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From Science to Business: Case Turku Innovation Platform

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The University sector is changing due to internal and external pressures. More innovations and application solutions are required from the innovation systems by the societies. The traditional way of increasing R&D and innovation has been to invest mainly in technology (the innovation or technology push). Market driven innovations (open innovations) have been less favoured by the policy makers and funding organisations of innovation systems. This is due to the fact that the technology push is easier to measure and control than the open innovation approach. Yet, today more and more innovations are created in an open innovation environment. The paper describes and analyses the changes in the innovation systems in Turku, Finland and illustrates the building process of a platform, the Turku Innovation Platform, TIP. It aims at creating a completely novel type of activity resulting in an increase in the number of innovations and science-based businesses, and, as a consequence, more inter-disciplinary research and other outcomes of invisible applications. TIP is currently no more than a concept but already in action. In the future, the outcomes will be analysed in a more detailed manner.

Field of research: Innovation research, entrepreneurship

1. Introduction

"Inventions have long since reached their limits, and I see no hope for further developments" Roman engineer Julius Sextus Frontinus, 10 C.E.

"When an inventor in Silicon Valley opens his garage door to show off his latest idea, he has 50% of the world market in front of him. When an in inventor in Finland opens his garage door, he faces three feet of snow." J.O. Nieminen, CEO of Nokia Mobira, 1984

Universities are among the oldest institutions in the world. The quest for higher and better knowledge is even older, as old as mankind itself. Universities have evolved from educators of church officials into servants of the public sector and, more recently, contributors also to more private activities, such as business.

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A number of changes have taken place in the economies and technologies that have affected both the public and private sector in the world. Universities as a part of the public sector are also facing a number of changes. Increasing demands for the shift from a traditional emancipative cultural agent towards active contributor to technological and economic development are being placed on universities. At the same time universities are expected to produce a growing academic workforce. In order to meet the new utilitarian challenges clear strategies embedded in university organisational structures are needed.

As we move further into knowledge economy, the role of universities is being widely reviewed. The growing number of public rankings and accreditations is but one phenomenon. Traditionally, universities have been autonomous, publicly funded organisations. Today, externally, diminishing public funding and productivity pressures are affecting the university sector and, internally, universities are looking for additional income from industry. The role of university management is essential in the future of universities during the 21st century (see Malinen & Toivonen, 1998).

The measures used in rankings indicate that a paradigm change is already under way. Many measures focus on what happens outside the university. The quality of scientific research is still, of course, highly appreciated, but innovative application of new knowledge for creating new businesses and making the established ones more successful has also become a prominent prerequisite of a successful university.

The European Union recognised this development in the Lisbon Declaration that aimed at making Europe the most competitive economic region in the world by 2010. Later, of course, the declaration has been adjusted but the basic message remains the same: Europe needs a more effective innovation environment and universities are expected to become major players in it.

In this paper, we review the development of the Finnish university system from the above viewpoint and present a regional (but also international) platform that aims at developing science-based businesses.

2. Background

The first Finnish university, the Academy of Turku, was established in Turku, the oldest city in Finland, in 1640. The reasons behind the action were partly theological (Turku was the centre of the Church in Finland that was then part of Sweden), partly measures aiming at regional development. The university was transferred to Helsinki in 1827-1828, after Finland became a Grand Dutchy under Russia. The University of Turku was (re)established in 1920, two years after the founding of the Åbo Akademi University. Today, Finland has 22 universities,

located in all parts of the country, from the polar circle in the North to the Southern coast. The motivation behind this proliferation has been based on regional policies.

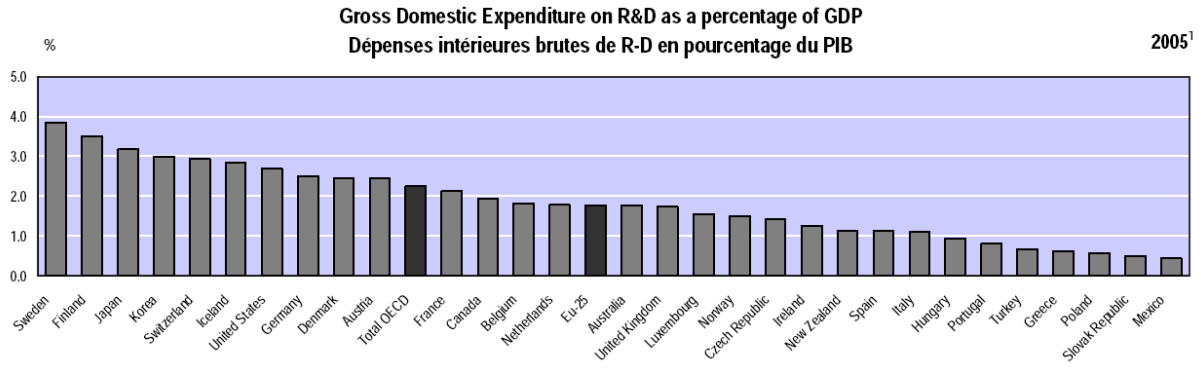
The Finnish University Policy has led to a number of initiatives. In Helsinki, a merger was suggested between the Helsinki University of Technology, the Helsinki School of Economics, and the University of Industrial Arts and Design. In East-Finland, a Union University was suggested between the Kuopio University and the Joensuu University. In Turku, The University of Turku and the Turku School of Economics agreed to constitute a consortium that would eventually lead to the establishment of a new, integrated university in 2012.

The University of Turku, dating with interruptions back to 1640, and Turku School of Economics, from 1950, would join forces. It was announced that the consortium would result in a top-quality international research university by 2011. However, it is not by announcement only that any university can reach top international quality. Concrete measures (from outside of the system, peer review etc.) and pertinent planing need to be carried out.

The Turku region, located in the south-west corner of Finland, has 3 universities, the biggest polytechnic in Finland and many research units of various organisations. The universities are the Turku School of Economics, the University of Turku and the Åbo Akademi University, which is the only multidisciplinary university in Finland that provides education in Swedish, the other official language of Finland. Today, there are more than 25,000 students and 400 professors in the area, and some 200 doctoral dissertations are submitted annually. Therefore, there are both history and new potential present in the area. Pressures for change on the local university sector are emphasized by the Ministry of Education due to increasing national pressures to merge existing independent universities.

The new millennium, also in Finland, has accentuated the importance of discussion on how, then, universities should be changed to meet the increasing demands of competitiveness. The regional policy from the 60s to 90s was based on the assumption that any university unit in the region has a favourable catalytic role for development. Universities were also seen as producers of basic theoretical research that is then brought forward by means of more practical R&D measures. The R&D would be carried out in special technical research institutions, and also in larger industrial companies. Finland set itself in the early 80s the goal to increase R&D spending onto top level in the world. This has also been achieved (see Figure 1 below).

Figure 1: R&D Expenditure in various countries and country groups, % of GDP (OECD main economic indicators 2006/2).



The R&D spending in Finland is very high. But if we look at the business start-up rate, the picture is not nearly as favourable. Early-stage entrepreneurial activity rate in 2006 is relatively low in Finland (5%) compared to for example US (10%) (see www.gemconsortium.org).

3. Literary Review

Innovation system activities followed in many countries the development of the US based initiatives, such as Silicon Valley and Route 128. National and regional innovation systems were developed in order to produce more science-based ventures, to help and support existing (growth) businesses, and to co-ordinate the actions of various participants in the system. (see Saxenian, 1994; Brännback et al., 2006). Cooke (2005) notes that the interest of innovation systems and related issues was very high in academic as well as policy oriented literature between 1987 and 2002. During that period more than 200 studies were published on innovation systems. Another notion can also be made: most of that literature covered those institutions that are in the core of an innovation system. Those institutions include companies, universities, research organizations, and support systems that aim at generating innovations (Niosi, 2002).

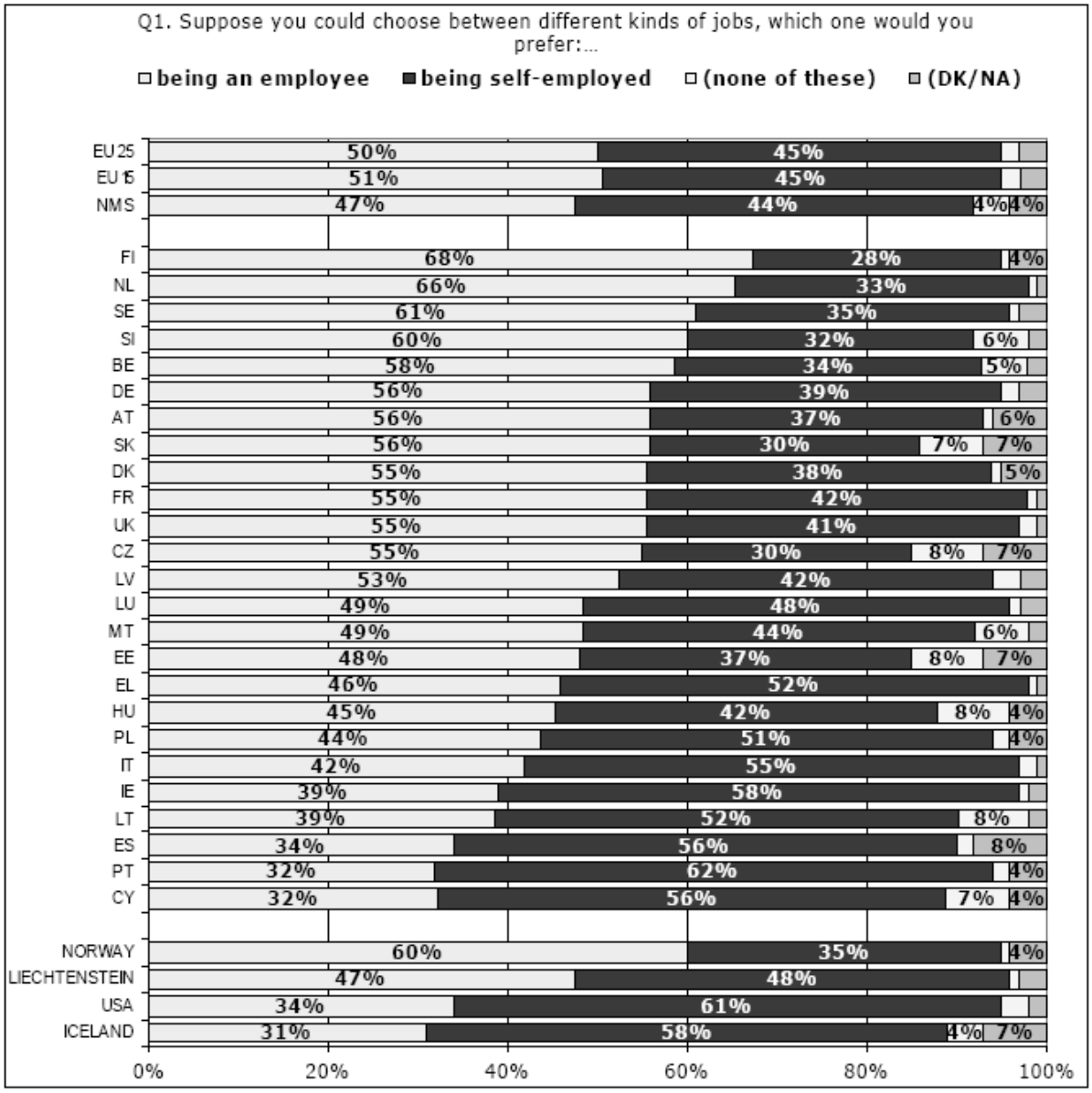
An innovative system is based on three different components: 1) substance factors (industry- or business-specific knowledge and skills), 2) structural factors (facilitating and enabling environment/infrastructure), and 3) dynamic factors (interactive processes within networks). The innovative system can also be divided into national, regional, and local innovation systems. (Smedlund et al., 2005). Vinnova (Swedish Governmental Agency for Innovation Systems) has introduced a model called Triple Helix for innovation systems. Triple Helix consist of university, government, and industry actors. (see Etzkowitz & Leyesdorff, 2000).

While the innovation systems are being developed new approaches and new ways of organising science-based businesses are being recognised. Examples of new types and approaches are, for example in biotechnology, (Pisano, 2006), design-based businesses (Utterback et al., 2006), or in a more general way (see Christensen, 2003 and 2006; Gladwell, 2002 & 2007; Johansson, 2006). Another new stream of literature is about how to survive and grow in the "open innovation environment" (see Christensen & Raynor, 2003; Christensen, 1997; Heath & Heath, 2007; Livingston, 2007). Therefore, the innovation system itself is under change, which calls for new ways of organising the innovation activities.

The Finnish innovation system has been systematically built since 1979 when the national technology committee was established. This was followed by several other very important actions of which the foundation of the National Technology Agency, Tekes, in 1983 and the launch of the technology programmes the following year are the key milestones. The first science park was created in 1982 and now, a quarter of a century later, there are 22 technology and science parks in Finland. Science parks are government initiatives forming regional agglomerations where scientific and educational institutions can effectively interact with existing firms and provide efficient seed-beds for start-up technology and science based firms. Accordingly, within the Finnish regional innovation system we find that in the close proximity of the 22 science and technology centres there are 20 universities with 163,000 enrolled students and approximately 21,000 new students enrolling annually. Additionally, there are 29 polytechnic colleges with a total of 120,000 enrolled students and 25.000 enrolling students annually. As a key factor in the efforts to build the Finnish innovations system, Finland has consistently invested in higher education. Measured by percentage of GDP only Denmark, Sweden and Cyprus have higher public investments on education, roughly 6.5%. Hence, 32% of the total population have an academic degree and approximately 38% of the population between 24-35 years have an academic degree. As a result, there is an abundance of knowledge-based resources.

To ensure competitiveness the system of science parks is currently being revised to better meet the future challenges. However, a striking paradox is that entrepreneurial prevalence is very low while the R&D expenditure is low and all innovation system activities have been put in place (The Finnish paradox). Explicitly, the national innovation systems are supposed to increase innovativeness. Implicitly, at least, it is assumed that entrepreneurial activity should also increase. However, in reality, attitudes towards starting a business are rather weak in Finland (see Figure 2).

Figure 2: Attitudes towards starting up a company in Finland (Flash Eurobarometer 160, 2004).



Finland has clearly been an innovation-push type of country. The company Nokia has had an enormous effect on the Finnish economy: the size of its turnover equals the size of the Finnish annual national budget, one fifth of corporate tax revenues come from Nokia, its exports cover 20% of total Finnish exports etc. As another indicator, Nokia represents about 40% of all Finnish R&D&T investments. In Finland, Nokia is seen as the most innovative company, but a very technology-oriented one. It is categorically assumed that the technology is developed first and its commercialisation can be carried out afterwards as a separate activity. Recent literature on innovations has emphasized the market-

pull aspect. Markets, existing or potential, are as often the initiating factor for innovation as technology. As a matter of fact, these two aspects should be considered simultaneously (see for example Chesbrough, 2003).

Universities are often regarded as major sources of new innovative knowledge, and therefore also new knowledge-intensive businesses. A recent study (Malinen et.al., 2006) revealed that the innovation environment in Turku, although strong in basic research, does not turn out new businesses to a satisfactory degree. Other findings of the study are as follows:

a) Industry-university problems - researchers are not implicitly encouraged to actively cooperate with industry. Due to increased national (Tekes) and international (EU) demand research institutions are becoming more active in university-industry collaboration (reactive vs. proactive approach?).
b) Industry tends to stress the immediate results from university research, which is often impossible and usually against the basic research ideology
c) The changing IP laws and regulations have made it difficult for all parties involved in collaboration to fully understand the nature of the innovation property rights
d) There are too few new ideas and innovations coming from the university sector to the innovation pipeline. Therefore, actors in the innovation system cannot select the most promising ones from a large pool of new ideas, but are forced to develop what they have been offered. Additionally, the setting in Finland at the moment is such as either you are a researcher or you start your own company. You cannot do both. Larger research groups do not encourage their individual researchers to commercialise their research-based innovations. Consequently, a large number on potential ideas are not pursued further.
e) Commercialisation activities and support are weak
f) Growth and internationalisation of new innovations have been very moderate due to a limited number of potential innovations in the first place and, secondly, due to the limited understanding and capabilities for commercialising new ventures.

To summarise our approach, we postulate the following barriers to successful innovation in universities:

- Knowledge creation does not have the necessary critical mass. Universities are too small to be competitive.
- Universities do not have adequate international networks.
- Basic research on markets and business competence is not strong enough to balance basic research in technology
- Applied research is too compartmentalised and interaction between business and technology inside the university is not sufficient
- Networking between knowledge-intensive businesses and universities is not strong and strategic enough.
- The education system does not offer sufficient understanding of business to the best brains in science.

- Support for potential start-ups is not systematically organised inside the universities.

Based on the previous discussion we will present in this paper a case of building-up an innovation platform geared towards solving the above mentioned problems and challenges.

4. Research Design

The paper presents a case, the Turku Innovation Platform, TIP, as a vehicle for increasing science-based new ventures. Therefore, the paper is descriptive and normative in its suggestions.

A number of actors (professors) had already earlier brought out the message that the innovation environment is not working well enough. Thus, the plan to set up an innovation network was drafted. According to it, Turku Innovation Platform, TIP, would:

- Establish a knowledge-intensive community with critical mass for world-class innovative research and international networking.
- Build a strong link between world class innovative research and creation of high-growth knowledge-based businesses.
- Improve the interaction of research in science and business in order to create a strong open innovation platform.
- Strongly support academic degrees in science and technology with elements of business competence.
- Increase the quality and quantity of new business deal flow in the region and to accelerate growth.
- Link industry into TIP as a partner in innovation.
- Improve the link between innovative research and venture financing organizations.

We illustrate TIP with the following two figures (see Figures 3 & 4):

Figure 3: Turku Innovation Platform and its key stakeholders.

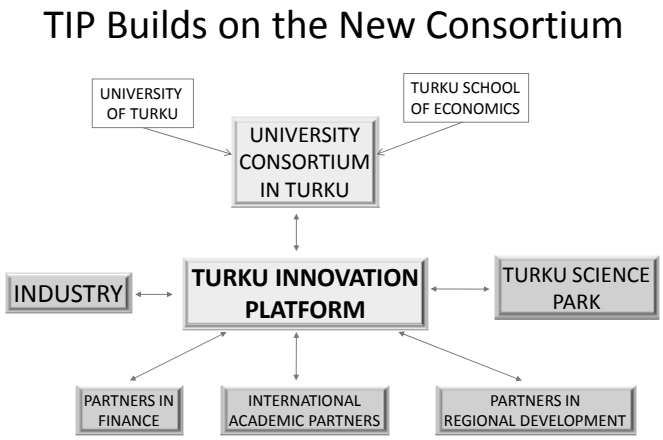
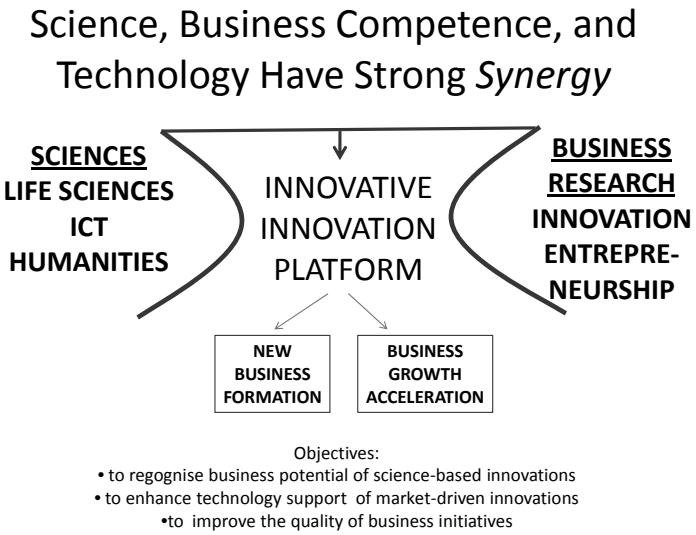


Figure 4: Turku Innovation Platform as a platform between sciences and business competence.



As can be seen in the figures, TIP is a nexus of an open innovation system containing various actors with different roles but common goals. In the past, the innovation systems have been clearly defined with joint goals and strategy. However, combining the activities of various stakeholders TIP acts as a catalyst for unpredictable innovative outcomes. In other words, TIP does not predict what the outcomes are but gears the activities towards the open innovation platform where previously separate fields of science (for example humanities + business competence + IT) work closely together.

5. TIP Goals and Elements

TIP is based on the open innovation concept (see for example Chesbrough, 2003). Science and business research is carried out on an integrated platform so that technology-driven and market-driven innovations support each other. As Malinen et.al (2006) clearly stated, the universities have a much broader potential for innovations than what are realised today. Therefore, the fundamental element in TIP must be raising the awareness of the innovation potential within the universities. The key goals for the awareness program include:

- Communicating the importance of innovation and entrepreneurship to the whole university community.
- Increasing the understanding of innovative entrepreneurship.
- Improving the ability to recognise potential innovations.
- Developing and nurturing the intellectual capital of universities.
- Developing international academic links.
- Enhancing business links.

The awareness process will also lead to regular international events dealing with Science to Business and Business into Science.

After carefully examining the knowledge base on the two universities (Turku School of Economics and the University of Turku), it was concluded that the TIP research platform presently contains four key areas:

1. ICT (computer science, information systems, software engineering, communication systems)
2. Life science (drug discovery, diagnostics, biomaterials, bioinformatics, biological and medical imaging)
3. Human and social sciences (media and communication, cultures and markets, virtual history, communication technology, sociology of education, digital culture, institutions and social mechanisms)
4. Business competence (science and science-based business, fast growth business, creative business, mobile business, innovation management, technology entrepreneurship, business foresight, IPR, venture business).

Innovation and entrepreneurship link all these areas together. The relevant research teams in the field of TIP activities now contain ca. 230 professors and 350 senior researchers. The PhD output is about 100 per annum. It is interesting to note that the “neighbouring” city, Stockholm, in Swedish, has similar strengths in research, so consequently, networking possibilities are currently actively explored.

Links between research and industry are already numerous. The Turku region is strong in many industries, e.g. metal and electronics incl. mobile phones (Nokia produces its top of the line phones near Turku), shipbuilding (the biggest Caribbean cruise ships are built in Turku), other maritime technology, and pharmaceutical industry.

The TIP education platform will bring entirely new elements to the university consortium. A fundamental problem has been the lack of business competence training for science PhDs. Therefore, a two-year MBA for innovation and growth has been developed. The MBA

- Is offered to PhDs on the three first research areas
- Is in all likelihood co-organised with the Stockholm universities
- Is a two-year program with three modules (business competence, entrepreneurship & innovation, and industry specific studies)

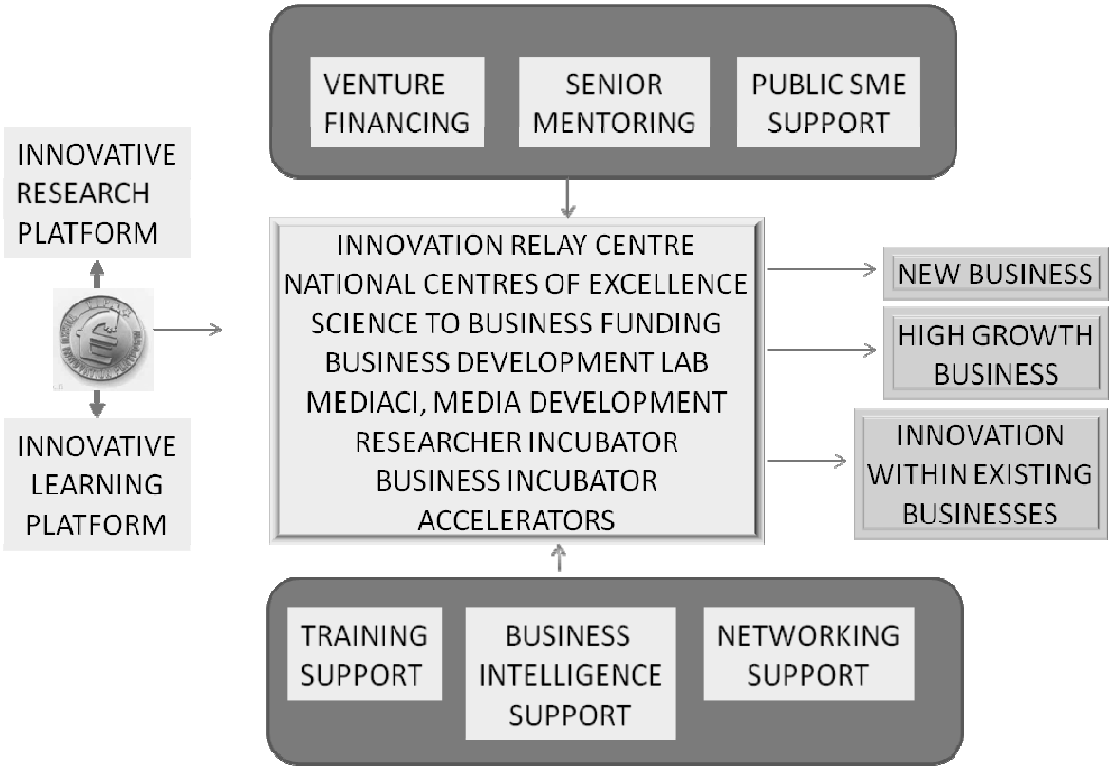
It is assumed that about 20-30 per cent of the PhDs would enter the program, thus, making it viable. In the future, similar networking arrangements will be made with other European universities, too. The program was piloted a few years ago with Life Science PhD students. The BIONET program lasted about 1 year and contained a fairly thorough introduction to business competence. It was generally regarded as a great success.

The TIP education platform has many levels and programs:

- MBA for innovation and growth for PhDs
- Researcher incubation support program (especially for life science)
- Nordic Master program for ICT and Entrepreneurship (partners Royal Institute of Stockholm, Copenhagen Technical University, Oslo University)
- Technology entrepreneurship Master's program
- Basic business competence for undergraduate science students
- Various programs for existing businesses, such as
    - eMBA
    - Executive High Growth Program
    - Turku Science Park incubator and accelerator support

The final element is to provide the participants with the services of the TIP business development platform. The Finnish support system covers all the necessary elements but perhaps improvement is needed in proactivity and integration/coordination. TIP will improve the quality and increase the quantity of innovative business ideas. In the following picture (Figure 5), the key elements of the development platform are outlined:

Figure 5: TIP business development platform.



There are many providers of support: Both Turku universities, Turku Science Park, Regional Government Agencies, various financial institutions, company experts, international academic and business experts. Before TIP, no formal integration existed over the whole field. The role of TSE is here three-fold:

1. The Business Development Laboratory, which is managed by TSE and brings together business and technology around a business possibility. The Business Development Laboratory was founded in 2007 at the Turku School of Economics to integrate entrepreneurship teaching into hands-on business training and development activities of science-based inventions/discoveries. In practise, a group of 4-6 business school students together with University of Turku Law School students and necessary external mentors assists the researcher(s) with a science-based invention (IPR holder) in developing a business plan and the future business operations of the potential new venture. The mentors in the programme are experienced professionals, hand-picked from the particular field of the invention in question. The programme consist of intensive training sessions, mentoring, business plan guidance and other relevant material where the student group and inventor together develop the potential new venture further “in the pipeline”. The outcome of this 5-month-exercise is usually a new start-up that continues its development in incubation or acceleration activities organised by the Turku Science Park.

A new set of 5 potential new ventures are being developed between January and May 2008.

2. The European MEDIACI consortium that supports new and existing digital media companies in order to reach fast European growth. It provides business foresight expertise, educational content for European Media Management programs and a virtual Business Development Laboratory.
3. Business intelligence services for the key industries of TIP.

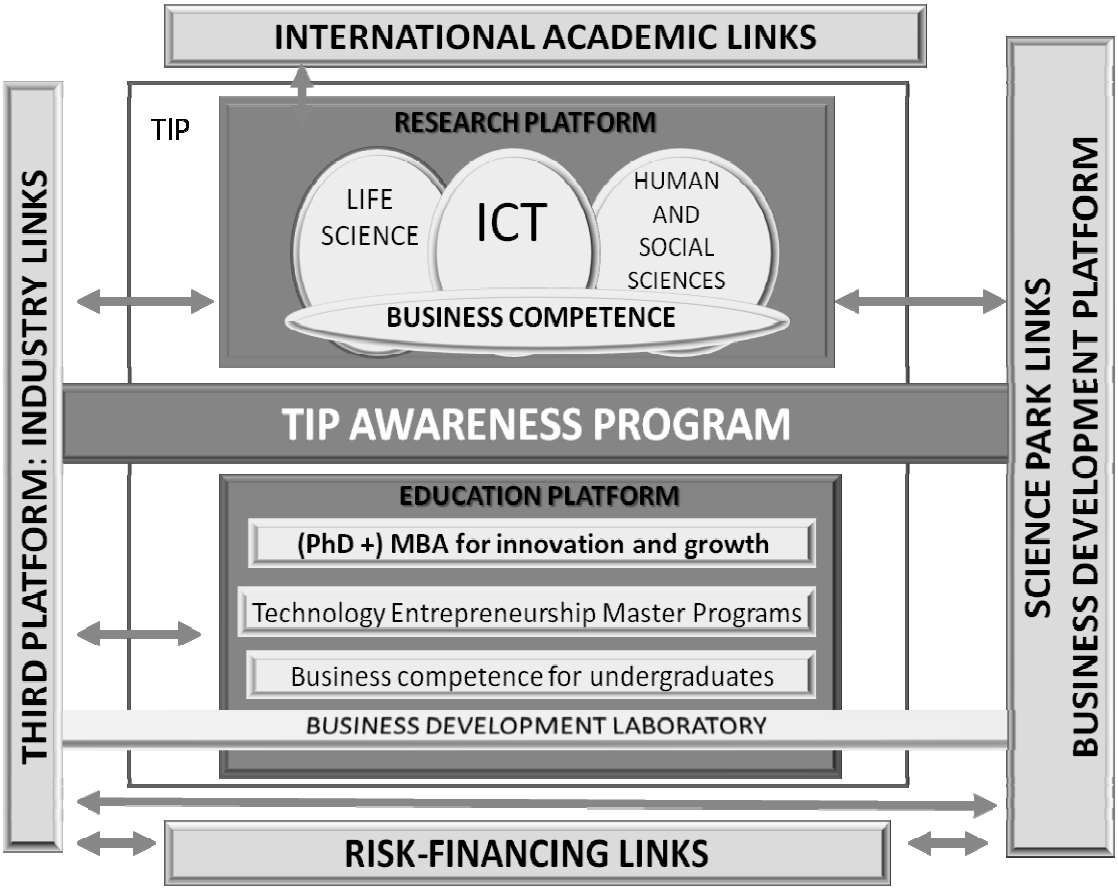
It is of vital importance that various players work well together. The academic faculty, the risk financing community, business managers, and entrepreneurs are all needed to make sure that businesses are developed efficiently and effectively. Business and technology life cycles become shorter and shorter and a slow progress would render many promising ideas obsolete. As the number of players is quite large, there is also a danger of narrow-mindedness. There has been a tendency to concentrate on the smaller start-up plans needing, say, 200 000 € as start-up capital. Larger plans of 1- 5 million € are not easy to establish because the individual actors regard the risk too big.

We have not mentioned business angels as a specific resource here. Turku has traditionally not had many active business angels. Through national and international networking this should be improved. In Finland, the early stage risk financing is almost exclusively taken care of by two state-owned companies, the Finnish Industry Investment Ltd and Finnvera Ltd. Today, less than 100 new start-ups receive equity from these sources (total number of start-ups in Finland is around 25 000 annually).

The Turku Science Park (TScP) constitutes an important link in business development. There has been a business incubator since the late 80's and over 200 start-ups have been as tenants there. TScP is currently renewing its structure to improve its interface with TIP and to increase its resources in business acceleration. Two limited companies are being established for the purpose of acceleration, one for life science and one for other technologies. Some Swedish capital is also invested into TScP and the funds in Stockholm can also better support business development in TScP.

TIP is, thus, structured around various platforms and four key links (Figure 6):

Figure 6: Turku Innovation Platform.



In figure 6 we present the Turku Innovation Platform and its linkages between various stakeholders. Additionally, it collects the previously presented platforms and key areas.

TIP will contribute to various stakeholders in many ways. For university research, education and development activities, technology and business competence combined will improve both the innovation research and education (basic and applied research) and especially interdisciplinary research and education. There will be an improved and larger number of potential innovative science-based business ideas for Science Park incubation and acceleration activities. The companies will benefit from university research when the research is not only technological in nature (plus open innovation benefits). However, there has to be a fit between the company strategy and the research conducted (see for example Arvanitis & Woerter, 2006). The risk-financing organisations are seeking more potential science-based growth businesses. The TIP aims at closing the existing gap between the financiers and universities. All this will be carried out within an

international environment. This international environment consists of international links of participating universities, faculties and researchers. Additionally, there will be links with other European and international initiatives such as European Technology Platforms (ETPs) in selected fields and other similar activities (Technology Transfer Systems, Innovation Relay Centres, Business Innovation Centres etc.). TIP is also looking for European Institute of Technology (EIT) initiatives and pilot projects.

5. Making It Happen

It is important to remember that in the field of innovation and entrepreneurship the economies of scale but also the economies of smallness exist. TIP should not be built into a solid monolith with a rigid organisational structure and heavy administration. Instead, TIP will be a mainly network-based activity.

TIP will provide an incubation period of 3-4 years. The new university structure will be functional in 2011. By then, the key platforms of TIP will all be in full speed, too. The Turku School of Economics, TSE, has historically been fiercely independent-minded and seen any merger with the University of Turku as a serious threat. Today, the TSE executive board unanimously supports the new integrated university structure. This new attitude is based on many dimensions:

- TSE is too small to survive alone the new Finnish university policy that is totally oriented towards high international excellence through larger and fewer universities.
- It was considered beneficial to participate in the preparation of the new structure among the first players, since there was a threat of a weakening budget if a passive status quo strategy were adopted.
- The ministry of education promised to change the university laws so that, in addition to faculties, universities can also be more loosely organised around schools of different fields.
- The conscious effort to link the universities in Turku more closely with the universities in Stockholm (with SSES, Stockholm School of Entrepreneurial Studies) made it necessary to organise the Turku effort around a local CEIS network (Centre for Entrepreneurship and Innovation Studies) that to-day coordinates the execution of TIP.
- The cooperation, since 2004, in the teaching of entrepreneurship between TSE and the ICT department of the university leads also to other kinds of cooperation.
- The open innovation and open business model thinking revealed many new benefits of business/technology interaction in research and business development.
- Business competence is today seen as an important element also in the degrees in technology and social and humanistic sciences. There is a recognised need for linking business competence into other fields of science, and this is the key function of TIP.

- The international networks of the two universities are much stronger if they are put together. TIP makes Turku a more lucrative partner for large international players, too.

The implementation of TIP is already under way. In 2008, the major new educational programs are opened and the first international Science to Business event will be organised. Also, the awareness program can be started in 2008. The critical elements are research and business involvement. It is fortunate that the 2007-2013 budget period of the European Union contains many suitable programs, where the TIP initiatives can find funding.

6. Conclusions

It is a well-known fact that open systems are more successful in dynamic environments. The Finnish universities are all state-owned and their budgets relatively tightly controlled by the ministry of education. The share of external funding varies considerably but government funding has been the major source of finance. Scientific knowledge creation has also been regarded as a separate process, which is automatically and sufficiently self-controlled by the scientific community itself.

Adopting the open innovation model for the larger universities will be a challenging exercise. The university funding and incentive system must be developed accordingly. It may also be difficult to accept the fact that failures are a necessary ingredient of academic activity, too. Also, the principle that academic knowledge is also tested in practical applications and businesses, may be difficult to accept in some academic circles.

Universities, naturally, stress the importance of academic freedom. However, it is very difficult for the university management to accept a platform, whose outcomes are not clear and measured. As the aim of TIP is also to connect unexpected research fields, the achievements in them are not yet to be seen.

The connections between the TIP and similar activities in Europe are yet to be presented. However, there are links, which were discussed earlier in the paper. Many of the new European initiatives are also in progress, and therefore, need a dynamic approach to tackle them. Many of the international connections will be built around international programmes such as FP7, Regions of Knowledge etc. (by the European Union). There will be many applications to be submitted to these programmes in 2008.

7. Implications

For a business school, the new times are challenging. Basic business research and education will remain the central activities. But it is probable that this new exposure to innovation and entrepreneurship through TIP will bring new momentum also to the traditional university obligations.

Many of the outcomes of TIP are realised in the future. TIP education platform will produce more business oriented/aware science masters and doctors. TIP research platform will develop many projects based on the combination of business and technology competence. TIP business development will take many shapes and forms (business development laboratory, fast growth company assistance etc.). And many of the outcomes are such as we cannot predict (combining various disciplines, such as astronomy, IT, and business competence).

TIP is in progress. The concept is ready. Awareness activities are already under way. In the near future, we will examine the outcomes and achievements of TIP and develop the concept if needed. Additionally, a set of measurable deliverables will be needed to help the management of the process. Innovation system evaluation by quantitative measures is challenging. However, these issues have to be tackled soon as well.

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