publication: Role of Higher Education Institutions in Society: Challenges, Tendencies and Perspectives, Nr. 1(2). Alytus, 165-173.
- Meristö, T. & Laitinen, J. (2013) Sustainability as a Business Opportunity Today and Tomorrow: Triple Helix Perspective, in Proceedings of The METNET Seminar 2013 in Luleå. HAMK publication 1/2014. HAMK University of Applied Sciences, Hämeenlinna, Finland.

Unpublished report about visionary concepts to our case company.

18. LINKS

- http://www.businesslohja.fi/
- http://www.laurea.fi/en
- http://www.laurea.fi/en/lohja
- www.laurea.fi/en/cofi
- http://novago.fi/en/
- http://www.innovaatioverkosto.fi/163



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19. KEYWORDS

Innovation, network, triple helix, cooperation, regional development, future-orientation, visionary concept design

20. PUBLIC CONTACT DETAILS

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IPT'S "QUICK & DIRTY" TECHNOLOGY VALUATION Model: An Analysis about embrapii licensing and Technology transfer negotiations

By Paulo Brito Moreira de Azevedo and Yuri Basile Tukoff-Guimarães









1. SUMMARY

The assessment of economic potential of technological innovation projects as tool for your valuation is one of the key aspects in negotiations between universities, research institutes and companies. There are many reasons for this, and one of the principal reasons is portfolio prioritization, which involves several different aspects, as economic, social and environmental impacts, and increase industrial productivity. An important aspect in the project selection process is the technology's economic potential. About technology transfer, the valuation of technologies are a relevant task to support Intellectual Property (IP) negotiations. However, in dynamic environments, negotiations for the commercial exploitation and payment of IP resulting from projects require quick answers due to deadlines. Moreover, technology valuation is one of the most complex activities related with technology transfer.

Due the challenges faced by the Institute for Technological Research (IPT) to take part in Brazilian Company of Industrial Innovation (EMBRAPII) projects, a quick & dirty method for economic valuation of technology has been developed. This was based on concepts such as Discounted Cash Flow (DCF) associated with Gompertz Curve adaptations as a way to support universities and research institutes in negotiations with enterprises. This method has been regularly applied during negotiations between IPT and companies. For this Good Practice Series, we will present cases of EMBRAPII projects. The results obtained confirm the validity of the model, enabling the application of this as an alternative to the methods found in the literature and eventually employed by universities and research institutes in Brazil. However, certain aspects of this model must be observed to more consistent valuations, mainly related with most sensible variables for each case.

2. BACKGROUND

The Institute for Technological Research of the State of São Paulo (IPT) is one of Brazil's largest research institutes, with state-of-the-art laboratories and a highly qualified team of researchers and technicians working basically in four major areas: Innovation, R&D, technological services and metrological support, and Information and education in technology. It was founded in 1899. IPT is a public research institute linked to the State of São Paulo, Brazil. Since 2012, IPT has been part of Brazilian Company of Industrial Innovation (EMBRAPII), founded by the Brazilian Government. EMBRAPII promote the interaction between Research Organization with Brazilian Companies to develop technological innovation. As main results, the Brazilian Government hopes to increase the number of Industrial Properties agreements and patents. During the negotiations, it is important to get an impression on the economic potential of the technology that can be developed. Another important aspect is the period of the negotiations, which are always defined in the short term. In this context, the Department of Business Support as part of the Planning and Business Coordination, created a Quick & Dirty method to estimate de value of this Technological Projects to support the contracts of IP between companies and IPT. Since



December 2012, the method has been applied often in the negotiations of commercial exploitation of technologies resulting from EMBRAPII projects.

3. OBJECTIVES

In the light of deadlines in IP negotiations, valuation projects under EMBRAPII must be sufficiently agile without sacrificing quality and accuracy in gathering information necessary for the activity. It based on related valuation literature, the researchers experience and technology transfer and licensing resulting from EMBRAPII projects. In this context the Quick & Dirty Method was created involving these objectives:

- Gomperz Curve (1825) was adjusted for a 20 years period (Patent lifetime), forecasting growth periods, expansion, maturity and decline of technology on the market;
- To provide fast results (up to 8 hours for valuation, including the survey information needed for running the model) to support the royalties negotiation and success fee for commercial exploitation of technologies under EMBRAPII;
- To develop and implement a methodology to estimate the future technology value based on real data variables from companies which will use the technology and market information. With less emphasis also estimates of future market performance and technologies alternatives are used, based on historical data analysis.

4. **RESPONSIBILITY**

The responsible party for the development and application of new valuation methods is the Planning and Business Coordination, with equivalent functions to Technology Transfer Office (TTO). This coordination has also other functions, for example, support for research projects in activities such as technical and economic viability of biotechnological and industrial processes.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The method is defined in four steps, based on concepts of discounted cash flow (DCF) associated with Gompertz Curve adaptations as a way to support IPT in IP agreements with companies. Gompertz Curve was created by Benjamin Gompertz in the nineteenth century for mortality studies. It is a mathematical model related to time series. For our application, it is interesting because it enables us to create scenarios of technology benefits over time. The basic model reference predicts the technical success of the project.





For the Net Present Value calculation (NPV), the IPT expenses are considered. Basically, these are: human resources, indirect costs, overhead and researcher prizes (1/3 royalties or success fee resulted of negotiations). In this case, the minimum NPV needs to be greater than the IPT expenses for a given project. Based on this information, the royalties percentage or success fees are calculated in to set fair values in agreement with the company partner, these are never calculated under the minimum NPV.

Based on the first results of the Quick & Dirty Method, an IPT researcher team presents to the legal members of companies the logic of calculation, bases on variables and market information considered in the valuation. Several meeting are done for refining the value until the final valuation. This is the main step for the negotiation success with companies. Its intent to these objectives:

- 1) Decrease the information gap (market, financial, business, etc.) between IPT and companies partners
- 2) Clarify in relation to the negotiation and valuation information assumptions.

As a result of this strategy, it was possible to see that the most companies perceive and encourage the IPT valuation process. Furthermore the companies agree with researcher prizes and reinvestment in research politics.

6. MONITORING AND EVALUATION

Metrics for monitoring and evaluation of the Quick & Dirty method are put into practical terms, with respect to the results obtained from its application. Thus, three main metrics can be listed:

- 1) Monitoring the results of negotiations between IPT and companies, taking into account the use of the Quick & Dirty method to valuation technologies and patents;
- 2) Assessment future amounts to be received by the IPT;
- 3) Monitoring financial results calculated with support of Quick & Dirty method.

Item 1 has two objectives: (1) comparison of the calculated and actual values for commercial exploitation of the technology, in order to improve business processes, including the application of the Quick & Dirty Method; (2) measure efficiency discoursed to time needed to close the deals. Deadlines for signing contracts and exploitation terms of intellectual



property resulting from EMBRAPII projects is lower than in previous negotiations performed by the institution (in some cases, the valuation process took six months to be done).

Items 2 and 3 seek to analyze the impact of the method in amounts to be received by the IPT. Policies can be created in the institution for improving the management of post-sale. Historically, IPT has difficulties with regard to the monitoring of royalties to be received by the commercial exploitation of technologies by companies. With future values estimates which will earn by the institution, provided by this method, is possible to promote a change of mindset about Royalty Rates and Success Fee values, as a way to promote reinvestment in R&D and awarding of inventors, as recommended in the Normative Instruction AD-18 (IN-AD 18) of IPT.

7. SUSTAINABILITY MEASURES

The meaning of sustainability used here refers to the systematic application of the method of valuation processes for a long period of time as a way to support the royalties rates and success fees negotiations to be paid by companies, in return the commercial exploitation of technologies developed by IPT. In this meaning, sustainability metrics for the Quick & Dirty method are:

- 1. Standardization process of technological valuation through Internal Normative Instruction (IN AD-18) which regulates the practices of innovation management by Planning and Business Coordination (Office of Technology Transfer IPT), which includes policies, patent, licensing and technology transfer developed by the Institution
- 2. Collaborative use the method with business partners which commercially use the technologies developed by the IPT.

Regarding item 1, the purpose of Planning and Business Coordination is to make the process of management technologies endorsed on the institution as a way to systematize the steps required for the implementation of patent licensing activities and technology transfer management.

Item 2 seeks to clarify the purpose of Planning and Business Coordination in respect to concepts and variables that are taken into account to estimate the profit to be earned by the companies from the commercial exploitation of technologies developed by IPT. Moreover, the valuation of technologies consists an incipient activities by the Brazilian research institutes and universities, which may have negative impact on another aspects in this regard universities/research institutes and companies in Brazil.

8. COSTS

In this case, costs refer only to expenses incurred with human resources to the development, implementation and negotiation of technologies with companies. Costs are divided between:

- 1) Development of Quick & Dirty Method: € 2.512 *
- 2) Application of the method: € 967 *
- 3) Negotiations between IPT and firms: € 2.116 *

* Conversion rate (1/03/2014): € 1 = R\$ 3.22954



The total cost involving the development, implementation and negotiation of technologies valued by Quick & Dirty method was \in 5.596.

9. FUNDING

EMBRAPII rules are clear about projects fund. Projects are funded in same proportion by EMBRAPII, IPT and company.

Furthermore, the development, implementation and negotiation of projects using the Quick ϑ Dirty method were financed exclusively with funds from the Planning and Business Coordination.

OUTCOMES & IMPACT

10. OUTCOMES

The main outcomes of the method are:

1) 16 proposals valued by Quick & Dirty Method

- In the present work, 11 proposals were submitted, of which:
 - Six projects contracts negotiate by Royalties (on net sales of products with IPT technology);
 - Two contract projects were negotiated by Success Fee (fixed amount to be received according to the products market with IPT technology);
 - Three projects with no contract signed in which payment will be made for royalties on net sales of products with IPT technology.

2) Decrease in time response for the technology valuation

3) Strong interaction between IPT and companies during the negotiation process of terms of intellectual property exploitation resulting from EMBRAPII projects.

11. IMPACTS

As seen in item 10 of this Good Practice Series, 16 valuations have been made up to February 2014, using the Quick & Dirty method. As the method is applied regularly in IP negotiations since December 2012, the average use is little more than one valuation study performed by month. By comparison, before this method, two valuation studies were made with the following characteristics:

- In the first case, all expenses was into account. The valuation was based on the methods of Sunk cost and Discounted Cash Flow. Four months were spent to perform the valuation in this case.
- In the second case, the assumption of the study was "what future financial and economic benefits Partner Company will earn with this collaborative research project developed with IPT". This study involved two steps: (1) analysis of the technical and economic feasibility of building a pilot plant-scale to develop technology before technology application in a full-scale plant; (2) performance of the technology in the market, considering three scenarios (pessimistic, expected and optimistic) for 10 years



period. The valuation was performed using the methodology of Discounted Cash Flow with Decision Tree Analysis, and took about three months to complete.

Quick & Dirty's benefits now reflected in reduction of the time required in intellectual property agreements with partner companies. As seen, the flow of negotiating proposals under EMBRAPII is intense, reflecting by the 16 evaluations made over 15 months. Such dynamism wouldn't be possible if the methodologies used before the development of the Quick & Dirty method was maintained.

Other aspect to take into account is the financial impact in short and long terms. The expected cash flow for the next 20 years, based on 11 projects valued at Quick & Dirty method is illustrated in Chart below.



According to the Chart above IPT expenses in EMBRAPII projects has been occurring since 2013 and extends to 2016, where it is expected to receive success fee for two projects worth approximately \notin 610.000. From 2018, the cash flows are increasing until it reaches its maximum value (\notin 1,29 million). Thereafter, the values will decrease to the expected value of \notin 870.000 in 2033. Based on this estimate, the following financial results could be achieved.

DISCOUNT RATE	10,75%
NPV	€ 3.160.949,80
IRR	27%

The cash flows expected results in IRR (Internal Return Rate) is much higher than the rate of return, based on the basic interest rate of the Brazilian economy (10.75% on feb/2014) practiced by the IPT to appraise their projects. In this scenario, the sum of the cash flows of the projects is, approximately, ≤ 15 million.

Those projects, two will be paid by Success Fee and nine by Royalty Rate. The high number of projects negotiated by royalties show, however, uncertainty in receiving the negotiated values. The cause is that the amount to be received will be arising for values that change in function of the revenue earned from sales of products with IPT technology in the future.

Finally, another application impact of this method is the involvement of companies in the valuation process. This always was a sensitive issue because involves internal corporate information, such as financial, commercial and strategic data. Therefore, the valuation has always been an activity characterized by the information gap between company data and the



financial, commercial and strategic data estimations made by the IPT. Using Quick & Dirty method associated with the approach of IPT with partner companies - shown in fifth topic of this case study - IPT has successful in collaborative studies with five of the eleven negotiations held so far.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

The benefits estimated from Quick & Dirty method are direct and indirect. The most important direct benefits are the tool developed. That allows estimating value of technology. Although IPT is one hundred years old (centennial) organization, IP contracts were focused mainly in legal aspects. The economic potential of technology few times was appointed in the contracts. The value was underestimated because was based in cost of researcher work hours. After adoption Quick & Dirty method, IPT improve the economic results of yours IP agreements. Another direct benefit was the indicators of innovation increase, as Patents and Royalty Rates. For the companies, the agreement process became clear and efficient in face the interaction with IPT for the technological scenarios definition.

Indirectly, the innovation management became more professional and mature supporting the definition of the best technological projects portfolio for companies and research organizations.

In all cases, Brazilian government (EMBRAPII) and firms could discuss deeper the rights involved in the commercial exploitation of intellectual property of research institutes. Valuation is part of the innovation management maturation of Brazilian Technology Transfer Offices.

13. AWARDS / RECOGNITION

No specific awards have been received until now.



14. PRIMARY CHALLENGES

The main challenge in the implementation Quick & Dirty Method is gathering information about the impact of technology in the company revenues. This is the most important task of model implementation. Otherwise it's hard and complex to acquire. Frequently inferences are made. Anyway, the feedback obtained from companies has demonstrated successes in the range of values.

15. SUCCESS FACTORS

The quick valuation response is one of the best results. Although, Quick ϑ Dirty is not precise, it's possible to obtain a scale of technology value if the development of this new



technology gets success. The innovation was the impact scenarios elaboration of new technology in the company's revenue using an adaptation of Gomperz curve. Another factor of success is the company contribution in the variable parameters definition, increasing the validation of results and the best results of agreements.

Finally, success metric will be the amount received in royalties' values and success fees from commercial exploitation of the technologies from EMBRAPII projects. Therefore, it is essential that IPT organize before 2016 an area for financial audits.

16. TRANSFERABILITY

Quick & Dirty method can be used for any universities and research institutes who trade their technologies with companies. In these negotiations, it is desirable to know the partners companies data information, because one of the assumptions of the method consists in (gross or net) revenue of the company that commercially exploit technologies / patents resulting from R&D projects.

FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

- Azevedo, P. B. M., & Tukoff-Guimarães, Y. B. Asociación Latino-Iberoamericana de Gestión Tecnológica - ALTEC, (2013). Adaptação da curva de Gompertz para novo método de valoração de tecnologias (ISBN 978-989-98721-0-3). Porto, Portugal: XV Congreso Latino-Iberoamericano De Gestión Tecnológica - ALTEC 2013.
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18. LINKS

- http://www.altec2013.org/programme_pdf/630.pdf
- http://www.altec2013.org/programme_pdf/1320.pdf
- http://www.ipt.br/noticia/776.htm
- http://www.desenvolvimento.sp.gov.br/ultimas-noticias/ipt-registrou-11-depositode-patentes-em-2013
- https://repositorio.uninove.br/xmlui/bitstream/handle/123456789/485/589-1211-1-RV%20-%20valorizacao%20de%20patentes%20em%20inst%20cientificas.pdf?sequenc e=1



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IPT'S "QUICK&DIRTY" TECHNOLOGY VALUATION MODEL

19. KEYWORDS

Technology Valuation. Patent Valuation. Intellectual Property. Economic Evaluation. Embrapii. Gompertz Curve Adaptation

20. PUBLIC CONTACT DETAILS

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VIRGINIA COMMONWEALTH UNIVERSITY PLAYING THE ROLE OF A VENTURE CREATION UNIVERSITY: HARNESSING THE ENTREPRENEURIAL TALENT OF ITS FACULTY, STUDENTS AND ALUMNI POPULATION

By Nicole Colomb and Ivelina Metcheva







CASE STUDY PROFILE

1. SUMMARY

According to a recent study done by the Kauffman Foundation, without startups, there would be no net job growth in the U.S. economy. From faculty inventions to student and alumni startups Universities play a key role in feeding and enhancing a region's entrepreneurial "ecosystem." To that end, over the past two years Virginia Commonwealth has been dedicated to developing a University-wide strategy for entrepreneurship focused on harnessing the entrepreneurial talent of its faculty, students and alumni population. With Richmond's growing ecosystem, including the emerging flurry of activity at VCU, Forbes magazine recently highlighted Richmond, Virginia as one of the "10 Up And Coming Cities for Entrepreneurs" in the world.

The initiative began in mid-2012 when Deans from each of its 13 different schools, along with senior administration, were gathered to discuss and gain consensus on the importance of Innovation & Entrepreneurship, priority levels, overall vision and next steps. Based on that discussion the following method was used to develop a cohesive strategy.

- Step 1: Creation of a Broad and Empower Steering Committee
- Step 2: Evaluation of Internal Activity, "Demand" and Available Support
- Step 3: Evaluation of External Assets and Resources
- Step 4: Ecosystem analysis and identification of resource "gaps"
- Step 5: Development and adoption of the Venture Creation University Strategy
- Step 6: Implementation & Testing

One tool used during this process, a student survey, revealed that 50% of the University's students, spread across all 13 schools, were interested in starting their own company. With over 33,000 students at VCU, this gained some significant attention both inside the University, and within the region. During this process VCU also collaborated closely with its regional partners in the development of a regional "innovation map," which has been largely publicized and is now utilized by our regional economic development teams.

With regional and University-wide participation and complete understanding of the internal and external environment, the Venture Creation University strategy was quickly approved by the steering committee, and adopted by the Vice President of Research and the Provost. Two months into the implementation phase of the strategy, a number of programs have been rolled out across the University in support of the strategy. In the first 4 months, over 55 student company ideas have been "pitched" 6 of which have entered a "seed incubation" program. In addition, over 5 faculty members have been assisted with potential start-up opportunities.

2. BACKGROUND

Virginia Commonwealth University (VCU) has cemented its reputation as one of the top 50 public research universities in the United States. Located in downtown Richmond, Va., VCU



boasts more than \$248 million in funded research. VCU also includes a Health System, which has been honored with more than a decade of national recognition by U.S. News & World Report, including being ranked a No. 1 hospital in Virginia for the past two years.

Employing 2,170 full-time faculty and 1,143 part time faculty members, the campus is a hotbed of innovative activity.

However, the innovation potential does not stop with our faculty and research staff.

VCU enrolls over 31,000 students in 13 different schools and one college. VCU offers comprehensive undergraduate, master's, doctoral and first-professional programs and encompasses one of the largest academic health centers in the U.S. including 33 graduate programs ranked nationally by U.S.

Within the greater Richmond region, VCU represents an important catalyst for Richmond's entrepreneurial ecosystem. To this end, in April 2012, VCU's Provost and Vice President for research jointly held the first VCU Innovation Summit. The purpose of the Summit was to open a university-wide dialogue on innovation and entrepreneurship among university leaders.

During the summit, the participants reviewed current activities and programs, discussed the importance of innovation and entrepreneurship for VCU, outlined a proposed vision for Innovation and Entrepreneurship, and suggested next steps for advancing activity around these areas.

Vision: Innovation and entrepreneurship are an integral part of the culture of the university, which is known as the major hub of creativity and innovation in the Greater Richmond region.

Following the summit, a Steering Committee for Innovation and Entrepreneurship was formed to evaluate resources and activities taking place both within the University and around the region. The group also worked to understand what the interest levels were among students, faculty and staff. The team then evaluated best practices across the country.

Armed with an understanding of both internal activity and level of demand, regional resources that could be leveraged and an outline of what leadership wanted to see, the I&E committee



Figure 1: VCU worked with regional partners to understand regional resources that could be leveraged. Results included this "Ecosystem Map"

designed a strategy for entrepreneurship that was tailored to VCU's unique environment. They called the Strategy Venture Creation University, or VCU Squared.



Figure 2: VCU Survey showing entrepreneurial interest levels within each school.



Venture Creation University, or VCU Squared is VCU's strategy for enhancing the culture of entrepreneurship and harnesses the talent of its students, research community and alumni population.

Launched by VCU's Provost and Vice President for research, VCU Squared is now being implemented across the University. As we outline below, VCU Innovation Gateway and daVinci Center are leading coordination of the strategy's implementation, and development of new programs that are accessible University-wide.

3. GOALS AND OBJECTIVES

Venture Creation University has two primary objectives. The first objective focuses cultivating innovation and entrepreneurship among the student and alumni population. The second objective focuses on harnessing the potential of University's faculty and research staff. Below we outline more detail around both of these objectives, including initial goals that were outlined for each.



OBJECTIVE 1: CULTIVATING STUDENT INNOVATION & ENTREPRENEURSHIP

The VCU Squared strategy is focused on helping students, the region's future workforce, become job creators as opposed to job seekers. The strategy focuses on four main goals for students, which are outlined briefly below.

Goal 1: Exposing Students to Entrepreneurship

Centralize information on entrepreneurial resources that are available around the University and the region. Through an extensive communications strategy, tied to a series of events, expose students in all schools to the possibilities of entrepreneurship.

Goal 2: Educating to Break Down Barriers

Develop educational programs that go beyond innovation to commercialization and new venture creation. Available to all students at VCU, regardless of school or major, the programs foster cross-disciplinary interaction.



Goal 3: Evaluating and Evolving Ideas

Ensure that students have access to both internal and external resources to assist them with evaluating their ideas and evolve those that have the potential viability.

Goal 4: Elevating Opportunities

Develop early stage support for promising student and alumni new venture opportunities. Programs will focus on reducing the major barriers for new venture creation.

OBJECTIVE 2: HARNESSING UNIVERSITY RESEARCH

The VCU Squared Strategy is also focused on harnessing the potential of VCU's research community, through VCU Innovation Gateway. The Innovation Gateway has designed and implemented a series of programs, which have a track record of success. Enhancement of these programs will improve the ability to capture the economic and societal impact of the University's research.

• Goal 1: Exposing and Educating the Research Community

Expand programs that expose faculty to entrepreneurship and to educate them on the opportunities for commercialization of technologies through start-up companies.

 Goal 2: Evaluating Technologies for Potential Start-ups Enhance the processes that leverage internal and external expertise to evaluate inventions and determine commercialization potential for new venture creation.

Goal 3: Elevating Opportunities & Support Start-ups

Enhance resources available to provide hands-on assistance to faculty with promising start-up opportunities. Develop internal proof-of-concept funding and assists researchers in securing external funding to mature technologies and attract investors, entrepreneurs and other commercialization partners.

• Goal 5: Connecting with Entrepreneurs and Investors Expand strategic relationships with entrepreneurs and investors as an essential activity to commercialization of University research.

4. **RESPONSIBILITY**

This initiative has multiple levels of responsibility that were important to its success. These levels ranged from senior leadership down to those specific departments tasked with implementation. Below we briefly outline those roles.

Senior Level Leadership

For successful implementation of a University-wide strategy, senior leadership must be clearly supportive and visibly involved. At VCU, innovation and entrepreneurship are two areas that are highlighted in the University's strategic Plan, Quest for Distinction. The University also highlighted this area as a priority by listing it among a limited number "University Level Initiatives," which are initiatives senior leadership believes should be priorities across all schools and departments.

As a response to this "call for action" VCU's Provost and Vice President for research hosted the first "innovation summit" described above, and tasked the Innovation & Entrepreneurship (I&E) Steering Committee with development of the VCU Squared initiative. The VP of Research and the Provost individuals are responsible for the research and academic agenda for the entire University, respectively.



University Wide Involvement and Oversight

As mentioned above, the Provost and Vice President for Research put together a Steering Committee for Innovation and Entrepreneurship. This committee is comprised of mainly Dean or associated Dean level participants from the majority of schools within VCU. After the strategy was developed and approved, the steering committee's role evolved to include:

- Design and Implement New Programs: Assist with and guide implementation of programs supporting the VCU Squared strategy.
- Coordinate University Wide Activities: Identify new programs across the University and help to coordinate activity where appropriate – helping to avoid unnecessary redundancies.
- Evaluate University Wide Activity Levels: Develop method or suggested guidelines that will allow the University to track activity levels
- Understand Regional Resources: Ongoing understand and help to promote assets/resources in the regional ecosystem
- Evolve IE Strategy: Assist University leadership in evolving strategy for Innovation / Entrepreneurship

The committee meets quarterly to discuss existing and evolving programs and ensure all schools and colleges are up to date and supportive of activities. While some programs are developed for and within specific schools, the steering committee helps the University avoid unnecessary redundancies and ensures programs are being developed that will reach the entire population – not just populations within specific schools.

Clear Implementation Responsibility

VCU Innovation Gateway and da Vinci Center are leading implementation of programs that have University-wide reach. These two offices are ultimately responsible for the strategy's implementation, and development of new programs that are accessible University-wide.

• Innovation Gateway

Reporting directly to the Vice President for Research, the VCU Innovation Gateway office responsible for commercializing VCU research. The office is also tasked with enhancing the overall culture of innovation and entrepreneurship at VCU and contributing to the growth of the region's innovation ecosystem. This broader mission will foster collaborations with local and prospective companies to build external support for our inventors; will grow an entrepreneurial population that could help us commercialize our technologies through new venture creation and thus support economic growth of our region.

• Da Vinci Center

Reporting directly to the Provost, the da Vinci Center is a unique collaboration of VCU's Schools of the Arts, Business, Engineering and College of Humanities and Sciences. The Center is a unique collegiate model that advances innovation and entrepreneurship through interdisciplinary collaboration. The academic program offerings of the da Vinci Center aim to create T-shaped individuals: individuals who are anchored in a discipline and have the capacity and openness to span across disciplines.







5. ACTIVITIES UNDERTAKEN

Below is a basic overview of the activities that were taken to support the goals outlined above. Again, these activities were reviewed by the steering committee and funded/supported by senior leadership.

OBJECTIVE 1: CULTIVATING STUDENT INNOVATION & ENTREPRENEURSHIP

Goal 1: Exposing Students to Entrepreneurship

Our research identified that there was an increasing amount of activities, programs, clubs and courses developing around campus and within our region that focus on I&E. However, there was no single "point of entry" for those interested in this area. The committee felt this could limit awareness and participation. In addition, the steering committee felt it was important to create and offer programs that were designed to draw out the entrepreneurial population. This initial "pipeline building" activity was a foundation for supporting the VCU Squared strategy.

Creation of Central Web Portal

VCU Innovation Gateway took the lead in created a central I&E Website. This website serves as a central location that outlines activities, programs and courses that are accessible to our students, which support IE activity.

Coordination of Internal / External Newsletters

VCU Innovation Gateway also disseminates two monthly newsletters. The first newsletter is sent at the beginning of each month, to students and faculty members. This communication quickly highlights events taking place

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around VCU that month. The second newsletter is a "snapshot" of events, activities and news that has taken place that month. This newsletter is circulated to both internal groups as well as external partners around the region. This centralized communications vehicle helps to give University-wide voice to the efforts taking place at VCU.

✓ Formation of Student Entrepreneurial Council

Most successful entrepreneurial ecosystems develop organically. Students tend to participate in programs that have evolved based on their interests, as opposed to a University's strategic Initiative. Understanding this, the Innovation Gateway formed a "Student Entrepreneurial Council," that included the leaders of both the VCU entrepreneurial clubs. The council meets monthly and to discuss upcoming events, coordinate communications and provide feedback. The Innovation Gateway looks to design programs that support and grow these clubs. Since initiating the council in late 2013, each club has grown in size and two additional clubs have formed.

Monthly Events / Weekly Activity

Each month Innovation Gateway hosts a least one program focused on drawing out additional entrepreneurial students. Events have included: Mentor workshops, where an entrepreneur or investor from the community comes in to "workshop" a specific idea; Entrepreneurial Seminars, where we invite a successful entrepreneur alumni to speak to



students about his/her experience; Networking Events, where we invite students from all clubs and schools to an event with mentors from the region; and/or, "Hackathons," where students come together to create conceptual products that meet an actual need.

In addition to these events, Innovation Gateway supports and helps to promote all events being organized and/or hosted by individual student clubs. The Student Entrepreneurial Council allows interaction of the clubs and encourages them to coordinate on events and enhance interdisciplinary interaction. This coordinated approach allows for promotion of at least one activity each week that any student at VCU can participate in.

Pop-up Pitches

At the end of various events, or randomly around campus, VCU Innovation Gateway organizes a "pop-up-pitch" competition. This competition is an informal 2 minute presentation that allows students to pitch a new idea they are or would like to work on. Those who present the best ideas are awarded \$300. All presenters are added to Innovation Gateway's distribution list and sent information



on how to get involved with supportive activity around campus.

Goal 2: Educating to Break Down Barriers

During its evaluation of VCU's internal environment, the I&E Steering committee found that a large populations of students were interested in entrepreneurship. It's also important to note that this interest was spread across all schools and colleges. They suggested the



creation of a University-wide educational program (entrepreneurship certificate) that would be accessible to all students will help in avoiding redundant activity among the schools.

✓ Certificate in New Venture Creation

The da Vinci Center has led development of a proposed certificate for new Venture Creation that would be available to all students, regardless of school or major. At the time of this Case Study, the certificate had been approved by the Academic Affairs subcommittee, and was before the University Council. If approved it will go before the University's Board of Visitors for final approval.

Goal 3: Evaluating and Evolving Ideas

Program goals listed above are designed to increase the exposure of our students to entrepreneurship, give them the necessary educational foundation and break down real and perceived barriers to new venture creation. If successful, these programs will help to build a pipeline of students interested in entrepreneurship, and armed with ideas of their own. Understanding this, the I&E Steering committee highlighted to need to capture those students that would like to move beyond the classroom walls to spin out a new company. The group proposed the development of programs that would help student evaluate their ideas and evolve those that have the potential viability.

Certificate in New Venture Creation

It was noted that the University wide certificate would provide this hands-on approach within the curriculum.

✓ Start-up Bootcamp

VCU Innovation Gateway has partnered with a local business accelerator to develop and host a start-up

bootcamp for entrepreneurial students. The bootcamp will be held in mid-August 2014 and allow students to learn about business model creation. They will have the opportunity to validate their own ideas, or team up with entrepreneurs in the region who are going through the process.

Hands-on "incubation" Assistance

VCU Innovation Gateway provides hands-on assistance to any student that has an idea for a start-up. At initial meetings, the group does an assessment of where the idea is. From there, the group will suggest next steps for the student (typically based on business canvas model). Once they have validated their business model, the team will make introductions to potential partners around the region that can help move their ideas forward.

Goal 4: Elevating Opportunities

Once this pipeline is built and "dealflow" exists, it's important that there are vehicles available to support entrepreneurial activity that represents viable opportunities.

✓ Venture Creation Competition

Organized by the da Vinci Center, the VCC is a University wide business model competition that allows students to





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submit their business ideas and pitch to a group of entrepreneurs and investors. Winners receive up to \$10,000 to bring their ideas forward. The VCC will host its 3rd annual competition in fall 2014.

✓ Other Funding Mechanisms Under Development

A number of other funding mechanisms are currently under evaluation at VCU. These will become important as the pipeline of activity increases and the number of viable opportunities rises. Specific programs under review include entrepreneurial stipend, grants, microloans and potentially equity investment.

OBJECTIVE 2: HARNESSING UNIVERSITY RESEARCH

Activities Focused on Goal 1: Exposing and Educating the Research Community

A solid intellectual property portfolio is critical in the commercialization process; therefore, VCU Innovation Gateway plays a critical role in advancing VCU technologies. To capture the clinical and economic benefit of our research, members of VCU's research enterprise must first understand the role of Innovation Gateway, and the importance of disclosing new inventions to the Office. A number of programs have been designed and implemented to increase understanding of the process, some of which are outlined below.

Outreach to Faculty and Education

VCU Innovation Gateway has multiple programs in place to expose and educate staff, faculty and administration on all aspects of technology transfer; including patent and copyright protection of intellectual property, licensing and entrepreneurial activities. These programs include departmental seminars, student lectures, regular department chair meetings and one-on-one meetings with "star" research faculty. To help increase awareness, Innovation Gateway has also launched a social media campaigned, expanded its web presence and produces an annual marketing piece.

Awarding and Incentivizing

To further incentivize faculty and research staff, Innovation Gateway works to publicize its success stories, and highlight successful inventors. The Office produces and distributes an annual marketing brochure that highlights selected VCU inventors and hosts an annual ceremony honoring VCU Inventors, with awards presented by the VCU's President and Vice President for Research.

VCU has also implemented an aggressive and very competitive revenue sharing policy to incentivize involvement with the Innovation Gateway process. Revenues received from licensing are shared according to the VCU intellectual property policy as follows:

Activities Focused on Goal 2: Evaluating Technologies for Potential Start-ups

The Innovation Gateway office reviews over 100 new invention disclosures each year, the majority of which are related to biomedical research. Once submitted, the invention disclosure is assigned to a technology manager. The technology manager uses the disclosure to evaluate the intellectual property and determine its commercial potential, maturity, and availability of IP protection. Once this evaluation is completed, those inventions selected for commercialization are protected through patent, copyright or trademark applications.



Commercialization Advisory Panel

VCU Innovation Gateway has developed an evaluation process that leverages all resources available. To his end it has VCU has formed a Commercialization Advisory Panel. The panel consists of industry experts, experienced local entrepreneurial and investors, who gather quarterly for a half-day session. These individuals lend further insight into invention potential, commercialization pathways and patent conversion decisions.

Pre-license Value Creation Program

When the Innovation Gateway team identifies a high potential idea or technology, they work closely with inventors to develop the opportunity. This hands-on approach ranges significantly based on the needs/wants of the faculty member and the specific project. The team can provide assistance with identification of initial application(s), review of market opportunity, evaluation of potential regulatory and reimbursement pathways, estimation of capital requirements necessary for development and/or preliminary financial projections to confirm viability. This process helps to focus inventors on data necessary to de-risk the technology. It also helps when trying to attract a seasoned entrepreneur.

Activities Focused on Goal 3: Elevating Opportunities

It's important to note that technologies developed at VCU are in an early phase of development. Many times, while they may represent exciting clinical and scientific advances, they are pre-proof of concept, and therefore too early-stage to attract industry partners. These technologies, if appropriate for a start-up company, are also too early to attract an entrepreneur with the experience necessary to take the technology forward.

External Proof of Concept Funds -- Assistance Program

Innovation Gateway works closely with its inventors to assist them in attracting external proof of concept funds. This support can include reviewing grant applications, development of those sections focused on commercial potential, and workshops to help prepare "pitch" presentations. The office also provides letters of support to inventors.

✓ Internal Proof of Concept Fund Under Review

Innovation Gateway has proposed the creation of an proof of concept fund, focused solely on VCU Technologies. At this time of this case study the fund was under review.

Activities Focused on Goal 4: Assisting start-ups and Connecting with Entrepreneurs

The offices "Pre-License Value Creation" program, mentioned above, also supports validation and advancement of opportunities appropriate for start-up companies. Understanding the complex nature of a biomedical start-up, the office must find a group or individual with the appropriate level of experience to take the technology to the next level. Innovation Gateway has an extensive entrepreneurial network, and works with its partners to identify and market opportunities to the entrepreneurial community.

✓ Regional Relationships

Innovation Gateway has an extensive entrepreneurial network, and works with its partners to identify and market opportunities to the entrepreneurial community.



✓ Start-up Bootcamp

VCU Innovation Gateway is working with VCU Medical Center and VCU School of Business to Design a bootcamp focused on advancing technologies that are appropriate for start-ups companies.

✓ Mentor Workshops

VCU Innovation Gateway hosts monthly events to support entrepreneurial faculty. These events include mentor workshops, training sessions, networking events and more.

6. MONITORING AND EVALUATION

The metrics for VCU Innovation Gateway have recently been updated to include activities of VCU Squared Implementation. Some of the initial metrics are as follows.

- ✓ Number of Programs/Events available in support of Entrepreneurship
- ✓ Participation in events/programs
- ✓ New company Ideas Presented
- ✓ Technologies/new Ideas assisted
- ✓ New companies formed

The I&E Steering committee is currently evaluating how to best track this information, as well as other metrics, on a University wide level.

7. FUNDING & SUSTAINABILITY MEASURES

Initial funding to begin work was provided by a "Quest for Innovation" Grant. These grants are awarded by the President of the University to provide seed funding for disruptively innovative ideas that will create a service, program or initiative that will improve what we are doing in a creative and unique manner. The "Innovation & Entrepreneurship" initiative was submitted for consideration in Fall of 2012. The Grant was awarded in the amount of \$50,000 in January of 2013, to move the project forward for 18 months. The I&E committee completed the evaluation process and formulated the VCU Squared strategy in summary 2013 and begin implementation in September 2013.

The VP of research has agreed to continued support of the program after the grants funds are depleted. The Innovation Gateway is in ongoing discussions with the VP of Research and Provost to ensure metrics are evaluated and growth of the program is considered when appropriate. The Innovation Gateway is also working with the office of Development to evaluate the potential of fundraising activities.

8. COSTS

The major source of cost for initial implementation was in programing. Only a small portion of the funds were used on staff since implementation was led within existing offices.

Activity	% of Funds
Initial Evaluation & Committee Work	6%
Marketing & Communications	20%
Monthly Programs	20%
Pitches	6%



Start-up Bootcamp	20%
Co-working Space	10%
Staff / Interns	20%



9. OUTCOMES

As mentioned above, initial funding for this initiative was awarded in January of 2013, and initial implementation of programs began in September 2013. Metrics are available for that initial semester and are as follows.

Results of Fall Semester (4 months only)	
Faculty Events	:
· √	Faculty Workshops Held: 3
\checkmark	Post doc Workshops Held: 1
\checkmark	Faculty / Post-doc Participation: 200+
\checkmark	New Faculty Ideas Assisted: 6
Student Events	
\checkmark	Student Workshops Held: 4
\checkmark	Student Seminars Held: 1
\checkmark	Student Participation: 450+
\checkmark	Companies Ideas Pitched: 55
\checkmark	Company Ideas "Incubated": 7
✓	Companies Formed: 1

10. IMPACTS

Short and long-term impacts include:

Internal Coordination

Centralize activities and avoid unnecessary and costly redundancies

- Regional Collaboration Coordinate regionally, and develop programs that meet the needs of regional ecosystem
- Job Creation
 Create pipeline of new venture opportunities
- Workforce Development
 Produce entrepreneurial workforce



Translation of Research

De-risk / mature promising innovations so they are attractive to prospective industry partners , investors, and entrepreneurs

11. INVOLVED STAKEHOLDERS AND BENEFICIARIES

A number of stakeholders benefit from the VCU Squared program.

- The University:
 - By centralize activities and avoid unnecessary and costly redundancies
 - Creating pool of entrepreneurial talent that can assist with commercialization of research
 - Coordinated approach allows the University to have "one voice." This allows communications to be clear and activities to have an organized and more significant image.
- Schools within the University
 - Students have access to entrepreneurial programs that supplement their education; however, schools do not have to take on the overhead associated with building new programs.
- The Region:
 - Coordinated approach allows easy "point of entry" for those partners in the region who may want to get involved or leverage activity taking place at VCU.
 - As regional ecosystem develops, there is a clear approach the University can speak to in regards to its contribution.

12. AWARDS / RECOGNITION

VCU Innovation Gateway has been asked to present this activity at the annual Association of University Technology Managers (ATUM) meeting.



13. PRIMARY CHALLENGES

The primary challenge currently facing this program is ensuring continued coordination of I&E activity as the initiative becomes more successful. Increased visibility within the community incentivizes individual schools to pursue fund raising efforts and associated activities within their individual schools. Understanding the Innovation Gateway and the office of the Vice President for Research does not have a development arm; this activity could lead to non-coordinated, segmented the efforts.



14. SUCCESS FACTORS

The key factor that has led to successful implementation has been clear commitment of the University leadership. Without leadership from senior administration a University-wide initiative would not be successful. In addition, creation of a committee that allows broad input and oversight allows for ongoing University-wide support, transparency and communications.

15. TRANSFERABILITY

Universities consisting of multiple schools/colleges, that do not have significant entrepreneurial programs may benefit from this case study. For updates on the programs evolution, please feel free to contact us directly.



16. LINKS

www.squared.vcu.edu.

17. KEYWORDS

Entrepreneurship, Economic Development, new venture creation, Innovation Gateway, Venture Creation University, VCU Squared, Virginia Commonwealth University, VCU.

18. PUBLIC CONTACT DETAILS

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COPENHAGEN INNOVATION AND ENTREPRENEURSHIP LAB - CIEL: Building a collaborative platform to Enhance innovation and entrepreneurship Across three major danish universities

By Cathrine Amalie Oldenburg, Mikkel Trym and Stine Hamburger








1. SUMMARY

Copenhagen Innovation and Entrepreneurship Lab (CIEL) is an alliance between three major universities in Copenhagen, Denmark and embodies their joint effort to develop and support initiatives within innovation and entrepreneurship for the benefit of students, education, research and industry at regional and national level. The CIEL consortium consisting of Copenhagen Business School (CBS), Technical University of Denmark (DTU) and University of Copenhagen (UCPH) targets three main areas: 1) Entrepreneurial education, 2) Studentdriven activities and 3) Entrepreneurship research.

CIEL operates through a number of novel multidisciplinary university-industry programmes in partnership with faculty, student organisations and local industry partners, specifically through the Entrepreneurship Excellence Programmes (EEP) - a series of multidisciplinary academia-industry training programmes for master students of the three partner universities. The Excellence Programmes are cross-university courses covering a specific thematic focus and offering real-life cases provided by industry partners. The programmes are 1) Digital Services Innovation in Healthcare, 2) Food Entrepreneurs, 3) Green Innovation in Cities, and, a further development of the 4) Bio-Business and Innovation Platform.

As a case CIEL illustrates numerous ways of how to foster an entrepreneurial mind- and skillset among students and faculty. It is a practical showcase of how different measures can support the development of entrepreneurial attributes in an effectual, collaborative, and sustainable manner within universities and for the benefit of society.

2. BACKGROUND

The Copenhagen Region is an urban capital area with a high density of well-functioning institutions, human talent and a number of existing initiatives supporting the development of entrepreneurial activities inside and outside the local universities.

Copenhagen Innovation and Entrepreneurship Lab (CIEL) was initiated in the fall of 2011 for a two-year project period (2012-13) as a trust-based partnership and alliance between UCPH, CBS and DTU to develop new, collaborative innovation and entrepreneurship programmes for the benefit of students, research and industry.

The CIEL project was selected in a national competition initiated by the Danish Government to become the entrepreneurial university initiative in Denmark alongside with a similar initiative at Aarhus University. Rather than establishing another entrepreneurship centre, CIEL was set up to build on the existing infrastructure and to foster collaboration among a wide group of stakeholders in Copenhagen. The aim was to build a vibrant, international entrepreneurial ecosystem with the partner universities in a central position. The partnership between the three universities amounts to more than 50% of the Danish university sector and has about 68.000 students enrolled in total.



The aspiration to enhance collaboration among the three partner universities, and connect the dots by building on the existing infrastructure and resources, was strongly supported by local industry, which had an interest in creating an ambitious, cross-disciplinary collaboration, with a need-based and proactive approach to knowledge creation.

Prior to CIEL some collaborative experience had been built among the three universities through a few pilot projects. This basic trust and knowledge among the partners was an important prerequisite for founding CIEL.

The partnership setup was rather ambitious as funding was not allocated to the individual university partner, but managed and implemented from a joint collaborative platform.

3. OBJECTIVES

The main objective of CIEL was to create a new model for generating entrepreneurship research, training, and support with an impact in greater Copenhagen and with international outreach. To achieve substantial entrepreneurial impact, CIEL was designed following a set of central principles:

- Equal partnership between the three universities in communication, contribution, and effort
- Focus on and commitment to coordination, learning, and exploration of synergies between the three partners
- Activities as close as possible to the research and study environments and as central as necessary
- Going-concern: sustainable business models must support all activities, and all partners engage with significant commitment to the joint entrepreneurship effort
- Openness and active engagement in partnerships with interested national and international partners to leverage activities and to broaden the scope
- User-driven approach by building upon and supporting student-driven initiatives

These translate into the following objectives:

- To build a lighthouse for entrepreneurship at the partner universities to drive development in the educational system
- To make entrepreneurship a significant part of the universities' activities
- To build upon and integrate existing entrepreneurship projects
- To create an enhanced collaboration between universities and relevant external actors
- To develop as a highly visible national and international resource base for entrepreneurship, recognised for its innovative approaches to teaching excellence as well as for its novel and professionally executed support activities

4. **RESPONSIBILITY**

CIEL was headed by a steering committee comprising the top management of the three partner universities. The steering committee was responsible for the overall strategic direction of CIEL and the appointment of the Programme Director. A joint location was



established in Green Lighthouse, Nørre Campus, where the CIEL director and secretariat was placed. A Senior Project Manager was positioned at each partner university, responsible for implementing programme activities in close collaboration with faculty staff. To support academic excellence and recognition an academic council was formed to peer review project proposals. See figure 1 for CIEL organisation chart.



Fig 1: CIEL organisation

CIEL was created to foster collaboration in an effectual manner, internally across a number of faculties and disciplines, and externally with business partners. Building on the existing organisational structure of the three institutions, CIEL was able to work as a matrix organisation, with a small groups of about seven project managers and more than 200 faculty members developing and embedding activities at departmental level.

IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The main focus of CIEL has been to engage, empower and, thereby, enable students 'to take action' based on their academic knowledge. The project has managed to create a number of collaborative platforms on which new, entrepreneurial activities have been co-created, coordinated and implemented across university departments and with a strong participation from industry.

During the project period CIEL has initiated more than 90 projects within the areas of education, research and extra-curricular activities in close collaboration with faculty members. These projects span from developing a teachers' training programme to supporting student-driven entrepreneurship activities bottom-up. See figure 2 for an overview of CIEL programmes.





Common to all CIEL activities is that they involve:

Integration of innovation and entrepreneurship skills within various disciplines and across departments. This is an effective organisational model for reaching, embedding and developing entrepreneurial mindsets and competences across universities. Rather than developing a strong 'centre', the focus is on developing a network of entrepreneurial change agents across universities. This enables champions to play the role of change agents in faculties and departments. It raises the standards, and it speeds up the process of change.

An **interdisciplinary** approach that enables CIEL to work with 'grand challenges' such as the themes of the Entrepreneurship Excellence Programmes (EEP), which deal with environmental sustainability in urban areas, digital services in health care and issues related to innovation in the food industry. These problems rarely have clear-cut solutions that can be identified by a single discipline; they are complex and ambiguous. Thus, they serve as a great learning tool for students, who must work together across disciplines to find solutions to a shared problem from different perspectives.

Industry-Academia Collaboration. Partnership with business, both private and public enterprises, provides a strong vehicle for integrating real-world problems into university education and research. Business engagement in combination with teaching provides new knowledge and new practical perspectives for finding, testing and evaluating solutions to 'grand challenges'.



Internationalisation, a core element in the development of best practices. It is essential for all CIEL activities to include an international, intercultural, or global dimension in their purpose, function or implementation. This process includes ensuring that the universities internalise findings from international experiences, that staff adapts to new cultures of learning and pedagogy, and that students and staff are able to understand their own culture in a global context.

The Entrepreneurship Excellence Programmes are CIEL's flagship projects and as such they illustrate the CIEL approach to key areas such as innovation and entrepreneurship teaching, multidisciplinarity, university-industry collaboration, etc. Therefore this case will focus particularly on the activities, experience and impacts of these programmes.

Entrepreneurship Excellence Programmes

The Entrepreneurship Excellence Programmes are multidisciplinary academia-industry training programmes for master students at the three partner universities. By working on real innovation challenges and in close collaboration with industry partners, the students develop entrepreneurial skills and mindset which in turn encourages them to add greater knowledge-based value in business and society over the long term as entrepreneurs, "intrapreneurs", etc.

The selection of themes for the Entrepreneurial Excellence Programmes was based on an open, competitive selection process. The selection criteria included; the relevance to society (grand challenges), commitment of external stakeholders (business society), research excellence in the field, and critical mass of students in existing courses.

Each EEP is composed of a steering group of university faculty and industry partners, as well as a project group responsible for teaching activities. Through this cooperation, the partner companies approach students with real-time problems providing students with the opportunity to work outside hypothetical case studies, and rather contribute to a possible workplace and develop solutions with practical value, or, in some cases, even entirely new start-ups.

The EEPs have been evaluated thoroughly and have received recognition for providing a new model to foster university-business collaboration, in where students are used as a primary resource in bridging the cultural and structural gaps between university research and the business partner. They pose an example of how student collaboration can be carried out effectively, as students generally approach these collaborations in a dynamic and open-minded way.

The case illustrates a model of how to create an engine or co-creation platform for developing and trying out new collaborative ideas and projects. Furthermore, the platform setups have served as an important driver to internationalise the field, as a critical mass of stakeholders and joint marketing has made it possible to position the fields strongly and attract high profile international partners.

Another important strategic outcome is that the EEP steering groups are in good positions to attract funding from e.g. Horizon 2020, KIC and national research funding programmes as they represent strong public-private partnerships with defined societal benefits and all have strong bases of practical experience in collaboration within the partner group



6. MONITORING AND EVALUATION

Each of the partner universities has their own individual agenda when it comes to innovation and entrepreneurship. One of them promotes entrepreneurship primarily through teaching and learning, while another focuses rather on business cases and start-ups. Furthermore the development of systematized evaluation measures on innovation and entrepreneurship activities at an institutional level is generally very poor to non-existing, as the field is still relatively young. For this reason CIEL has emphasised the monitoring and evaluation of all activities, as these are essential factors to ensuring further learning and development, but also to meet the growing need for institutions to co-operate on developing shared indicators and survey instruments to align what and how we measure entrepreneurship initiatives on a national level.

Monitoring and evaluation of CIEL activities have been divided into two main deliverables; a mid-way evaluation and a final evaluation (due spring 2014) measuring:

- Achievement of set objectives (output) including an assessment on completion of specific performance requirements and principal activities
- Effect (outcome) including the assessment of the project's long-term (current and potential) effects on local and regional growth and employment
- Process (organisation and cooperation) including an examination of factors or processes that either hinder or promote the achievement of project goals and milestones

The purpose of evaluating CIEL activities was not only to ensure project objectives were achieved, but also to evaluate the integration of achieved results into the partner universities' activities on a practical and strategic level, as well as assessing the quality and applicability of the didactic methods developed by CIEL, namely the effect of the education programmes in relation to students' competence and awareness towards entrepreneurship.

As a main programme the EEPs have been thoroughly evaluated which has resulted in a 360 degrees examination of the effects of this programme, including:

- A survey of academic staff's experience of participation in the EEPs
- Qualitative interviews with students examining their experiences from the EEPs
- White-papers developed by the steering committee of each EEP with descriptions of the processes of developing the programmes
- A quantitative evaluation of the teaching effect on students' entrepreneurial competence, measuring the effect on 200 course participants against a control group of 800 students, which showed significant, positive effects in a number of areas
- An evaluation of the outcome for industry partners.

The two latter evaluations (teaching effect and industry collaboration) were carried out by two independent agencies, whereas the CIEL project management group conducted the general project monitoring and evaluation to ensure a high level off stakeholder feedback and learning.



7. SUSTAINABILITY MEASURES

Ensuring long-term sustainability has been a central objective throughout the project, especially since the CIEL project is 2nd or 3rd generation of entrepreneurial development projects at the partner universities, where a major learning point from prior experience was the importance of establishing appropriate sustainability measures, including:

- Building on existing infrastructure and resources: Rather than developing new (parallel) organisations or developing new courses from scratch, CIEL has focused on creating change through collaboration and connecting existing resources. Critical mass and the alignment of resources are important aspects in creating an effectual an sustainable change
- Local ownership: All CIEL activities were implemented across departments where the departments co-financed and owned developed activities. The core CIEL project organisation facilitated the development process in close collaboration with faculty staff. In order for activities to advance rapidly and with a high degree of local departmental ownership, the project managers had to ensure the right balance between personal leadership and local engagement
- Leadership commitment: A strong commitment from top management at the three partner universities was an important aspect in ensuring sustainability. Their commitment made it easier to get faculty staff on board and to take a long-term perspective on developed activities
- Long-term financial commitment: About nine months into the project the steering committee decided to continue the programme beyond the initial project period, however, it took another year for them to decide on the financial contribution. A long-term financial commitment is an important aspect in securing programme sustainability

The CIEL steering committee decided to continue CIEL in a 2.0 version focusing on embedding selected joint activities at the three partner universities, namely the EEPs with a continuation of the existing programmes as well as initiation of three new EEPs in 2014. Moreover CIEL 2.0 will continue to fund and support student-driven activities across the three universities.

Furthermore there are many examples of CIEL projects that continue outside of the CIEL platform for example the teachers training programme 'Innovation Pedagogics' now integrated at the pedagogic centres of UCPH and DTU and the university-business collaboration programme Bridging the Gap (DTU).

8. COSTS

The total cost of CIEL was EUR 5m including the expenditure of implementing all nine entrepreneurial programmes during the two-year period 2012-14. 60% of the overall expenditures relate to the development of new educational programmes, courses and teach-the-trainer initiatives, whereas 20% were used to support student co-curricular activities and 20% to initiate new cross-department entrepreneurial research projects.



In total more than 200 faculty staff members have participated in the development of the nine CIEL programmes, with more than 86.000 development hours spent. In total, this equals about 53 years' full-time equivalents. The Entrepreneurship Excellence Programmes each cost about EUR 35.000 to develop over the two-year period. After the two-year development phase, the programme must sustain itself through teaching and research activities. Each programme has an income based on the 5-8 courses developed, and they each have good potential for attracting new research funding due to the grand challenge orientation of the programmes, the critical mass of research excellence and their close collaboration with local businesses.

9. FUNDING

The total CIEL funding was EUR 5m. An initial seed funding of about EUR 0.5m originated from Danish Business Authority (Government), through a national competitive call to appoint the Entrepreneurial University of Denmark. The funding was increased with another EUR 0.5m from the Capital Denmark Growth Forum and another EUR 1.5m in funding from the partner universities. Finally, all the collected funds were matched 1:1 by the European Structural Funds (the Social Fund) sponsoring EUR 2.5m. In average, 22% of the funding came from the universities, 14% from the Danish government, 14% from the regional Growth Forum and 50% from the European Union.

OUTCOMES & IMPACT

10. OUTCOMES

The CIEL project outcome and impact is focused on creating a substantial long-term organisational change through conducting an integrated and collaborative effort in partnership with faculty staff and local businesses. An outcome could be a new educational program fostering more entrepreneurial skills and mindset among students. However, as the educational program is developed in collaboration with faculty and business there are other important outcomes and impacts related to their participation.





Fig 3: Stakeholder motivation and outcome in CIEL collaboration

Outcome of Entrepreneurship Excellence Programmes

It is still too early to determine the long-term transformational impacts of the EEPs. It is, however, quite evident that collaboration among institutions and stakeholders, and the creation of critical mass, is a very efficient tool in fostering a more entrepreneurial mindset and transformation of the university organisations and beyond. Below, Table 1 presents the outcome of the EEPs in terms of courses and number of involved stakeholders.

	Courses	Academic staff	Students	Industry partners
Green Innovation in Cities	5 semester courses 2 summer schools	28	187	30
Digital Services Innovation	3 semester courses 1 summer school	9	68	13
Food Entrepreneurs	2 semester courses 2 summer schools	14	90	13

Table 1: Outcome EEP

For a detailed view of outcome and impact of all CIEL programmes please see Appendix 1.

11. IMPACTS

The impact of the Entrepreneurship Excellence Programmes has been assessed through thorough evaluation:

 A survey among EEP teaching staff, most of whom had little or no experience with teaching multidisciplinarity or innovation & entrepreneurship, shows that they find the collaboration with academics from other disciplines as well industry partners very valuable. Furthermore they consider the multidisciplinary approach to have



raised the level of the students' casework and class discussions. However a large part of involved staff members agree that the programmes have been more timeconsuming than expected, primarily due to administrative barriers and differences in university systems

- An evaluation of industry partners shows satisfaction with the EEP collaborations and that these have led to generation of new ideas, access to new knowledge, branding and recruitment, new networks and partnerships, etc. (see CIEL Erhvervsevaluering - in Danish)
- The first-of-its-kind evaluation of the impact of CIEL's approach to of innovation and entrepreneurship teaching shows that the EEP courses have had a statistically significant positive impact on the students' experienced competence in entrepreneurship and innovation (See Evaluation of Entrepreneurship and Innovation Education). This evaluation allows for follow-up studies measuring medium and long-term effects
- 3-7 years after completing the course, it will be possible to measure 'objective' outcomes. Here students at master's level can be expected to have graduated and started their careers. It will thus be possible to see whether the students who have taken entrepreneurship courses start more companies than the control group. Similarly, it will be possible to measure whether the students in the intervention group are more likely to act as intrapreneurs in established companies and organisations, i.e. generate value in existing contexts.

8-15 years after completing the course, its impact can be measured by looking at other 'objective' outcomes that focus on the broader impact on the economy, e.g. how many of the entrepreneurship course students have become growth entrepreneurs compared to the control group, how many jobs have been created in companies started by these students compared to the control group, and on that basis calculate the economic impact at a regional level.

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

A core objective of CIEL has been to involve a broad range of stakeholders from inside and outside academia. With a focus on building on existing initiatives and activities CIEL has developed an interactive map of the entrepreneurial ecosystem in Copenhagen (see ciellab.dk/map) in collaboration with key players. This has helped not only to highlight the many opportunities for budding entrepreneurs in Copenhagen but also in enhancing collaboration between these initiatives.

13. AWARDS / RECOGNITION

The CIEL case has been presented and discussed at numerous national and international events held by the Danish government, the regional development agencies and universities. In particular, the interest has revolved around the pros and cons of using a "bottom-up" collaborative model, as opposed to organisational merging, and the effect of using students as a core resource to enhance innovation and university-business collaboration. The novel approach to entrepreneurial teaching has also been a focal point among the many third parties enquiries.

More than 50 international groups have visited CIEL during the past two years. The OECD/EU University-Business Forum has used CIEL as a case for novel university-business



collaboration at two forum meetings. Furthermore a third party agency has developed a bestpractice case study on CIEL for the new HEInnovation assessment tool.

An EU Interreg programme identifying best practice cases in Europe has nominated CIEL as one of the most innovative projects of its kind in the European Union. CIEL is furthermore used as a teaching case at the Entrepreneurial University Executive Leaders Programme conducted by University of Oxford and Universities UK.

LESSONS LEARNED

14. PRIMARY CHALLENGES

In building a platform organisation across three institutions some considerable challenges arise. These will be described in the following section.

Structural Challenges

On a practical level a range of barriers occur when organising courses across departments and even institutions. These include:

- Differences in semester structures (e.g. block vs. semester)
- Differences in credits and ECTS practice
- Differences in examination practices
- Differences in course application deadlines
- Incompatible IT systems

These barriers make course development unnecessarily time consuming for teaching staff when rigid structures hinder rather than accommodate project activities.

The platform organisation of CIEL has allowed activities and ideas to spread relatively fast, but at the expense of control and power. Therefore trust and balancing of expectations between project management and involved faculty becomes extremely important factors in this kind of organisation and sets new requirements for leadership and management.

Another challenge lies in the fact that the institutions are divided into sections and silos that act according to local conditions and agendas making it difficult for a project team to align project strategies with both general and local organisational strategies of three different institutions. The aim here should be to identify common denominators and create critical mass across campuses.

Cultural challenges

The understanding of innovation and entrepreneurship in education differs across disciplines, which makes it important for project staff to be able to speak many 'languages'. Communicating innovation and entrepreneurship across campuses and academic cultures



requires sharp communication skills, as it has to be 'translated' in order to bring value to different disciplines (e.g. there is quite a difference between the understanding of entrepreneurship in humanities and technical sciences). In projects where different cultures meet it takes time and struggles to create common ground and common understanding.

Another cultural challenge is related to the different time perspective among faculty staff and business partners. All parties are cautious about the time resource they put into the collaboration, but universities operate with a fairly long-term perspective whereas industry partners need to consider short-term factors such as quarterly budgets, manpower resources, etc. Students have here proven very useful in bridging the gab between university research culture and the corporate world, as education courses have clearly defined timeframes, e.g. 4-week summer schools or 4-month semester courses, and partnerships can be initiated right away with low entry-barriers.

Diversity of teaching models

Teaching methods have diverged between the individual EEPs and have to a large extent been tailored to the specific course, teacher, industry partner, etc. There is, in other words, no one-size fits all solution. Each EEP group has developed its own approach to teaching. This poses a challenge of collaborating and learning across programmes. As the EEPs are the first generation of this type of education, much work remains to be done in finding a sustainable model, disseminating the didactic approach and involving a broader audience. In the future we will probably see a convergence of models and a stronger conceptual framework.

Scaling

CIEL has been a very effective model in developing entrepreneurial skills and mindset for university staff and students. A major challenge however is the transition from large-scale project to becoming part of the core university organisation and culture, in particular with regard to engaging the whole management line from top management, faculty and departmental management and the administrative system.

Top management commitment is an important factor in securing success in this type of programme. Top management needs to take upon a personal responsibility in continuously communicating and reinforcing the need for change. CIEL has experienced a strong commitment from top management throughout the development process. In some situations however it has proved difficult to maintain the needed continuous support from top management, and in particular it has proven difficult to obtain a high level commitment from middle management, whereas the participating departments and faculty staff have been highly committed.

15. SUCCESS FACTORS

Flexible organisation

A central factor in the success of CIEL has been the platform organisation's ability to operate both vertically and horizontally across the three partner universities, connecting the dots and building on existing experience and knowledge. This approach was possible partly through the strong commitment from top leadership. However universities are complex systems and in some cases top level commitment turned out to be insufficient, with a need for commitment on all leadership levels.



Student-centred approach

CIEL has developed an effective model for creating lasting cultural change taking an education approach where students are seen as resource and driver for change, namely through the EEPs where students act as a powerful catalyst to drive cross-disciplinary university-industry collaborations.

Using students as a link to local businesses

Involving the university research community in the development of these entrepreneurial educational programmes seems to be a good way of building the researchers' competences and mindsets towards external collaboration. Where research-based university-industry collaborations tend to restrict themselves to narrow research disciplines and projects, leaving the researchers less flexible to move out of their comfort zone, this student-centred approach allows more space for researchers to experiment across disciplines and with industry partners in a close to risk-free environment and the collaborative platforms have resulted in a number of spin-out activities, such as students thesis-work, internships, industrial PhD projects and new research projects.

Measurement and effect

Another success factor has been the effort put into producing tangible, measurable results such as the evaluation demonstrating the effect of entrepreneurship teaching on students. Being able to verify the effectiveness of the model is central to the success of the project. In general CIEL has focused not only on achieving project goals but also on communicating products and results to stakeholders inside and outside universities, which has led to recognition and new partnerships. The communication aspect is often overlooked in these kinds of projects and should be an integrated part of activities.

Room for improvement

The success of CIEL is by large a result of a joint effort by group of university champions working extra hours with few direct incentives. In order to scale up the activities and to engage at all department levels there is a need to modernise university structures, administration and incentive systems.

16. TRANSFERABILITY

Overall, CIEL has proven an interesting new model for creating high-level sustainable and embedded initiatives across departments/universities that effectively fosters an entrepreneurial skills and mindset among students and staff and for the benefit of society.

Based on the new HEInnovation assessment criteria CIEL may be relevant with regards to:

Leadership and Governance:

• CIEL demonstrates a model for coordinating and integrating entrepreneurial activities at all levels across the university.

Organisational Capacity, People and Incentives

 CIEL demonstrates a mechanism for breaking down traditional boundaries and fostering new relationships - bringing internal stakeholders together (staff and students) and building synergies between them.



Entrepreneurship Development in Teaching and Learning

- CIEL is structured in such a way that it stimulates and supports the development of entrepreneurial mindsets and skills
- At CIEL staff takes an entrepreneurial approach to teaching, promoting diversity and innovation in teaching and learning
- CIEL support entrepreneurial behaviour; from creating awareness and stimulating ideas through to development and implementation
- CIEL validates entrepreneurial learning outcomes
- Collaborating and engaging with external stakeholders is a key component of teaching and learning development in CIEL.

University - business/external relationships for knowledge exchange

- CIEL is committed to collaboration and knowledge exchange with industry, society and the public sector.
- CIEL demonstrates active involvement in partnerships and relationships with a wide range of stakeholders.
- CIEL specifically supports staff and student mobility between academia and the external environment.
- CIEL links research, education and industry

FURTHER INFORMATION

17. PUBLICATIONS / ARTICLES

CIEL has gathered a number of further readings at www.ciel-lab.dk/resources/, including:

- ▶ CIEL annual report
- Students' learning outcome: An evaluation of the EEPs
- Business-University collaboration in education: An evaluation of business partners' experiences from participating in the EEPs
- Tool Box for developing Entrepreneurial Teaching and Training
- White paper and other materials on the individual EEPs

Forthcoming (July 2014): CIEL is currently developing a handbook about the transition towards the Entrepreneurial University based on the CIEL project.

18. LINKS

• Website: http://ciel-lab.dk/



UIIN GOOD PRACTICE SERIES

19. KEYWORDS

Collaborative Innovation; Cross-disciplinary; The Entrepreneurial University; Entrepreneurial Excellence Program; Building an Entrepreneurial Ecosystem; Learning-By-Action; University-Business Collaboration; Entrepreneurial Pedagogics; Integrating Entrepreneurial Activities; Internationalisation; Student Mobility; Entrepreneurial mindset and skills; the Copenhagen Case.

20. PUBLIC CONTACT DETAILS

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Project activity	Aim	Outcomes	Impacts
Research			
ENTREPRENEURSHIP RESEARCH ACCELERATOR (ERA)	Increase the volume, quality and cross- disciplinarity of entrepreneurship research through seed-financing the development of international collaborative entrepreneurship research proposals.	Novel research collaboration, new research projects and an increased number of research publications. Researchers are more aware about the potential of collaborative research and research funding opportunities.	Increase the cross- university and industry collaboration with novel research projects that have a strong impact on society (educational, scientific, entrepreneurial and economic).
START-UP DATABASE	The project combines the uniqueness of danish national statistics (including CPR and CVR registrations) and international excellence in entrepreneurial databases (Kauffmann and others) by creating a database for novel longitud research on the impact of I&E university education.	An open access database and a novel cross-university research collaboration providing an important overview and detailed insights about the numbers and nature of university start-ups.	Qualitative and quantitative research publications that provides a unique insights in the nature of university starts-ups. The knowledge can be used worldwide to improve how the university supports student start- ups, including I&E university education. The long term impact is more entrepreneurial students who are able to create new jobs and growth in society.
Education			
ENTREPRENEURSHIP EXCELLENCE PROGRAMME (EEP)	TREPRENEURSHIP Develop a multidisciplinary academia-industry training programme focused in knowledge-based value creation, aimed at fostering entrepreneurial skills and mindsets among students through the completion of real innovation challenges.		Empowered university students who are based on a high degree of academic excellence and concrete knowledge and experiences in turning knowledge into value. The academia-industry partnership will create new start-ups and jobs in society.
ENTREPRENEURSHIP MODULE FOR THE HIGHER EDUCATION TEACHER PROGRAMME	Develop and implement a teaching module for the Higher Education Training Programme in order to train all new university teaching staff in entrepreneurship didactics.	All new university lecturers have been trained in entrepreneurship didactics.	University education will create more impact in society, as a result of using a more action- oriented real life didactic, where corporate partners participate more in the education and as a result of more entrepreneurial students.

Appendix 1: Outcome and impact of CIEL activities



www.uiin.org

DEVELOPMENT OF EXISTING AND NEW COURSES	CIEL education programmes will be introduced to all relevant bachelor and master study boards. The entrepreneurship introduction programme will be developed, tested and launched for all students. Development of graduate programmes and teaching plan for the Excellence Programmes.	The direct effects will be an increased knowledge in the field on the 3 universities and among students. This new insight can be helpful in creating more businesses or create value to existing companies.	The short term effects are increasing knowledge in the field among a bigger group of stakeholders, who can spread the message. Longterm effects: teachers and students have increased knowledge and engagement about entrepreneurship and can inspire others to think entrepreneurship in the future.
NETWORK FOR ENTREPRENEURIAL TEACHERS AND RESEARCHERS	CIEL is creating value to the already established teacher corps and aims at creating increased value for ongoing activities.	Teachers will have a larger network and have acquired more competences within the field.	A larger number of teachers will use their network and teaching competences within the field.
Extra curricular			
STARTUP SPIRITS: EVERY STUDENT AN ENTREPRENEUR	Create a broadly appealing risk-free environment to engage students in entrepreneurship.	Teachers and students have increased their knowledge about entrepreneurship across studies and universities. Students will through the game have an opportunity to put themselves in the place of an entrepreneur.	The long term effects are that teachers and students have increased knowledge and engagement about entrepreneurship and can inspire others to think entrepreneurship in the future.
SUPPORT FOR THE ENTREPRENEURSHIP ECO- SYSTEM	Analyse, map, develop and coordinate the entrepreneurship eco- system support.	Create an overview, improve the collaboration and overall performance of the entrepreneurship support system, including the initiation and implementation of new activities.	More students will use the entrepreneurship support system and the new activities will improve the quality and impact of the support given.
ENTREPRENEUR IN RESIDENCE	Develop, pilot and implement the novel teaching and entrepreneurial programme EIR, where existing university IPR is used both as an educational and an entrepreneurial driver.	EIR will result in a number of novel educational programmes and a minimum of four springboard events and two spin-out companies.	The EIR will result in a new and vital approach to university tech-transfers, where students and entrepreneurs play a key role in creating new ventures and spin-outs.
Organisation			
Create a strong, dynamic, well recognised and viable organisation that creates value for each of the participating organisations through joint collaboration with I&E education, research and student activities. Successfully implementation of the current	The project organisation, including project - management, - administation, -evaluation and -communication are established and working well together. The project steering committee, academic advisory board	A strong, dynamic, well recognised and viable organisation capable of creating added value, becomes a natural partner in the strategic and daily development of the partner universities.	Universities and university graduates becomes more oriented and skilled in creating concrete knowledge- based value with great societal impact.



project portfolio and the development of new project initiatives. Milestone 4.	and international partners are etablished and working well with the organisation. The organisation develops an annual activity plan, including a communication and evaluation plan, and interim finacial statements.		
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AQUADEMIA: Bridging Academia and Water-Related Business Through Competence Development

By Andrea Bikfalvi, Pilar Marquès and Ignasi Rodriguez-Roda







UIIN GOOD PRACTICE SERIES

CASE STUDY PROFILE

1. SUMMARY

AQUAdemia is a Knowledge Alliance named "Competence-based training and internship model for Innovation in water related HEI educational offer". The AQUAdemia project aims at reducing the existing gap between industries and higher education institutions (HEI) in the water sector by means of designing an international internship process to enhance competence development of students. The general objective of the project is to develop and test a model for a better competence-based training for the water-related industries.

AQUAdemia aims to create structured and result-driven cooperation ventures between universities and companies, bridging the gap between the two sectors in the area of waterrelated industries, research centres and HEIs. It brings together important European representatives of Business and Academia from five countries which are joining forces to design innovative, sustainable ways of increasing human capital to create a strong knowledge alliance.

2. BACKGROUND

In nowadays socio-economic context both universities and business have to face challenging realities and constantly adapt to new scenarios. Going beyond educational and research purposes, Higher Education Institutions (HEI) are the major workforce provider as today's students are the professionals of tomorrow. Preparing students for the real world of work is a major importance issue driving change in both content and method. On the other hand, the business sector highly oriented towards finding solutions to real problems expects and selects personnel sound in both knowledge and skills and competences. Even benefits are often obvious, finding joint modes of working between these two major pillars of any society, in general, and innovation system, in particular has been a challenging issue in the attention of different communities from policy-making to academia and business.

Our proposal includes a case study developed in the framework of a European project for life-long learning under the rules of the European Innovation Partnership (EIP) initiative. The vision of EIP Water is to stimulate creative and innovative solutions that contribute significantly to tackling water challenges at the European and global level, while stimulating economic growth and job creation.

AQUAdemia project is the result of the cooperation between university partners and business partners to reduce the gap between the competences attained in formal university education with the competences needed in the water-related industries. To do so, two types of partners establish increased collaboration:

 University institutions: UdG (e-MTA Campus), TUGraz, TUDelft, UGent are universities which strongly promote innovation through new technologies and have the objective to encourage environmental sustainability and innovation creating a strong knowledge alliance with Business and Academy.



Business organizations: Aqualogy Development Network, ITWH, Dommel and • WUSMED are the business partners who represent a well composed mix of assorted companies with strong focus on knowledge management, providing water and environmental industries solutions and technologies.

AQUAdemia encourages structured, result-driven cooperation ventures between universities and companies, bridging the gap between the water related industries, research centres and HEI's.

The main purpose is to ensure the continuous and sustainable knowledge transfer and the constant improvement of educational offer, training, internships, curriculum development.

The expected impact is to strengthening the role of HEIs as engines of innovation and increasing the employability, creativity and innovative potential of graduates, professors and company staff.

3. OBJECTIVES

The general objective of Aquademia is to develop and test a model for a better competencebased training for the water-related industries. To carry out this general objective the project will:

- Analyse the market needs of water related industries.
- Define a competence-based model to assure a better match between the HEI offer and market needs.
- Manage a sustainable connection between students-academia-industry. ▶
- Design and deploy training programs for students.
- Carry out internships for students and teachers following an innovative and European mobility scheme.

4. **RESPONSIBILITY**

The leader of the project is the University of Girona.



& FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

The process designed has a sequence of five main steps:

1) Identify the problems that companies and institutions have to solve to answer the current social needs in the field of water management in the four countries of the Aquademia partners, Spain, Belgium, Netherlands and Austria. The information collected by surveys and interviews allows to identify what competences are needed to solve these problems and define them in a more specific, comprehensive and assessable way.



- 2) Translate the identified problems into projects. Each group describes the way to translate the problem into a project to solve it. The competences, the contents, the kind of activities and the tools and criteria to assess competences is designed jointly between academic staff and professional staff and it includes the set of competences to be acquired by people who will be in charge of developing the projects.
- 3) Planning of competence oriented internships to carry out the defined projects. First of all defining the profile of the students, then selecting master students from all the universities and designing one tutor to monitor each student during the whole process. To develop the project a specific software is used, using a software especially built to manage curricula.
- 4) Evaluation of the results of internships is also provided. This evaluation is made using several criteria used by the tutors and professionals.
- 5) Certification of the competences, once they are acquired by the students and once the initial problem is solved or in the way of being solved. This certification allows the students to show more specifically that he or she has been trained focussing on this competences and it could help them when they are looking for a job.

The five former steps have been grouped into five actions to be managed, presented in the following table:

	ACTION	LEADER	MAIN TASKS AND RESULTS
1	MANAGEMENT OF COMPETENCIES	BUSINESS AND ACADEMIA	Competence modelCompetence certification system
2	MANAGEMENT OF PROJECT IDEAS	BUSINESS AND ACADEMIA	 List of problems and challenges transformed into project ideas
3	CURRICULA DEVELOPMENT	ACADEMIA	• Define training method and integration into existing educational programs
4	TRAINING AND MOBILITY	ACADEMIA	 Strengthen mobility of teaching and professional staff and students. Competence evaluation (initial) Training execution
5	PROJECT EXECUTION	BUSINESS	 Project development
6	KNOWLEDGE AND COMPETENCE CERTIFICATION	BUSINESS AND ACADEMIA	 Project evaluation Competence evaluation (final) Competence certification

6. MONITORING AND EVALUATION

The AQUADEMIA project aims at designing and testing of a better competence-based training for the water-related industries. The stages of the project are organized into Working packages that are monitored and evaluated. All the project is aimed at providing learning and good practices by means of monitoring each of the processes and evaluating them.



7. SUSTAINABILITY MEASURES

The project is currently co-financed by the LLP, Erasmus multilateral projects (EACEA) which covers the special costs of experimenting with the new competence-based training with the aim to design an enhanced process of training based on competences needed by the companies. The new design has to be implemented by HEI, which means that they will have to upgrade or modify their existing processes. Thus, the result of the AQUADEMIA project are improved processes to be implemented with approximately the same type of resources that HEI already have, but with new improved or innovative systems.

8. COSTS

The AQUADEMIA project has a special funding to experiment with a new competence- based training. The aim of the project is to define new improved systems with approximately the same costs as the current existing structures of HEI.

9. FUNDING

The project is currently co-financed by the LLP (540441-LLP-1-2013-1-ES-ERASMUS-EK), Erasmus multilateral projects (EACEA) but in the long run, it is not expected any significant additional funding to implement the new system designed.

OUTCOMES & IMPACT

10. OUTCOMES

The AQUADEMIA project will deploy its activity and generate a set of deliverables. The main ones are:

- A general competence model for project management in water-related industries
- A competence certification system
- A competence evaluation questionnaire
- A system to manage competence-based training for the water-related industries.

11. IMPACTS

The main impact of the project is the effect of a new improved system to manage a competence-based training for the water-related industries, which cares about the different stakeholders involved:

- 1) Students: To ensure their improved competence proficiency.
- 2) Companies: To ensure that companies benefit more from their participation in internship programs.
- 3) Universities (or other HEI): To ensure the improvement of their competence training capability.





12. PRIMARY CHALLENGES

The main challenge of the project is the cultural change for a very close collaboration between HEI and companies, so that they have to reveal the desired competences from students that will participate in the execution of their projects.

The second main challenge is the identification of a common system across institutions and countries to improve competence-based training by means of internships.

The third challenge is the adoption of the defined system within participating organizations and the escalation of the solution from the small number of internships dealt in the project to the bigger number of the reality.

13. TRANSFERABILITY

One added value of this project is that this design could be used in other contexts and fields of knowledge. Particularly, the system produced will be easily extended to other HEI in the same and different countries in Europe. And secondly, a parallel system can be developed for other fields of knowledge, different from the water-related industries,

FURTHER INFORMATION

14. KEYWORDS

Competence, competence development, competence model, academia, business, water.

15. PUBLIC CONTACT DETAILS

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16. LOGOS OF PROJECT PARTNERS























LEAD TO WIN: AN ECOSYSTEM APPROACH TO MAKING UNIVERSITIES MORE ENTREPRENEURIAL

By Tony Bailetti, Michael Weiss, Steven Muegge and Mika Westerlund



Ð	GENERAL Informati	ON
	TITLE OF THE CASE	Lead to Win
	SALES PITCH	An ecosystem approach to making universities more entrepreneurial
	ORGANISATION	Carleton University
	COUNTRY	Canada
	DATE	March 2014
	AUTHORS	Tony Bailetti Michael Weiss Steven Muegge Mika Westerlund
	NATURE OF INTERACTION	 Collaboration in R&D Academic mobility Student mobility Commercialisation of R&D results in science Lifelong learning Curriculum development and delivery Entrepreneurship Governance Other
	SUPPORTING MECHANISM	☑ Strategic instrument ☑ Structural instrument or approach ☑ Operational activity ☑ Framework condition



CASE STUDY PROFILE

1. SUMMARY

Carleton University's Lead to Win ecosystem delivers services to technology entrepreneurs for the purpose of creating knowledge jobs in Canada's Capital Region. It brings together assets, partnerships, and programs at the university and community level. As the keystone, Carleton University, located in Ottawa, Canada, establishes and operates lead projects around challenging problems, supports entrepreneurs to launch and grow their ventures, provides them with access to global partnerships and to a shared infrastructure, and helps them monitor their progress.

As of February 2014, the Lead to Win ecosystem has raised \$7.75M, reviewed 339 opportunities, graduated 91 ventures that will create a minimum of six jobs in three years, published 400+ articles in our online journal, and received numerous awards.

2. BACKGROUND

The Lead to Win ecosystem was launched in 2009 in response to the recent and dramatic economic downturn in the Ottawa region. The downturn's effects included loss of technology jobs, withdrawal of venture capital, the break-up of the largest local private sector technology company (Nortel), and the need to adjust to the realities of the new economy. Initially, Lead To Win was founded to develop technology-based businesses, but over time the program has grown to also encompass all growth-oriented businesses.

In the years leading up to the creation of the Lead to Win ecosystem, technology employment dropped by 30%. Just over the course of 2009, 8.600 technology jobs were lost. Venture capital investment has also decreased significantly. Whereas in 2000 investments totaled in \$1.3 billion, in 2009, on \$24 were invested. 2009 was also the year that Nortel, the region's largest provider of technology jobs filed for bankruptcy.

Bailetti and Hudson (2009) provide background about Lead to Win and the region where it operates. Other published articles about Lead to Win and companies participating in the Lead to Win ecosystem include Bailetti (2010), Singer & Dexter (2011), Wacheski (2011), Muegge (2012), and Bailetti & Bot (2013).

3. OBJECTIVES

The goal of the Lead to Win ecosystem is to create six technology jobs per business over three years and to attract investment in technology companies that operate in Canada's Capital Region. With a population of 1.4 million, Canada's Capital Region is an official federal designation for the Canadian capital of Ottawa, Ontario, the neighboring city of Gatineau, Quebec, and surrounding urban and rural communities.



4. **RESPONSIBILITY**

Initially, the activities of the Lead to Win ecosystem were coordinated by the faculty members of the Technology Innovation Management program (TIM Program; http://timprogram.ca) at Carleton University. Since 2013, governance of the program has been transferred to the Lead to Win Council, whose members include Carleton University faculty and business leaders from the Ottawa community. The Lead to Win Council provides oversight and strategic focus for Lead to Win. To deliver the services, Lead to Win relies on other key stakeholders that include mentors, faculty that delivers the bootcamp, a network of reviewers, the desk primes, external incubators and accelerators, and economic development agencies at the municipal, provincial and federal level.



IMPLEMENTATION & FUNDING

5. STRATEGY & ACTIVITIES UNDERTAKEN

Building on James Moore's notion of a "business ecosystem" (Moore, 1993, 1996, 2006), we consider an ecosystem to be a network of actors inside and outside the university (the former include faculties and departments, the latter economic development agencies and partners) whose individual activities share to a large extent the outcome of the ecosystem as a whole (Muegge, 2011, 2013). As members of an ecosystem, actors can achieve system-level results that they could not achieve on their own (Carbone, 2009; Hurley, 2009; Bailetti, 2010; Bailetti et al. 2013).

The components of the Lead to Win ecosystem include A) space, B) opportunity assessment, training, and networking, C) access to business development experts (sales, operations, funding, progress monitoring, and global orientation), D) external funding for entrepreneurs, and E) strategic assets (including mentors, global partnerships, an online journal, tools and processes, and the Research Center on Global Entrepreneurship and Innovation).

A. Space

Lead to Win does not own its own building. Instead it rents space that is operated by incubators or accelerators located in various neighborhoods. Space is then provided free of charge to qualified technology entrepreneurs.

B. Opportunity assessment, training, and networking

Lead to Win provides advice to entrepreneurs, training and networking opportunities. The services include opportunity assessments, a six-day Lead to Win bootcamp, the Technology Innovation Management Lecture Series of public lectures given by industry and academic experts, workshops for entrepreneurs, and events delivered jointly with ecosystem member organizations.

C. Business development experts Lead to Win offers business development expertise through five "desks", people with considerable experience in an areas such as investing or sales. The Invest Desk trains and coaches startup founders regarding external investment and facilitates



fundraising for companies with opportunities that have matured sufficiently to be ready for external investment. The Develop Business Desk advises startup founders on how to grow their businesses. It also assists founders in defining a list of target business relationships and in creating pitches for partnerships. The Sales Desk trains entrepreneurs on how to improve the success of their customer sales engagements. The Progress Desk ensures that companies meet growth milestones. The Global Desk educates founders on how to launch and grow ventures that are global upon inception.

D. External funding for entrepreneurs

Lead to Win helps entrepreneurs secure early funding through government grants and endowments that pay for student interns working for a startup, and projects to launch born-global ventures, ie ventures that are global from inception. Entrepreneurs can also get access to later-stage equity financing through the Invest Desk.

E. Strategic assets

Strategic assets are unique, high-impact, and not substitutable. These assets link human capital to ventures' growth and the region's economic development. Currently these assets include: founders and their ventures, mentors, the network of bootcamp faculty and opportunity reviewers, an online journal (TIM Review, www.timreview.ca), master-level theses and projects (carleton.ca/tim), the open source BigBlueButton web conferencing system (bigbluebutton.org), tools and processes, and the Research Centre for Technology Innovation.

6. MONITORING AND EVALUATION

Metrics collected to monitor and evaluate the performance of the Lead to Win ecosystem include the number of ventures created, the number of opportunities reviewed, and the amount of investment raised by participating companies. Outcomes are further discussed in section 10.

Within the Lead to Win ecosystem, startups follow a four-phase lifecycle (Bailetti & Bot, 2013). Each phase provides an opportunity for monitoring and evaluating the progress of the startup, which must pass specific criteria in order to progress to the next phase.

- A. Phase I focuses on evaluating the idea. Proponents pitch their ideas for an opportunity to a review board, where they are evaluated on criteria relating to customer value, competitiveness, and partner value. Each review board consists of 4-5 experts with diverse backgrounds, who are drawn monthly from a database of over 100 reviewers.
- B. Phase II provides training, feedback, and two tiers of opportunity reviews.
- Proponents participate in an intense six-day Lead to Win bootcamp, where they harden and strengthen their opportunity. The first three days of Phase II emphasize development and clear articulation of customer and partner (ecosystem) value propositions. The second three days of Phase II focus on other aspects of entrepreneurship including financing, legal considerations, and attracting talent. External reviewers examine these opportunities on Day 3 and Day 6. Day 3 reviewers assess whether or not proponents of a business opportunity can i) clearly articulate their customer and value propositions and the key differentiators for which customers are willing to pay and ii) are ready for Days 4-6. Day 6 reviewers assess



the strength of the business opportunity and participant's readiness for Phase III (Bailetti & Hudson, 2009).

C. Phase III focuses on developing the minimum viable product.

Proponents build out the minimum viable product and the minimum value organization to accelerate sales to first customers. In this phase, founders have access to business development desks that help them launch and grow their technology businesses. They also receive assistance to secure early funding through government grants and endowments (eg matching funding for internships).

D. Phase IV is concerned with scaling up the venture. Proponents scale up by delivering their first product to customers. The goal of this phase is to get to revenue of \$1M per year from paying customers, and to create 6+ jobs over the first three years.

7. SUSTAINABILITY MEASURES

The sustainability and continued success of the Lead to Win ecosystem requires A) a large, diverse, and active community of volunteer faculty, reviewers, mentors, and other individual supporters, B) continued participation by organizations that support entrepreneurship through services and resources, C) continued support by economic development organizations that donate funds and resources, and D) continued demand from entrepreneurs seeking to participate.

The Lead to Win Council works actively to maintain and strengthen the value propositions for each group of stakeholders.

8. COSTS

Mentors, bootcamp faculty, and reviewers contribute on a volunteer basis. This is essential to the operation of Lead to Win on a low cost structure. Volunteers participate for various reasons, discussed in section 12.

Costs of operating the Lead to Win bootcamp can include meals, space (which is often donated), and the reproduction of participant training materials.

9. FUNDING

The program is free to qualified founders who have been accepted into the program. Carleton University does not take equity in participating companies.

Funding to cover the costs of Lead to Win is provided by regional economic development organizations, the province of Ontario, and the federal government of Canada.

Carleton also received an endowment to fund student internships in ecosystem member companies.





10. OUTCOMES

As of February 2014, the Lead to Win ecosystem has raised \$7.75M, reviewed 339 opportunities, graduated 91 ventures, published 400+ articles in our online journal, and received numerous awards.

11. IMPACTS

While many existing initiatives to make universities more entrepreneurial have centered on providing space and training, we find that the most significant value is created by the other components of the ecosystem. These components (business development expertise, external funding for entrepreneurs, and strategic assets) complement the space and training resources. Entrepreneurs often lack business development expertise, legitimacy to receive funding, and access to global networks.

The unique value points to entrepreneurs are:

- Stronger business opportunity quickly
- Knowledge to establish and grow successful business
- Confidence, encouragement and motivation
- Access to large and diverse business network
- Foundation to sell to first customers, raise funds and attract talent

The benefits to the region include:

- Cost effectively delivers high-impact, regional-level outcomes
- Retains value created by entrepreneurs in the region
- > Attracts and retains investment, talent and opportunities
- Creates jobs and new knowledge
- Increases tax revenue
- Diversifies regional economy
- Revitalizes areas
- Builds a local identity
- Links region to the world
- Provides a role model for other regions

12. INVOLVED STAKEHOLDERS AND BENEFICIARIES

Stakeholders in the Lead to Win ecosystem include A) entrepreneurs, B) economic development organizations, C) service providers, and D) individual volunteers. Each stakeholder group benefits from its own distinct value proposition.



Entrepreneurs benefit from new knowledge and know-how, mentorship, access to resources and services, assistance obtaining external funding, and access to a network of entrepreneurs and service organizations. The components of the LTW ecosystem were previously described in section 5. Technology ventures that graduate into phase 3 and phase 4 of Lead to Win are better positioned for success.

Economic development agencies benefit from the new jobs created the region. By supporting Lead to Win, these organizations advance their own mandates for economic development.

Organizations providing services to entrepreneurs gain access to technology entrepreneurs who may become future customers of their services.

Individual volunteers from the business community participate as bootcamp faculty, reviewers, mentors, and other support roles. Volunteers participate for a wide variety of reasons. Some are owners, managers, or employees of organizations that participate in Lead to Win; for them, participation in Lead to Win is part of their job function. Others seek access to entrepreneurs, or to build their brands as consultants and advisors, or to disseminate new knowledge, or to give back to the community.

13. AWARDS / RECOGNITION

Lead to Win has received six major awards since 2009 from the City of Ottawa, the Ottawa Chamber of Commerce, the Ottawa Carleton Research Institute (OCRI), the Ottawa Chinese Community Service Centre (OCCSC), and the International Talent Acquisition Centre.



14. PRIMARY CHALLENGES

The main challenges to launching Lead to Win as an ecosystem included:

- Defining the system-level objectives that would bind together the stakeholder groups
- Identifying the stakeholder groups and their motivations for contributing to the ecosystem
- Designing the ecosystem platform anchored around a process to launch and grow ventures that provided strong incentives for each stakeholder group to participate
- Defining a business model for operating the ecosystem platform
- Defining how to track progress of the health of the ecosystem
- Operating a mentor program



Nascent entrepreneurs at the idea and opportunity phases of the new venture lifecycle cannot afford to pay market rates for the services that Lead to Win provides. The costs of providing Lead to Win are borne by other stakeholders who benefit in various ways from their participation. Stakeholders achieve objectives that they can't achieve working on their own.

15. SUCCESS FACTORS

The key success factors include:

- Capability to apply theory to solve a real world problem. The faculty of the Technology Innovation Management program at Carleton University were uniquely positioned to launch the Lead to Win ecosystem in 2009 (Bailetti & Hudson, 2009). Lead to Win directly applied knowledge from TIM research programs in technology entrepreneurship and commercialization, open source software, business ecosystems, communities, industry platforms, and product development (Muegge, 2011, 2013; Bailetti, 2010; Bailetti & Bot, 2013; Bailetti et al. 2013).
- Existence of a healthy ecosystem that supports venture creation. Ottawa has the 3rd youngest population in Canada and 68,000 university students in the Fall of 2013; 1,900+ knowledge-based companies; 75,000 knowledge workers; and 1,500+ companies with fewer than 50 employees.
- Ottawa was rated #1 out of 61 global cities (Martin Prosperity Institute, 2013).

16. TRANSFERABILITY

This case study will be useful to entrepreneurs, educators, management researchers, and anyone seeking to foster entrepreneurship, job creation, and regional prosperity.

Lead to Win has been highly successful in Canada's Capital Region (Bailetti & Bot, 2013). Whether or not Lead to Win can be successfully replicated in other regions remains an open question. The authors invite others to learn from this case study and to apply those lessons in their own regions.

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18. LINKS

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- www.timprogram.ca
- ▶ www.leadtowin.ca

19. KEYWORDS

Business ecosystems, technology entrepreneurship and commercialization, opportunity reviews, platforms, communities, business development, born global entrepreneurs


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