Small Innovative Business Support Network / SIB net (EU 31398)

Feasibility study on Technology Incubators and New types of Business Incubators

Research report

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Executive summary

Technology incubators can be defined in numerous ways; however, some features – nurturing technology-intensive start-ups, exploiting close ties with the research community and having financial interest in the performance of the incubator company – are considered essential. Not one profit-driven, privately-run technology business incubator has been established in Latvia so far, and the reasons are:

- The private equity secondary market and public stock markets are underdeveloped (which should provide an exit scenario for incubator operators holding shares in incubator companies).
- Private investor investment horizon is generally short, possibly shorter than needed to benefit from investments in technology start-ups, while returns expectations – high.
- Few new business ventures are created in Latvia, the main reasons being cultural (reluctance to become entrepreneurs), financial (lack of early stage financing) and commercial (poor competitiveness).
- Pecking order theory is followed – companies first use retained earnings, then assume debt, then issue new equity; accordingly, help in accessing equity financing is not often required.
- There exist cultural barriers to sharing ideas and equity and to being coached.
- Investors have preferred to invest in lower risk ventures which, for some time, provided high returns.
- The number and quality of new technology businesses in Latvia is low as few scientists have the means to work on new products.

In Latvia, Riga has the critical mass to host a technology BI – it is conceivable that 10 or more companies at any time could benefit from being in the TI incubator. Elsewhere in Latvia, its creation can only be feasible is there are strong supporting factors (a university with life sciences or engineering focus, quality research facilities and other conditions to attract foreign scientists/managers). Ventspils, thanks to its undergraduate and graduate computer sciences studies and municipal support, could be the most suitable host for another TI or its subsidiary if such was made in Latvia. In Estonia, Tallinn and Tartu qualify, where the existence of university and local business support vehicles helps attract bright students, researchers and entrepreneurs. Pre-seed and early stage support to technology businesses in Kurzeme region is already provided by the existing traditional business incubators.

There is lack of formal equity financing schemes for technology start-ups in Latvia. To be specific, there is only one seed and start-up capital investment fund – Imprimatur. Groups of angel investors lack organization and have none to little joint investment track record, therefore they are reluctant to co-invest. The network of family, friends and acquaintances is exploited when early stage financing is sought. Lack of competition for projects may worsen financing conditions for technology start-ups. Luckily, several private initiatives are under way, for example, Open Coffee Club Riga, Labaca (Latvian American Business Association of California), which may attract and organize business angels into joint investments.

Technology start-ups often choose to establish their operations closer to their market, i.e., not in Latvia. For technology start-ups where economies of scale are important, the number of potential users hugely affects the financial upside potential. Accordingly, companies tend to incorporate and/or operate where language, institutional, and financial barriers are least burdensome with regard to user base creation.
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1. International experiences

1.1. TI definition

Incubators are defined as “support structures for enterprise creation”; support structures targeted at entrepreneurs and inventors prior to company formation are occasionally referred to as “innovation centers” (CERAM, 2002). Technology incubator differs from traditional business incubators by:
- Strictly for-profit orientation.
- Focus on high growth potential companies only, disregarding lifestyle businesses.
- Relatively high reliance on new product/technology development and co-operation with academia.

For the purposes of this report, technology incubator is defined as “a business incubator with high incubator management support level for companies developing high level of technology”.

This definition stems from the typology of business incubators as demonstrated in Ester et al (2005, 16):

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1.2. TI role

The purpose of technology incubators is to have the following roles and objectives:
- Create economies of scale in provision of accommodation and services to start-up companies.
- Create places of learning.
- Create symbolic places of entrepreneurial spirit.
- Derive profit from innovations by helping to develop, finance, and market them.
- Accelerate and streamline start-up creation (CERAM, 2002, 14).

1.3. Variety of incubators (see CERAM, 2002 for examples)

Support structures for enterprise creation differ in their location, focus, rules, financial incentives. Common types of incubators include:
- Regional incubators (objective being rejuvenation of a specific territory)
- University incubators
- Industry specific incubators
- Incubators created and run by a specific company for businesses related to its main product or service
- Incubators dedicated to certain categories of people
- Non-profit incubators
• Incubators to accommodate subsidiaries of foreign companies and incubators to establish subsidiaries abroad

### 1.4. Comparison of existing TI

Estimates suggest that as many as 3000 business incubators operate worldwide (Ester project team, 2005, 16).

Next, a few selected illustrations of various TI designs are given; TIIs vary greatly in their features and approach, yet statistical inferences or numerical estimates of the whole TI industry should not be based on the further examples – they are merely to introduce reader to the various features of TI and create body of knowledge for considering a TI in Latvia.

**Focus on particular industries** is quite common, for example:

- **Naiot** business incubator, located in Israel, Tel-Aviv and **Yoqneam** (Stoffman, 2005) makes investments in medical devices (70% of portfolio) and software (20% of portfolio).
- **The Environmental Business Cluster** in San Jose, California nurtures clean-energy and environmental technology companies.
- – **Yozmot HaEmek** in Israel helps bring to market medical devices and materials.

**Investment (equity or grant) size and composition:**

- 500 thousand USD - **Naiot**, Israel (Stoffman, 2005). 200 thousand USD equity investments and 300 thousand USD government loan/grant.
- Grant of NIS 500 thousand per year (EUR 100 thousand) for two years, – **hiCenter**, Israel.
- $1 investment per every $3 of private capital, up to $1 million – **The Advanced Technology Development Center** (Atlanta, Georgia).
- $10-20 thousand – **Y Combinator**, California.
- Up to EUR 10 thousand grant for market studies and business planning – **TULI**, Finland.
- Up to EUR 40 thousand grant for external expertise on market and competition studies, business model and business plan – **LIKSA**, Finland.

**Benchmarking** – what does the TI want to achieve and how its success is measured:

- Traditional business incubators, especially, with public co-financing – number of incubator companies, their survival rate, jobs created, regional development, taxes paid, premises occupied.
- **Rubicon Centre** – “nurturing commercial research in the South West [Ireland] Region”.
- **Yozma** – “marked the beginning of a professionally managed venture capital market in Israel” (Yozma, 2011).
- “To help reduce the deficit in the trade balance; to create new employment opportunities for skilled persons” – Israeli TI program initial objective.

**Portfolio company shareholding:**

- 40% TI, 50% entrepreneurs, 10% employee stock ownership plan (ESOP) – **Naiot**, Israel.
- 20% TI, 20% investors, 10% ESOP, 50% entrepreneurs – initial Israeli TI program guidelines.
- 5% TI – **hiCenter**, Israel.
- Below 10% TI – **Y Combinator**, USA.
- Widely varying – currently between 1.2% and 47.35% with median being around 15-20% - **Encubator**, Sweden.
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TI size:
- **Naiot** (Israel) admits 4-6 new companies to the incubator annually, and there are 8-10 incubator companies altogether.
- 11 companies in **hiCenter**, Israel as of April 2011.
- **Ytra** program in Finland supported development of 12 regional TI. Initially, 98 new companies joined these incubators; eventually, the number of incubator companies reached almost 200 (Sitra, 2011). Accordingly, the average number of companies per incubator was about 16.
- Forbes (2010) states that in US, approximately 300 technology incubators exist, and the total number of TI companies is about 6000. Accordingly, the average number of companies per incubator is 20.
- One of the best known TIs in US is **Y Combinator**. It helped launch 172 technology companies in five years.
- **Houston Technology Center** (Texas, US) works with 60 companies at a time and has helped 1000 companies in 10 years (Forbes, 2010).
- **The Technology Innovation Center** (Illinois, US) houses 38 companies and has nurtured 350 companies in 24 years (ibid.).
- 5-6 new companies per year in **Encubator** (TI of Chalmers University of Technology and University of Gothenborg, Sweden).

Incubation period:
- 4-6 months screening and 12-24 months incubation in **Naiot**.
- Up to two years – **hiCenter**, Israel.
- “Discovery Zone” in **Rubicon Centre** with Cork Institute of Technology (CIT) in Ireland – 12 week assistance on business idea formulation and its feasibility study, then up to 2 years 8 months incubation (**Rubicon Centre**, 2011 and Avotiņš, 2011).

Services rendered:
- Coaching and management training;
- business evaluation; seed, bridge, venture capital financing and business angel network;
- technology market intelligence, technology services (troubleshooting, applied research, testing, certification);
- premises and infrastructure and support services; may include free or subsidized office space;
- part-time or full time management involvement in management board or chairman position; includes contact building and gaining access to financial, technological and commercial networks;
- IPR counseling and strategy; contract research; and other advisory services.

Number of TIs:
- Technology Incubator Development Programme (**Yrke**) 2003-2007 in Finland included 12 regional technology incubators (Sitra, 2011).
- In Israel, there are 26 government-financed business incubators (**HiCenter**, 2011).
- Avotiņš and Sosārs suggest that if public financing is granted to TI creation in Latvia, two incubators should be supported. That would naturally increase competition for viable projects, ease comparison of TI operator effectiveness, and reduce risk of industry image failure - if there was only one TI and it failed or was mediocre, the whole technology incubator concept would be compromised. The suggested structure of two TI operating in same marker, however, is unlikely to prove feasible if the TI is located in a small community – in Riga with its approx. 800 thousand inhabitants two TI would enhance competition for potentially profitable projects; in a smaller town like Ventspils two incubators could prove unable to get enough companies for survival.
Accordingly, the number of TI created could be reduced to one in case of a smaller TI location.

1.5. **Tradeoffs and dilemmas**

Technology incubators have different approach to service provision, geographical coverage, financing sources etc. These various conditions can impose limits on TI performance and operations. For example, TI must decide what services are provided in-house and what are bought from outside.

It is reasonable to have in-house competence in areas where active and regular involvement is required. What is more, narrow, specific competences may be retained provided there is enough workload. *Naiot* (Israel) TI, for example, had an analyst with MD degree, a biological analyst, a regulation advisor, and in intellectual property advisor on the payroll. Employment of so specific personnel can be explained by the industry focus – medical devices require both understanding of technical aspects of new product ideas (analysts with medical background) and comprehension of the regulatory framework (patents, licensing, clinical trials, product compliance, centralized purchases etc.).

1.6. **TI policies, operations, financials, and services**

1.6.1. **Provision of financing**

Equity and debt financing are two obvious sources of funding for new enterprises. However, their role is perhaps overstated – for example, Gullander and Napier (2003, 15) cite a research indicating that only 1-4% of all new start-up firms in Sweden and Norway receive risk capital. Business incubators – both traditional and especially “new economy” – also serve as islands of new equity financing. For example, in Zemgale region in Latvia, approximately 50 companies were admitted to the regional business incubators. Not less than three of them have obtained new equity after joining the incubator and another three are fundraising now. Such figures, although not statistically representative, prove that incubator companies tend to be active in raising new equity.

TIs serve as partial substitute to business angel investments. Business angels, if they invest as physical persons rather than entities, are subject to unfavorable tax treatment – their capital gains are taxed whereas their written-off investments do not provide tax shield (Gullander and Napier, 2003, 9). Hence, a legal entity providing start-up financing is in superior position – its losses on nonperforming investments at least reduce total tax basis.

1.6.2. **Management**

TIs provide strategic advice and hands-on management. For example, *Naiot* (Stoffman, 2005) lists, inter alia, these services:

- R&D monitoring
- Product definition and development
- Intellectual property strategy
- Defining regulation path (i.e., bringing new products to the market in highly regulated industry of medical devices)
- Market intelligence
- Executive mentoring.
2. **Overview of the region**

2.1. **New technology businesses in Kurzeme region**

According to *Ventspils high technology park* (VATP), its technology park currently hosts 11 enterprises, and its business incubator has 34 companies in Ventspils and another nine in Talsi. Interestingly, VATP has pioneering pre-seed incubation in Latvia – its “pirmsinkubators” or pre-incubator provides advice and premises for initial business idea formulation. Pre incubation services are provided free of charge both to private persons and to new companies, and they include equipped work places, access to meeting rooms and office equipment, mentoring, networking and business advice.

2.2. **New technology businesses in Latvia**

Riga hosts 38% of all small and medium sized companies in Latvia (Josefin, 2010, 10). In 2009, LIAA (Latvian Investment and development agency) contracted a market research on creation of new products in Latvian enterprises. The research was carried out by SKDS from November 2009 to February 2010 via 300 phone interviews. 55% were manufacturing, 17% - service and 21% - trade companies. More than half respondents claimed to export at least half their sales. The main findings were (see LIAA, 2010 (1) for details):

- Among those companies having made investments in research and development of new products, median annual investment was 50 thousand LVL.
- In 42% of cases, the new products or technologies were protected with the help of patents and trademarks.
- 18% of respondents claimed that lack of scientific research resources in Latvia hindered their development and research efforts. Of these respondents, 63% have sought research cooperation abroad; more than half of those seeking foreign help have agreed on cooperation terms with foreign entities.
- When asked what financial support they would prefer, 33% of respondents chose research grants, 41% chose loans with preferential terms, and 26% could not answer decisively.
- 52% of respondents have in the last five years created and introduced to the market new products (goods or services). Median number of new products created and introduced to the market among those companies which have developed at least one new product is four. Older and larger manufacturing companies with strong exports are most likely to create new products. For comparison, another study in 2009 claims that 23% of companies interviewed had introduced a new or significantly improved product or service in the preceding 12 months (quoted in Josefin, 2010, 14).
- 39% of new product developers have cooperated with local or foreign scientists or research institutions.
- Interestingly, as much as 19% of all respondents planned to submit patent applications within next two years.

Since only 16% of all companies reviewed were less than five years old, this research is more relevant to business in Latvia as such and does not reflect new technology businesses specifically. However, its findings are still relevant because creation of new products (even in older companies) can still be subject to TI (via spin-offs and joint ventures).

According to LIAA, 2010 (2), in European Union on average, 5% of all companies can be considered “gazelles”, while the respective figure for Latvia, Estonia and Lithuania is 3%,
12% and 8%, respectively. A “gazelle” in this context is a company less than five years old with annualized growth over 20%.

In 2007, Latvian Investment and development agency (LIAA) commissioned a research on innovation in Latvian SMEs. The findings were not promising in light of the TI idea – companies had little interest in research cooperation and research delegation to external parties; new product development on average took 5-6 months, which indirectly reflects the relatively low level of innovation – radically new products and technologies can not be developed so quickly; only 30% of surveyed companies could be considered innovative according to the survey criteria.

2.3. Deal flow

2.3.1. From academia locally

From January to March 2011, 81 Ph.D. degrees were awarded in Latvia. The figures for whole 2010 and 2009 are 176 and 135, respectively (Latvijas Jauno zinātnieku apvienība, 2011). Only a fraction of the new doctors are likely to develop new products relevant for the TI and be interested in the services of such support structure. For example, of the 176 persons being awarded Ph.D. in 2010, only five got Dr.chem., eight got Dr.phys., five - Dr.sc.comp., and 34 - Dr.sc.ing (ibid).

Presence of technology incubators and other support systems, it is argued, is only valuable if there is knowledge that can be turned into actual products and services. Or, as Hautamaki (2010, 57) puts it, “these financing and intermediary organizations might be important, but, nevertheless, economic success results from the creation of know-how and the universities maintaining it”. In light of that, the interrelation between a TI and a nearby research community is essential.

If a TI was created in Riga, its Technical University is the most appropriate counterparty due to its size and scope of applied research. Riga Technical University had 15 thousand students, 764 tutoring staff, and 152 patent applications in 2010. TI in Riga should be closely linked to the technical university either via resource sharing agreements, joint venture or as its subsidiary. Outside Riga, Ventspils with its University College (faculty of Information Technologies) and city council’s capability to finance such projects is a reasonable candidate. Alternatively, Jelgava with its Agricultural University (training and research areas include ICT, forestry, agriculture, food, and engineering) and proximity to Riga can be considered.

In considering the link between business support services and academia, St.John’s Innovation Centre in Cambridge, UK can serve as an example. They provide accommodation, management-related training and consulting; the Centre helps companies attract financing, however, do not issue grants, loans or purchase equity directly. At the end of 2002, 50 companies were supported by the Centre and demonstrated considerably higher survival rates compared to similar businesses without the support (St.Johns Innovation Centre – About, 2011).

2.3.2. From companies abroad

Riga is the largest city in the Baltics, located favorably in terms of proximity to Estonia and Lithuania, commercial air service, and general language proficiency of the population. Accordingly, numerous foreign companies have chosen to establish their regional offices in Riga. Foreign direct investment, according to Lursoft, from 1991 to April 2011 has amounted to 4,011 billion LVL of which 3,147 billion were invested in Riga; Ventspils is a distant third with 134 million LVL FDI. Of all 616 foreign enterprises which have established their offices in Latvia, 529 have been registered in Riga.
2.3.3. Latvian entrepreneurs and scientists returning to home country

According to Hautamaki (2010, 46), foreign degree students comprised 31% of all university students in US, 14% in Great Britain, 13% in Germany, 12% in France; and 2.7% in Finland. Statistics show that of 112 thousand students in Latvia in 2009/2010, only 1760 (i.e., 1.6%) were foreigners. As pointed out, low international exchange makes it hard to raise the standards of universities. Accordingly, brain drain takes place – smart students and researchers go abroad.

Hautamaki (2010, 45) points out that, for example in UC Berkeley (California), 17% of all post-graduate students were foreigners. In comparison, only 9% of post-graduate students in the University of Helsinki were from abroad.

If sufficient conditions for entrepreneurship in technology-intensive areas are created, it is reasonable to assume that some of the Latvians having studied or done research abroad would return to their home country. The effects of “brain drain” would thereby be diminished.

According to Avotiņš, four years ago an estimated 800 Latvian students were getting higher education in Berlin alone.

Grēns (2011) estimates that approximately one hundred young Latvian scientists had returned from studies abroad to work in Latvia in recent years; he fears, termination of public funded research grants after 2013 would make those one hundred scientists leave Latvia for good.

2.3.4. From Latvia to Estonia

No estimates of number of Latvian entrepreneurs of companies moving their activities to Estonia are available. Yet, several advantages of Estonia for early stage enterprises are evident – there, corporate income tax is 0% on re-invested profits (Tartu Science Park, 2011). According to typical company lifecycle, initially expenses exceed revenue; hence, no profit is earned early on. Hence, the preferential corporate income tax treatment in Estonia is of limited benefit to technology start-ups. However, other aspects of the entrepreneurship support structure may facilitate high-tech deal flow from Latvia to Tartu or to Estonia in general. The benefits include:

- Supposedly less red tape. In the widely quoted Doing Business index (2010), Estonia is well above Latvia on such rankings as “Starting a Business” (37th vs. 53rd) and “Trading Across Borders” (4th vs. 16th). Interestingly, Latvia fares better on “Getting Credit” (6th vs. 32nd).
- According to Eurostat (2011), 1986 researchers were employed in business enterprise sector in Estonia in 2008. In Latvia, although the total number of researchers was higher, only 759 were reported to work in the business enterprise sector. Accordingly, access of business to researchers is easier in Estonia.
- In Estonia, 0.51% of the population aged 20-29 were doctorate students in science and technology fields (Eurostat data). In Latvia, the respective figure was only 0.17%.
2.4. **Pre-seed company support in Kurzeme region**

Early stage company support in Kurzeme region is provided by two business incubators (Ventspils and Liepāja) and Ventspils Augsto tehnoloģiju parks (VATP, high tech park). The incubators are two of the nine regional business incubators created in 2009 and financed by European Regional development fund (ERDF). Like the business incubators in Latvia, VATP in Ventspils and Kurzeme business incubator in Liepāja helps companies and their founders not only after the companies are established but also in pre-seed stage, providing advice, premises or subsidized access to services. However, the setup of the regional business incubator program and its reporting metrics suppose that the incubators should host companies showing revenue growth, creating jobs and paying taxes. In pre-seed stage, such performance is untypical, which reduces the capability of incubators to support ideas before they have shown economic potential.

2.5. **Pre-seed company support in Latvia – private initiatives**

To remedy current weaknesses of the start-up financing scene (lack of joint investment culture among business angels, low investment readiness, low number of appropriate technology-intensive, high growth potential ideas), a few private initiatives have appeared recently.

*Labaca* (Latvian American Business Association of California, [www.labaca.org](http://www.labaca.org)) is a business angel network, with representative office in Silicon Valley, screening business plans and mentoring in capital attraction.

*OpenCoffee Club Riga* does informal meetings for networking, provides training in capital attraction and technology start-up management (*OpenCoffee*, 2011).

*Jauno uzņēmēju centrs* (Young Entrepreneur Centre) is a free of charge business consulting to young would-be entrepreneurs. The program is based on a similar activity in Sweden (*Jobs&Society*). According to the Sweden experience, after the consulting is done, one third of members decide not to pursue entrepreneurship, a third establish a new company immediately and another third – establish their companies some time later (*Kārkliņa*, 2010).

*Nordea business school* offered free of charge training, coaching and mentoring. Unlike other pre-seed company support, *Nordea* school also targets relatively simple business ideas and does not require project novelty (ibid.).

*Imprimatur* seed capital fund provides convertible loans of up to EUR 100 thousand. The fund is highly selective (investing in /lending to five projects out of 100 reviewed is close to the current selection rate, according to its investment manager Jānis Janevics, as quoted by Velde, 2011). *Imprimatur* does not substitute for the lack of a dedicated technology incubator in Latvia because the fund only invests in projects with initial prototype and/or first clients, whereas the purpose of TI includes creating the first prototypes and/or gathering market intelligence.

*Ideju kauss* – (Idea cup) is a business plan competition organized annually.

*Commercialization Reactor* is organized by Latvian Investment and Development agency and does match making between technology projects of foreign origin and local financiers.
2.6. **Pre-seed company support in Tartu region**

In Tartu region, early stage company support is provided by Tartu Science Park (TSP) and the local branch of Enterprise Estonia. TSP was founded in 1992 and is linked to University of Tartu (UT). More than half of Estonia’s R&D is carried out in UT. Currently 15 technology companies are incubated at TSP (Tartu Science Park, 2011).

Enterprise Estonia is established in Tallinn with offices in Tartu and Johvi. The organization administers financial and informational support to new ventures in Estonia.

2.7. **Demand for and supply of TI and support in Kurzeme region**

Riga is the largest city of the three Baltic states, and technology companies tend to establish themselves in Riga where labor pool, infrastructure, and access to financing are most favorable. However, such trends as IT services outsourcing, virtual workplaces, ad hoc product development teams, and emergence of regional business support structures enhances new business creation outside the capital. What is more, certain state support programs provide more favorable terms for projects being implemented in rural areas and/or less developed regions. The subjective view of the author of this study is that each regional business incubator (there are two in Kurzeme region) currently hosts at least 2-3 companies which could benefit from being served by a technology incubator instead (main contribution of TI being hands-on management, international expertise, intellectual property expertise and access to scientists). Such amount of companies can be considered the minimum critical mass needed to establish a dedicated early stage support facility. Feasibility of a TI in Kurzeme depends on these factors:

- Ability to finance its creation and early operations, including but not limited to local municipality support (e.g. free premises, local tax discounts).
- Level of welfare and supporting services (including residential real estate, schools and hospitals, recreational objects etc) which may facilitate or hinder the move of entrepreneurs from their home city to the TI host.
- Job market and supply of skilled labor in industries related to ICT, engineering, natural sciences.
- Ability to attract new technology projects from abroad. Important parameters include language skills and cultural fit, and potential to develop into a regional centre of excellence in at least one industry (e.g., Space exploration in Ventspils).

2.8. **Demand for and supply of TI and support in Riga**

Ester project team in 2005 estimated a deal flow of 15-20 technology based projects over first two years of TI in Latvia. They suggested that 3-6 companies (projects) would come from pharmaceuticals and biotechnology, 3-4 from medical technologies, 2-4 from information and communication technologies (ICT), 2-4 from new materials and 4-6 from elsewhere.

It is estimated (Avotiņš, 2011) that 10-20% of TI deal flow would come from local students and researchers, 30-40% would originate at local business sector, and the rest would come from abroad.

In contrast, Gullander and Napier (2003, 13) estimated that in Sweden 30-40% of ideas come from the university system, 30-40% from the business sector and the rest from investors. In Latvia the ratio of scientists to general public is lower than in Sweden, hence it is reasonable to assume the scientists’ contribution to TI companies in Latvia would be below 30%.
2.9. Demand for and supply of TI and support in Latvia

The Lisbon agenda suggests 1/3 of total research and development (R&D) should be financed by public funds and 2/3 by private. Average in all EU (EU27), 2,01% of total GDP is spent on R&D; in Latvia, the respective figure for 2009 was only 0,46%; in Estonia it was 1,42%. Of all R&D expenditure in EU27, 54,7% come from industry; in Latvia, only 36,9% of R&D expenses were financed by industry (Eurostat, 2011). The statistics suggest that, first, Latvia spends relatively little on R&D and, second, that private entities provide too small a share of financing for that. Assuming Latvia strives to approach the Lisbon agenda recommendations, action to promote R&D and to enhance industry involvement in its financing should be taken. TI are relevant because they facilitate cooperation of industry and academia and contribute to R&D financing (this already happens in the regional business incubators now – the incubator operators cover up to 85% of applied research project costs and thereby considerably improve the access of start-up companies to research they need).

2.9.1. Demand for equity financing

Establishment of facilities for promoting access to equity financing is identified as one of the tasks to promote new product development and company creation. E.g., business angels or early-stage risk capital funds could be more involved in the operations of existing business incubators; one could set an informal monetary target of equity investments in business incubator companies (e.g., two investments per year totaling 50-100k EUR).

Currently, access to equity financing is insufficient if judging by statistics and comparing to countries where equity financing is better developed - reliance on retained earnings is a notable feature of Latvian companies – in LIAA 2010 (2) survey, 47% of companies interviewed in Latvia relied solely on own financing, whereas in EU on average only 16% of companies denied using any form of external financing. What is more, in two years prior to survey, only 29% Latvian companies have received debt financing, while the average figure for the whole of EU was 45%. It may be speculated that lower activity in external capital attraction was due to bad general economic conditions in Latvia in 2008-2010. It would be therefore an interesting subject of further research to see if capital attraction in 2011 in Latvia is closer to the EU average.

In contrast, Initial Israeli TI program review suggested that 78,7% of all surviving TI companies attracted private investments after they graduated from the TI. This may indicate that TI graduates have higher investment readiness, defined as ability and willingness to attract external funding. To enhance equity financing for early stage ventures, ground rules for business angels should be established to financially participate in TI operations either at general level (cover TI expenses and have equal share in all stockholdings) or in particular projects (seed money in specific TI companies).

2.9.2. Demand for intellectual property protection

Numerous surveys (e.g. LIAA, 2010 (2)) indicate that entrepreneurs in Latvia have concerns about establishing and protecting their intellectual property. Entrepreneurs are afraid of having their intellectual property stolen (e.g., breach of patent). Accordingly, expertise in intellectual property protection (IPR) is likely to be a valuable feature of the technology incubator. IPR in this case shall include both IP strategy formulation, patent application advisory, and strong legal support in case of IP rights breach.
2.10. Demand for and supply of TI and support in Estonia

Tartu Science Park companies were recently surveyed about investment attraction. One question asked to indicate what share of their company they would be willing to give to an investor. Of all 24 responses, 10 were “none to 10%”, 11 said 11-33% and only 3 accepted 34-51% share dilution and none chose the >51% option (Tamm, 2011).

Illing (2011) admits that, predictably, Estonian start-up companies are reluctant to issue new equity and they rather bootstrap or take loans. Interestingly, he also points out that generally better companies (i.e. companies with superior product or management) are also more likely to understand and accept the idea of share dilution. As venues for attracting equity he mentions Seed Camp, Springboard.com, and TechStars.

According to Illing (2001), in 2006-2008 Tartu Science Park had considered creating its own investment vehicle. Creation of a small (less than EUR 1 million) seed fund was analyzed, however, the science park decided not to pursue it. Although the potential benefits were clear (reducing the funding gap below EUR 30-50 thousand, increasing the attraction of the science park), the risks outweighed them. Main arguments against creating an in-house investment arm were:

- No regional diversification; early stage of product development being financed and small portfolio would create large risk of losing the investments.
- Portfolio creation and management costs would be prohibitively high.
- The Science park would not be able to make follow-up investments and therefore would risk strong dilution of its ownership stake and could not help portfolio companies in need of expansion capita.

2.11. TI market potential

The market potential in Estonia can be considered by looking at the earlier activities and their results. Ambient Sound Investments (www.asi.ee), an asset management company established by former employees of Skype have not only made portfolio investments in ICT companies but also nurtured and developed several technology ideas in-house. As of May 2011, ASI has three portfolio companies undergoing business incubation. According to Indrek Jasska, ASI Investment Manager, the technology incubation of such type has not proven clearly successful. Jaaska points out that matching ideas with managers is difficult and does not generally yield the same commitment as when they (the ideas) are implemented by their authors. Put differently, ideas develop better when they are run by their authors rather than by paid managers. What is more, ASI prefers to invest in established companies with formulated business plan, some product and core team in place. Business incubation, in contrast, generally deals with earlier stage ventures and as such entails risks that investors prefer to avoid. As to suitability of Estonia for technology incubation, Jaaska stresses that TI is more feasible in areas with high concentration of new technology projects, e.g. hubs in Eastern Asia. Establishment of a technology incubator in Estonia is not justified by the market size, and investors prefer to work directly with attractive projects instead.

The market potential across Latvia and Estonia has the simple implications of different intensity of economic activity (Riga vs. Tallinn, Tartu, Parnu). Due to raw size, it is easier to establish deal flow in Riga.

The impact of Sweden and Finland on the start-up scene in Estonia can be said to be reflected in innovation culture, usage of English as main business language for new technology projects, focus on exports, and relatively efficient support structure.

In Latvia it can be speculated that the impact of Russian language, business practices and business links (oil cargo transit corridor) is more visible. Among all EU countries, Latvia
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excels at knowledge of first foreign language – Eurostat statistics suggest that as much as 54.7% of those surveyed in Latvia spoke fluent Russian and another 24.7% spoke good Russian. Activities aimed at attraction of Russian-speaking inventions, scientists and investors to the start-up market of Latvia are becoming more prominent. 4th Commercialization Reactor will take place on 31 May to 2 June 2011. The matchmaking event facilitates cross-border cooperation between scientists, entrepreneurs and financiers. The crucial role of Russian language is reflected in the fact that technology presentations have Russian as working language. One can conclude that attracting ideas from other former Soviet Union countries is a direction where Latvia can excel and gain market traction in the field of early stage technology-intensive projects. Issuance of EU residency permits on the basis of investments in a Latvia-registered company is another tool how financing of start-ups can be facilitated. As a suggestion for further research, the question of EU-membership and local legislation impact on foreign capital investment in Latvian companies can be considered.

2.12. Sustainability of TI intervention

Entrepreneurs are rational, they use support as long as it is beneficial for them. The discount (share of EU financing for services rendered) goes down sharply after some duration of incubation in the current LIAA BI program – for example, JIC business incubator tenants in Zemgale pay 15% of full cost in first year of incubation and 45% in the second year (the respective rates for Ventspils business incubator are 15% and 30%). This creates a notable outflow of BI companies soon after the first year of incubation is over. It is suggested (Sosārs) that a technology incubator in Riga should not discount its services; instead, it should make sure that incubator companies get seed money and then help put that money to the best possible use.

Based on interviews, the TI operating budget is estimated EUR 500 thousand per year. Initially the expenses should be covered by operator’s own funds or public support. Gradually, the support would go down as TI companies would mature and their equity capital change hands. It may well take at least two years from business idea formulation to viable exit by, for example, IPO or trade sale. So is it reasonable to assume that at least two years after establishment the TI operator would not financially benefit from its shareholdings. Accordingly, the funds for TI operation should initially be at least EUR 1 million.

2.13. Deal flow generation

To attract viable companies and would-be companies to the technology incubator, the following activities are to be used:

- Networking – informal recommendations from TI company managers.
- Targeted PR (e.g., Naiot organizes annual national Medical device contest). Cooperation with Latvia Investment and Development agency in attracting company founders and scientists from abroad. Participation in forums, conferences, trade shows.
- Relationship with universities. The author of this research stresses the importance of employing all available human capital. In other words, even if the TI was closely linked to one specific research institution (by being its subsidiary or a joint venture, or having particular co-operation terms), the incubator companies should still have full access and similar benefits to using services of other research institutions.
- Relationship with traditional business incubators (traditional business incubators have higher visibility in their regions in Latvia; BI could direct feasible business ideas to the TI).
3. Pre-seed business support instrument: findings and recommendations

3.1. Market bottlenecks

3.1.1. Lack of trust

Founders are afraid investors will take over. Investors are afraid the companies will run double accounting or fail altogether. Reluctance to accept joint ownership was also noted in Ministry of Economics commissioned research on external financing availability to SMEs in Latvia (Par ārējā finansējuma pieejamību maziem un vidējiem komersantiem Latvijā, Rīga, 2006). The survey not only emphasized that entrepreneurs in Latvia feel uncomfortable about giving away a share of their company but also that they are rather poorly educated in corporate governance and shareholder relations. Solution: develop investment readiness. Educate would-be entrepreneurs about company financing principles and considerations. Share success stories when equity attraction has lead to superior company performance and gains.

3.1.2. Market too small for technology projects

No or small home market and small number of pilot customers in the region (Elsila, 2005). Projects move where customers are (e.g. California, Boston area, UK, Germany). Solution: focus on technologies, products and services with strong local or regional demand. Consider the incubation of not only what is traditionally considered high technology (e.g. ICT, pharmaceuticals, electrical engineering) but also what is relevant for Latvia and where Latvia is internationally competitive (e.g. forestry products, new agricultural products, renewable energy).

3.1.3. Lack of exit options

First North is part of NASDAQ OMX stock exchange with focus on small growth companies in the Baltic region. As of April 2011, in the First North trading list the whole three Baltic states are represented by only one company – GoldInvest Asset Management and no trades have taken place until April 2 (NASDAQ OMX FirstNorth). This lack of active public equity markets reduces the scope of available exit routes for next stage financiers (venture capital funds etc.) which in turn reduces their willingness to invest and is likely to lower company valuations. The importance of exit options and role of secondary equity markets was already pointed out in ESTER project presentation (Modena, Avotins, 2005).

Scientists are forced to work on project basis and generally can not afford devoting themselves to longer term applied research. Put differently, scientists have to spend time and effort applying for research grants and financial support for their new product/technology development projects. Requirements and administrative burden of such financing hinders innovation and may prohibit scientists from always pursuing their research interests. The reason for the project-based orientation is the general lack of permanent, long term secure research funding in Latvia (Borzovs, 2011).
3.2. **Cross border cooperation bottlenecks and potential**

The purpose of this study has also been to investigate the possible co-operation between Latvia and Estonia and to consider implications for technology incubation. It must be concluded that several aspects hinder the cross border (and also cross-generation) co-operation potential:

- Language barrier (older people tend to be better at Russian than at English, younger people haven’t learnt Russian).
- Similar cost of running business in both countries means there is little point of outsourcing or setting up subsidiaries (e.g., Latvian IT firms employ Ukrainians rather than Estonians).
- Cross border cooperation likely in industries which are similar or standardized (e.g. energy). Notable energy sources in Latvia and Estonia are different and geographically specific despite the geographical proximity (hydro power in Latvia, mineral resources in Estonia), hence less knowledge transfer can take place in the industry.

3.3. **Implementation plan**

To establish the TI, the following actions are relevant:

- Risk capital investment vehicles need deal flow; accordingly, they may provide consultations to incubator companies for free. In case of conflicts of interest, business incubator representatives should act as sell side advisors.
- Create a list of research institutions in Latvia with their actual contact persons and typical pricing of research appointments (if that is possible). That way, help incubator companies estimate their development budgets better.
- Employ project managers who work typically part time on each project. Their remuneration is base salary (competitive, not excessive) and performance bonus (% of EBIT, % of net profit or % of company value in liquidity event).

3.4. **TI design and features**

A three stage technology incubation has been suggested. Such setup helps distinguish insufficiently good business projects before much money and time is spent for their benefit.

3.4.1. **Pre-seed**

In this stage, the incubator provides facilities where business idea authors could talk freely, learn about entrepreneurship and shape their ideas.

The objectives are to:

- Build creative environment.
- Encourage would-be entrepreneurs freely contemplate on their business ideas.
- Help formulate business ideas.

TI contribution at this stage is:

- Premises (accommodation).
- Networking events and coaching.

Objectives of this stage are:

- Understand whether the business idea is worth further investigation.
- Filter unfeasible business ideas.
3.4.2. **Pre-incubation**

Expert views differ on the duration of this stage. Sosārs (PC, 2011) suggests 2-3 months is reasonable time frame for creating business plan, carrying out initial market research, and attracting money for further operations. Gullander and Napier (2003, 14) inform that in Sweden pre-incubation takes on average five months.

Pre-incubation should entail:

- Setting up management team.
- Formulating business idea and its main features (unique selling proposition).
- Drafting a business plan.

TI contribution at this stage is:

- Facilities and tools for productive planning; the total floor area needed for 6-10 incubator companies and several pre-incubator teams is approximately 1000m² and would include offices, open space workplaces, meeting rooms and a place for socializing, e.g., a kitchen.
- Coaching (TI project manager involved on part time basis, e.g., 16h per month).
- Providing financial means so that business idea authors could afford to spend several months for planning and fundraising; grant could be as high as average monthly income prior to joining the incubator; according to Avotiņš, up to 3000EUR/month scholarship for up to 6 months is available for business idea investigation in Italy, Umbria region; the incubator company management team should have no other work commitments during pre-incubation.

Objectives of this stage are:

- Get seed money.
- Create management team.
- Find fit between idea authors at TI project manager.

3.4.3. **Incubation**

Gullander and Napier (2003, 14) suggest companies may stay in a business incubator for 1-2 years. Current state aid program for regional business incubator prescribes maximum incubation period of four years (Biznesa inkubatori, LIAA, 2011); however, the support to incubator companies drops notably each year making incubation longer than two years unlikely to be attractive. TI operator shall set milestones and provide further support only when they are met. As a rough guide, identifying the first customers in 6 months and getting first revenue within 12 months since acceptance to the incubator may be reasonable deadlines.

Incubation stage shall include:

- Product development, including applied research, prototyping and testing.
- Market acceptance testing.
- First sales.

TI contribution at this stage is:

- Manufacturing, office or laboratory premises.
- Provision (directly or by contractors) of product development services.
- Provision of intellectual property consulting.
- Human resources consulting and headhunting.
- Hands-on management (TI project manager in board member, CFO or CEO position with at least 40h/month involvement).
- Executives in residence – skilled, experienced business owners and managers who are involved for specific tasks and work with BI companies or advisory capacity or as part-time executives (Chief Technology Officer, Chief Financial Officer, Chief Strategist etc.).
- Networking and internationalization services. This service may imply setting up offices or partnerships abroad for supporting TI companies in their main export markets (e.g., setting up Silicon Valley and London offices).

Objectives of this stage are:
• Getting the company to operational profitability.
• Preparing the company for next financing round.

3.4.4. **TI financing**

TI budget per year has been estimated at up to 700 thousand EUR depending on size and services rendered (Sosārs), with the lower boundary being around EUR 500 thousand. Until portfolio of TI shareholdings has been accumulated, the budget shall be financed from founders’ investments. If TI is run by state institution (e.g., LIAA), the financing can come from state budget or from a public support like ERDF. If TI is run and owned privately, its expenses can be covered from share capital contributions, consulting fees or membership contributions (e.g., business angels financing TI companies also cover part of the management costs).

In later years, TI operations can be financed from capital gains earned by selling TI company shares. Sosārs suggests TI operator would own 10-15% of TI company share capital and in addition, the TI project manager who is involved in company operations would personally obtain a share option or straight equity of about 5%.

So far, it has been forbidden to use public grant money to purchase shares of private enterprises or get them in exchange for services rendered. Put differently, the existing business incubators are not permitted to obtain an ownership stake in incubator companies. If such limitations last and TI are operated with public support, the TI will have to find other ways of getting compensated apart from the prospective capital gains. Deputy Secretary of State of the Ministry of Economics Liepiņš (2011) pointed out that publicly financed business support structures are likely to be created in 2012-2013 with estimated funds up to 14 million EUR and that it was not clear whether publicly financed TI will be permitted to become company shareholders.

3.4.5. **Financing of incubator companies**

Sosārs emphasizes that pre-incubation stage should result in successful fundraising. If the company instead had to bootstrap, its feasibility and survival chances would go down sharply. Sosārs goes as far as to suggest that TI should not incubate companies that can not prove they have financial means for the early stage (product development, taking to market). Funding secured prior to full-scope incubation should be in the order of magnitude of EUR 50 thousand.

Co-investment grants are suggested (Sosārs) as another type of financing for TI companies. If private investors (founders, individual business angels or their groups, start-up capital fund etc.) contribute funds for incubation stage, public grant of certain proportion would also be provided. For example, a EUR 15 thousand public grant would follow EUR 30 thousand business angel investment.

Expert views differ on who should provide services to TI companies and how much should they cost. Sosārs suggests TI companies should pay market rate for all services except for hands-on management involvement of TI project managers. Another approach would be to partly cover the cost of services rendered.
4. Conclusions

Technology incubators entail and provide services and tools which are generally beneficial to new companies with technology products or services. Both in Latvia and Estonia there are business support structures and instruments, both subsidized and at market rates whose design and operations are at least in some aspects similar to those provided by TI. Specifically, there are regional business incubators in Latvia that also admit new technology projects and provide them with technology advice, easier access to debt or equity financing, access to grants and subsidies, and physical premises. There are business plan competitions and international matchmaking events, a seed capital fund providing convertible debt for early stage financing, and carrying out mentoring and training. Business angel networks are being created. However, each of the existing support structures has its own weak spots. Business incubator operators have different objectives and benchmarks than those of entrepreneurs; the seed capital fund has little competition and invests in few projects; competitions and matchmaking events are bureaucratic and therefore discourage some applicants; training and mentoring is done on voluntary basis and the mentors cannot afford being much involved in each project management.

Creation of two technology incubators in Riga has been suggested. Interviews and desk research identified most important features of such entities:

- Commercial focus and profit orientation.
- Simplicity, speed and little red tape (the current state of affairs where scientists spend much of their time writing project applications and reports to get funding was pointed out as a bad example).
- Fostering openness, courage, initiative and sharing.
- Strong international presence (local technology companies move abroad, closer to their markets; if a technology incubator has representation or valuable contacts abroad, the company can feasibly operate from Latvia).

Importantly, links with research community shall be enhanced – either by setting up the TI as a joint venture or subsidiary of Riga Technical University or University of Latvia or by having cooperation agreements and focus on scientists having ideas with business potential.

Alternatively, creation of TI outside Riga, specifically, in Ventspils has been suggested. Arguments for such option are strong current business support services rendered by the regional business incubator and high tech park there, possible municipal support and links with the University College.

Regardless of the path chosen, idea import is crucial – local sources of technology intensive ideas and capabilities to have those ideas materialized are limited. Latvia lags behind on commercialization of inventions and on applied research activity.

In Estonia, not one TI exists. Several institutions partly substitute for lack of full-scale TI. Ambient Sound Investment provides high level of management support to its three incubator companies. Yet it has no direct links to the academia and does not have the scope of a TI (only 3 companies as opposed to 6-20). The existing support structures like Tartu Science Park incubate technology companies and provide them with facilities and technical services. They do not get involved in company management and do not directly provide early stage financing. There is no definite answer whether creation of one or several TI in Estonia is feasible.
Appendix - interviews

Objective and topics
Make sure terms are understood the same (definition of start-up, business incubator, technology incubator etc.).
Verify facts (quantification of the supply and demand side – number of companies, number of entrepreneurs, number of spin-offs, budgets, burn rates, survival rates, industry and geographical division etc.).
Learn best practices.
Learn current bottlenecks and systemic weaknesses.
Estimate prospective demand for a technology incubator.
Compile a list of incubator services.

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