

THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

# Where Does High-Tech Become a Business?

About the Importance of Space for Supporting Knowledge Processes at  
University Business Incubators.

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Göteborg, Sweden 2004

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## ABSTRACT

Major public investments are being made today to support business development, especially those that are anticipated to germinate from advanced technological competence development associated with universities and their interacting business environments. University business incubators are an important component in this effort. They are environments especially designed to support the generation of business developed in research and education. In West Sweden eight business incubators with university connections are being developed. The first one was the incubator at Chalmers University of Technology, Chalmers Innovation that today has grown to become a recognised business incubator.

This licentiate thesis reports from an investigation of Chalmers Innovation. The investigation is a first stage of research of incubator activity in West Sweden financed by Formas as part of their key action area 'The construction client with the customer in focus'.

The objective of this thesis is to see how the opportunities and problems facing the technological entrepreneurs with regard to establishing themselves in the business sphere can contribute to experience and improvement in the management of the incubator, the construction process and to the concept of developing enterprise at a university. The research question is how and where the intensive knowledge process - the meeting between technological development work and enterprise/business knowledge - takes place. The method used is a case studie using concepts that focus on different stages of this generative knowledge process that takes place in different spaces.

The findings of this first case study - that will be compared with and developed by more cases in the next stage - indicate that the new entrepreneurs need more varied business environments and more support to be able to take place in different business networks in order to grow and be able to drive a generative knowledge process on their own.

There are many instances that may be able to utilise this work. The investigation of the business incubator at Chalmers can firstly provide increased knowledge for those responsible for the everyday work at the incubator, i.e. business developers and service staff. It may also be of interest to the participants in the regional network known as *Incubator Competence*, where all business incubators that are in the process of being established are included. Regarding the latter this work can function as a basis for development programmes and briefs. More generally, it can be of importance for those managing and building properties associated with the establishment of new enterprise and similar activities.

For those actors working with regional development and planning, this work can illustrate important aspects to draw attention to in the task of developing environments for business. If regional development is to be economically and socially sustainable, the construction clients and the facility managers should be considered as part of the work of building up an innovation system. In this

role they shall not only provide adequate buildings and service structures, but also generate environments able to serve as an arena for economic, cultural and social business networks, and that are able to adapt to change with the development of the business and the community. For this purpose more work is needed to get more knowledge of how space is a resource in creating new businesses.

**Keywords:** *University Business Incubators, Facilitating Space, Technological Innovations, Entrepreneurial Development, Knowledge Processes*

## List of publications

This thesis consists of a covering paper and three papers and an investigation in Swedish. The investigation in Swedish, is printed as a separate report and will in the covering paper be referred to as the investigation. The papers are referred to by the numbers presented here:

### Paper 1

Birgersson, L. and Strid, M., 2002, *Spatial Aspects of the University Incubator*. Published in the Proceedings of the 2<sup>nd</sup> International Postgraduate Research Conference in the Built and Human Environment 11 – 12 April 2002, , pp 671 - 679, ISBN 1 900491 70 2, University of Salford and Blackwell Publishing, Salford.

### Paper 2

Strid, M. and Birgersson, L., 2003, *Facilitating Business Incubators as a Place– the case of Chalmers innovation Stena*. Published in the Proceedings of the Euro FM International Symposium “Innovative Workplaces” 14-17 May 2003, pp R3.2/ 1-12, Rotterdam.

### Paper 3

Strid, M and Birgersson, L., 2003, *Studying University Business Incubators as a Place – The Case of Chalmers Innovation Stena*. Published in the Proceedings of the 3<sup>rd</sup> International Postgraduate Research Conference in the Built and Human Environment 3 – 4 April 2003, ESAI, Lisbon, Portugal, pp 195-205, ISBN 1 900491 915, University of Salford and Blackwell Publishing, Salford.

### The Investigation

Strid, M., 2004, *En undersökning av mötet mellan tekniskt kunnande och affärskunskap i Chalmers Innovation*.

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I have carried out my work as a Ph.D.-student at the Department of Space and process at the School of Architecture, Chalmers University of Technology.

There are several people that have helped the realization of this work. First of all Lisbeth Birgersson, Ass.Professor, my tutor and colleague, thank you for your brilliant ability to supervise, I'm honoured to be your apprentice. I would also like to thank Inga Malmqvist, Ph.D. and Göran Lindahl, Ph.D. for the valuable comments you gave at the two different seminars. To the rest of my colleagues; you make everyday special, at the coffee table as well as at seminars.

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Marie Strid,  
Mölnlycke, March 2004.

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*“You have to take risks, he said. We will only understand the miracle of life fully when we allow the unexpected to happen.*

*Every day, God gives us the sun – and also one moment in which we have the ability to change everything that makes us unhappy. Every day, we try to pretend that we haven’t perceived that moment, that it doesn’t exist – that today is the same as yesterday and will be the same as tomorrow. But if people really pay attention to their everyday lives, they will discover that magic moment. It may arrive in the instant when we are doing something mundane, like putting our frontdoor key in the lock; it may lie hidden in the quiet that follows the lunch hour or in the thousand and one things that all seem the same to us. But that moment exists – a moment when all the power of the stars becomes a part of us and enables us to perform miracles.” ....*

*Paulo Coelho (1994, p.8)*

*By the River Piedra I Sat Down and Wept*

# 1. Introduction

This licentiate study focuses on university business incubators, by which universities attempt to get technological ideas transformed into businesses. In the study it is investigated how and where such a knowledge transfer takes place. The place I have studied is the business incubator associated with the Chalmers University of Technology known as Chalmers Innovation. This in turn is part of the regional network that has been set up to increase the level of competence among those working with such incubators in West Sweden.

I view the activity of the business incubator as a knowledge process and pose the question how this is related to the space constructed to accommodate this activity. With this work my aim is to contribute to clarifying the image of the incubator activity, and how construction and management of the built environment can support this type of activity.

The task has been carried out partly by writing three papers that were presented at international conferences, and partly by carrying out and presenting an investigation of the business incubator. The purpose of this main document, even referred to as 'the covering paper', is to place the investigation and the papers in a single context and explain how I have worked.

**The first paper** was written with the purpose of acquiring a historical background to the university incubator. An important source in this context was literature about Silicon Valley, a district that has become a model for an innovative region, and where the university sector has had major importance. Work with this first paper provided me with some fundamental perspectives and concepts, as well as leading to those issues that were important. This helped me to begin framing the problems and provide a focus for the investigation of the incubator. The activity in the incubator is described in the paper as a linear process comprised of three phases in between entrance from the sphere of the university to the exit leading into the business sphere.

**The second paper** is based on the initial interviews and the results these provided. The focus is on the incubator at Chalmers. The paper provides a background to how the incubator at Chalmers evolved and functions. The objective was to test if the interviews could illustrate two perspectives: knowledge about how space for action is produced and knowledge about how the same space is utilised.

The interviews focused on what way the facilitators support the prospective businesses in the process, and how some of the entrepreneurs utilise this support. The interview material was processed in connection with me writing the paper together with my supervisor. The first linear model of how technological ideas are shaped to businesses in the incubator is further developed.

Regarding **the third paper**, no additional empirical material has been added. This focuses on the conceptual development by means of introducing the so-

called SECI-model (Nonaka & Takeuchi 1995, Nonaka & Konno 1998). This model focuses on how especially tacit knowledge, knowledge embedded in praxis, is transmitted within organisations. The choice of this model is motivated by the material generated from the first round of interviews, and what became clarified during the production of the second paper.

**The investigation**, written in Swedish, presents the interviews I carried out with the entrepreneurs and facilitators at Chalmers Innovation.<sup>1</sup> Apart from the findings from these interviews, it provides a background to the business incubators linked to the universities. This investigation is intended to function as a document in its own right in the same manner as the papers being independent units. It therefore contains a short presentation of how the research work was carried out.

## 1.1 Objective

The objective of this thesis is to see how the opportunities and problems facing the technological entrepreneurs with regard to establishing themselves in the business sphere can contribute to experience and improvement in the management of the incubator, the construction process and to the concept of developing enterprise at a university.

There are many instances that may be able to utilise this work. The investigation of the business incubator can firstly provide increased knowledge for those responsible for the everyday work at the incubator, i.e. business developers and service staff. They may also be of interest to the participants in the regional network known as *Incubator Competence*, where also those business incubators that are in the process of being established are included. Regarding the latter, this work can function as a basis for a programme.

For those actors working with regional development and planning, this work can illustrate important aspects to draw attention to in the task of developing environments for business. Apart from these, my work can be of importance for those managing and building properties associated with the establishment of new enterprise and similar activities.

A further purpose of this thesis is to present my post-graduate studies. With this licentiate thesis I open up my own research project for discussion, which is intended to be a starting off point for a PhD thesis.

## 1.2 The disposition of the licentiate

The first chapter of 'the covering paper' attempts to place the subject of my thesis in a social and research context. Chapter 2 illustrates how my framework of reference has evolved through my research environment's focus on architecture and enterprise. The same environment has also inspired me to understand the importance of place. The reference framework around the

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<sup>1</sup> *A study of the meeting between technological know-how and business knowledge at Chalmers Innovation.*

university incubator has been developed with the aid of research on entrepreneurship, which the second section in the chapter demonstrates. Chapter 3 is about methods. This is then followed by chapter 4, the findings of my work, which is set out in the summarising of papers and the investigation. The covering paper is concluded by a discussion about the findings, chapter 5, which also presents how I intend to pursue my research work further.

### 1.3 A current social issue

The Swedish government has the ambition that 37 500 new businesses will be set up annually.<sup>2</sup> To create businesses from the best ideas that emerge from research and students' ideas is an ingredient of the confidence placed on developing industry and commerce. Special interest is directed towards the universities of technology where technological ideas are anticipated to provide impulse for new innovations. By innovation in this context is meant "the transformation of knowledge to new products and services or to new processes and new working methods".<sup>3</sup>

The insight as to the importance of the development of knowledge, especially that of technological knowledge, for the creation of new businesses has gradually evolved, and above all during the 1990s meant that the authorities support business incubators as a component within a more overall system for innovation. A clear indication of this is the Swedish Agency for Innovation Systems, VINNOVA, which was founded in January 2001.

In order to achieve social development with sustainable economic growth, according to VINNOVA, a favourable climate for innovation is demanded. The agency states "such a climate is characterised by knowledgeable persons, an entrepreneurial climate in the community and learning by an exchange of knowledge between people and organisations. This demands a goal-oriented policy that supports innovative activity".<sup>4</sup> And further: "An innovation system consists of the network of organisations, people, and regulations within which the creation, diffusion and the innovative exploitation of technology and other knowledge takes place." On a national, sectorial and regional basis, public organisations, universities, businesses and individuals are working today to build up such innovation systems. The Chalmers business incubator, Chalmers Innovation, and the network for Incubator Competence in West Sweden are part of this build up.

Chalmers Innovation constitutes one of the links in what is Chalmers University of Technology's contribution to the region's innovation system. Other links include Chalmers Technology Park and Chalmers School of Entrepreneurship. Developments at Chalmers give a clear indication of what Nilsson & Uhlin (2001, p.17) mean is "a second revolution passing through the entire university world" (my translation). This means that the universities are on the way to "take on a role as the engine for economic development".

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<sup>2</sup> Budgetproposition 2003 ,  
<http://finans.regeringen.se/propositionermm/propositioner/bp03/helhet.htm> 2004-03-03.

<sup>3</sup> Vinnovas homepage : <http://www.vinnova.se> ; 2004-01-12.

<sup>4</sup> <http://www.vinnova.se/innovations/bakgrund.htm>; 2004-01-12.

This has become a part of the *third task* for the universities decided by the Swedish government.

This change has also been described as society transgressing from an industrial to knowledge-based society. The latter implies that knowledge is the most important production factor. Businesses and the university are loosening up the boundaries between each other (Gibbons et al 1994). Besides education and research, the universities are assumed to contribute to the development of business and the surrounding region (Nilsson & Uhlin 2001). They are seen as important components of regional development; partly as a result of their unique technological competence, and partly because ideas from research and students can lead to innovations and new businesses (Jacobsson & Lindholm Dahlstrand 2001). It is especially in the latter case that expectations are placed on the incubator activities associated with the universities.

It is obvious that the university business incubators are given an important role in the current development of society. To study how an incubator functions should therefore be of interest to the community. I also consider it motivated to focus the study of the incubator as a knowledge process. Transmitting knowledge is a decisive activity in a knowledge-based society. Transmitting knowledge demands a meeting place. The question is how such places are on offer in the built environment?

#### **1.4 The focus of my research**

Incubators linked to universities are being studied within several disciplines with various points of departure. Some study how businesses/organisations are born or started, or/and how they are developed or grow. Other researchers study innovation systems and clusters, industrial districts, innovations, social networks and technology transmittance. As if this was not enough, researchers on entrepreneurship also study entrepreneurs from the perspective of individual competence or their way of thinking. Most of these researchers have a point of departure in economic contexts.

Where do I stand in this flow of research? Technological innovations occur and business development takes place somewhere, but a great deal of the research around business incubators take the relationship to place for granted, or touch on it with words indicating some links to a place, for instance such as cluster forming, networks, districts, geographical proximity.

My main interest is specifically how a place supports business development and how business development demands continual spatial change, everything from the adaptation of existing buildings to a gradual transformation of the city structure. The issue is what is it about different places that foster business development? How does the built environment relate to this? What can developers, constructors, managements and urban planners do in order to support business development? How does the built environment interact with the birth of businesses – in the meeting between the spheres of the university and business?

This study focuses on how the core activity – i.e. how the meeting between technological know-how and entrepreneurship – takes place in the room that is provided by the incubator, but also how this relates to other places on the outside. It is the link between the activity and the social and constructed space that interests me. At the focus is the innovative knowledge process, i.e. how knowledge is combined into something novel, and how this novel activity acquires place – in practical terms – in the community.

The incubator is founded on the image that technological ideas/know-how can, with the relevant support, become innovations that businesses can sell as products or services. It is from this image that the present organisations and spatial structures are shaped, and it is also a point of departure for my research. My investigation of Chalmers Innovation attempts to answer the following questions:

1. *How do the facilitators and entrepreneurs respectively view the process of shaping businesses out of technological ideas from the university?*
2. *Where does this knowledge process take place?*
3. *How does the incubator support this knowledge process?*

In a report commissioned by VINNOVA, Nilsson & Uhlin (2001, p.20) are of the opinion that the issue of “how a local/regional analysis can contribute to the understanding of innovative processes” is relevant. To focus on the local/regional perspective, according to these researchers, is an opportunity to understand the innovation process from the importance of both the institutions and what can happen by chance. They mean that the system as a whole cannot be controlled. The ambition must be instead to change out control for the will to influence, i.e. the primary political task being to attempt to influence/foster local/regional innovation processes.

Possibly my research can be a contribution to such a local/regional analysis. In any case, it is an attempt to understand what happens locally and regionally within a part of what is viewed as a regional and national innovation system, that is to say the place where the university carries out a part of its third task.



## 2. Development of the frame of references

The focus of this thesis on place has its origin in research at the unit Space and Process in the School of Architecture at Chalmers. This started off with research on business environments, and has among other things led to research about processes of change, property development with a focus on businesses' core activity and dialogues in the early stages of the design process. A common interest for these different directions is to distinguish between the concepts of *place* and *space*.

The incubator as an entrepreneurial environment, a place for transmitting knowledge and a part of a regional innovation system, belong to his research. This chapter aims to show how my work has started off from research about architecture and enterprise, but also how I have searched through other research fields with connections to the business incubator.

### 2.1 About architecture and enterprise

#### Space and business

The research environment I belong to at the Chalmers School of Architecture is the unit known as Space and Process. Since this unit was formed, at the end of the 1970s<sup>5</sup>, the basic issue dealt with has been how the built environment interacts and can interact with business development. This research tradition is, and has been, closely linked to businesses and their facilities, building actors, facility managers as well as urban planners.

The direction of research has a strong association to the educational activity carried out from the onset by the institution, and which focuses on the needs of small businesses. Issues that the student projects deal with are concrete and relate to the physical environment, such as for example, 'What sort of loading bay does a dairy need?' Parallel with teaching, the unit's research was developed. This has evolved to encompass two different lines of development. One of these works with larger companies and the interaction of the building with the organisation. The other has worked with urban environments for the support of the development of small (micro) enterprise.

The first line of research, workplace environment and space in relationship to organisation, has provided two main findings. The first is the importance of focusing on the entire working environment and not just the space as a symbol and function, which the traditional architect role works with. This has meant that the researchers have studied how people and objects actually relate to each other in everyday praxis and make space as a usable place. In order that the knowledge about the utility of the environment can be expressed, those persons participating in praxis have to be involved. The other finding from this line of research has shown how organisational changes result in spatial changes, but

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<sup>5</sup> From the start this unit was called the Department of Industrial Architecture and Planning with Joen Sachs as the professor in charge. During the mid-1990s, the name was changed to Space for Work, which during a later reorganisation was changed to Space and Process.

also the opposite, how spatial changes give rise to changes in the organisation (Granath 1991, Rehal 1997, Lindahl 2001).

The second line of research, which has often focused on the situation of the small business in different and often older industrial zones, brought about increased knowledge about other aspects. The first is that there are contrasting images of these areas, one from the outside and another from the inside. The planners tend to regard them from the outside, while the businesses express different notions from the inside. The findings from this research have shown that there is a need for different environments for businesses, and to fulfil these needs the planners must develop their knowledge together with the businesses. The other aspect emerged from the experience gained by the various development projects that the researchers participated in. They found that when the businesses became involved in the creation of the physical part of a business environment, their network and interaction developed and became stronger (Törnqvist 1987, Birgersson 1996, Öhrström 1997).

### **Place and space**

Architectural research deals with issues about space in many different ways. Space may be tied to function, something that can be measured, but also to a symbol. For a business a building's symbolic value may be of great importance. A recent case illustrating this point is the reorganisation of the Swedish postal service, which has meant that the Swedish post offices have been closed down or transformed into payment offices called Svensk Kassaservice.<sup>6</sup> The post office, which in most Swedish towns was a separate building in the same way as the bank, police station and Council House, moved into the supermarkets or some equivalent space. In this manner, this activity lost the building as a symbol and became anonymous. It will be interesting to see what this will mean to the postal service in the long run.

The architect manages space as a symbol primarily by discussing various proposals to give expression to the architecture together with the company management. Space as function, but above all its usability, has been the focus in our research environment. Usability denotes how people are able to *take their place*. It contains both practical and existential dimensions.

In my research environment the importance of place has become increasingly apparent, which Göran Lindahl's (2001) thesis 'Space as a resource in processes of change' is an example of. Lindahl argues that *the place* belongs to the activities that are carried out there, whereas *space* is a tool to plan and design the physical prerequisites in order that something is able to take *place*. Therefore *the place* is something more than just the spatial references or bounds.

This is in agreement with what the philosopher José Ramirez describes when he claims that *place* and *space* are not synonymous concepts. "Space is an

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<sup>6</sup> The importance of the building's symbolic value for companies has given rise to a diploma examination project at the Chalmers School of Architecture, *Branding and Architecture, a Study in Architectural Briefing with Posten Sverige AB as a case study*, by Emelie Larsson, 2002.

empty dimension, a geometrically regarded physicality. Place (that the Greeks called *topos*) has no determined dimensions. A place occurs when something important happens, where human meaning is allowed to come about and be articulated” (Ramirez 1993, p.10).

In both lines of research at Space and Process there is a clear perspective with respect to place and space. *The space* is that which (urban) planners and architects work with that provides a focus on function, symbol and spatial planning. *The place* is not only a function, but a more advanced interaction with the activity.

How things take their place is a knowledge that those participating in the activity know about, but in general do not need to express. During work involving change it is necessary that those working with the activity participate in order to express how the buildings function as a place. Then the dialogue becomes an important tool, which in my research environment has become a component of the development work (Birgersson 1996, Rehal 1997, Lindahl 2001).

### **Facilities Management as a tool for core business development?**

Another point of focus in my research environment has been developed via the international movement known as Facilities Management (FM). FM has meant that a specialised competence has evolved for the management of properties and associated services with a focus on the core business and the needs of the customers. FM has primarily dealt with large companies and those support activities that are required in order to develop the core businesses of these companies, i.e. a division between the companies primary and secondary production (Jensen 2001).

At Chalmers, FM became a component of a strategic investment within research 1998. The definition of FM is as follows<sup>7</sup>:

*“The design and change of a building and organisation of services associated with the building based on the demands arising from the core businesses of the users.”*

In contrast to the Chalmers tradition, the working environment has not been a part of FM. The international trend is moving towards an increasingly humanistic perspective where people and activities shift from being means to becoming a goal. This means the international movement is becoming closer to the perspective prevalent in my research environment.

In general, the facilitation of the building and connecting services has become a FM task carried out outside the strategic decisions concerning the development of the businesses. Viewed in this context, the business incubator is both a typical FM-task and an unusual one. The latter is because a satisfied customer does not remain a tenant; instead a successful result of the management is registered as a rapid turnover among tenants. In the business incubators there are generally persons responsible for adapting the existing

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<sup>7</sup> From <http://www.fm.chalmers.se/php/allmant.php>, 20 February 2004.

spatial structure and other associated services to the core activities. These do not participate in strategic decisions concerning the core business, but work in practice close to the business developers and with the customers, the impending businesses.

Within FM research there is at present a lively debate around the historical developments that have resulted in FM as a support activity and a field of knowledge in its own right. The development of knowledge, on the one hand, has focused on improving the operational tasks. At the same time, it has, on the other hand, led to an increased awareness of FM's strategic role as a manager of both financial and human/physical resources, and whose experience has a decisive value for the development of the core business. My research project may be regarded as a contribution towards developing FM as a strategically important part of the core business.

### **A new role for the construction client?**

This research work is financed by Formas within the framework of 'The construction client with the customer in focus', first stage 2000-2003. The objective is to develop knowledge applicable for a construction client/management active in those networks that support innovative knowledge and business development. The value to society of developing such knowledge is that the construction client/management can develop a more customer-oriented and flexible praxis, and that those actors building up innovation systems can with time develop a more sustainable system.

A construction client has of tradition been a person or organisation contracted to construct an object, building or other object, for his own or somebody else's account (Ryd 2003). In her thesis 'Exploring Construction Briefing', Ryd (2003) especially deals with the perspective of the construction client with regard to briefing as an important knowledge process. As I view it there is a general knowledge gap between the practice of construction clients and facility managers of built environments and the practice of business development. I am especially interested in narrowing this knowledge gap when it comes to business creation related to advanced knowledge environments. Within FM the construction client is seen more as a function that can change and belong to that of the owner, developer, construction contractor and the user. The ideal, as I see it, is to be able to integrate all relevant categories and intentions in every specific project.

### **Summing up**

Within the framework of my licentiate work I have attempted to make use of the experience of my research environment when it comes to connecting the development of businesses and the built environment. Especially interesting for my subject is how changes in the built environment can support the development of the businesses in question as well as the generation of the necessary networks.

From my research environment, I have also taken account of the difference between how a social activity takes place and how specialists construct space around an image of this activity. As a tool for looking at the incubator, this

perspective, acquired via my research team's work with FM, has been of help in examining what it is that constitutes support activity, and what can be regarded as the core business. In the same manner, to regard the construction client as an interconnecting knowledge task able to link together experience between usage, management and construction.

## 2.2 About business incubators

Those definitions<sup>8</sup> and the literature about business incubators I have found in my search clarify that incubators are about:

- Fostering regional development, the production of new technologies and change regarding the region's industrial sector.
- Supporting growth and the survival of new businesses that are innovative and knowledge intensive, which throws the focus on the early stages.
- Produce successful, i.e. growing businesses that are able to be self-sufficient after their period at the incubator.

To achieve this the following is required:

- Various forms of support in the form of services at a place.

The various forms of support provided are based on the idea that the businesses are quickly able to find their places in the business world, and that they will and want to grow.

### **The incubator and entrepreneurship**

By various means the incubator attempts to add *entrepreneurship* to the technological know-how in order to create expanding businesses. Researchers in the field debate what entrepreneurship is in practice. In relationship to the incubators and the prospective businesses, this refers to something that can be taught, and that belongs together with the necessary knowledge required to be able to shape and run a business and that does not comprise of the technological competence.

The actual word entrepreneur is French, entrepreneur from *entreprendre* – *entre*, between and *prendre*, take up.<sup>9</sup> The meaning is to undertake, set about.

According to Landström (1999) entrepreneurship was studied within several different disciplines, but with different levels of analysis and focus.<sup>10</sup> The levels of analysis vary from the individual via organisation and religion to society as a whole. At the focus is the entrepreneur as an individual, entrepreneurship, entrepreneurial businesses, relationships-networks as well as the spatial, social, cultural or economic system.

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<sup>8</sup> These are described in more detail in my study 'A study of the meeting between technological know-how and business knowledge at Chalmers Innovation' which is published separately but also constitutes a part of this licentiate thesis.

<sup>9</sup> The concept was used as early as the 12<sup>th</sup> Century. In Swedish the word 'entreprenant' was used earlier in the meaning of enterprising. "Det friska, entreprenanta arbetet, som bryter egna banor" (Geijer 1839). Source: Svenska Akademien och Språkdata, Göteborgs universitet 2001, <http://g3.spraakdata.gu.se>.

<sup>10</sup> He takes up psychology, organisational behaviour, business economics, networks, geography, sociology, social anthropology and economics.

Schoonhoven och Romanelli (2001) argue that entrepreneurship, both the individuals and the process of creating organisations is "a *fundamental dynamic of change in society*". They continue that entrepreneurship is "essential to the creation and renewal of economic wealth and well-being". In other words, entrepreneurship may be said to deal with creating something new i.e. innovations.<sup>11</sup> Growth businesses are at the focus within the research field of innovations and growth. According to Saemundsson (2003) research around growth businesses is linked to four different fields of research, economics, organisational studies, strategies and management and entrepreneurship. These, according to the same source, can be divided into two main categories. The first is interested in providing explanations and predictions around changes in business size. The other, on the other hand, is interested in what happens in businesses when they grow, i.e. the business's own process.

### **Entrepreneurship, space and place**

What especially interests me is when entrepreneurship is associated with *space and place* from the perspectives of:

- *where* (in what context) new organisations are started (Romanelli & Schoonhoven 2001)
- *proximity* to other organisations of importance for the development of the newly established business
- the *local/regional prerequisites* important for the businesses (Miner et al 2001)
- a *local process* in a limited geographical area (Schoonhoven 2001).

According to Romanelli & Schoonhoven's (2001) empirically based conclusions, individuals learn about the opportunities/possibilities of setting up businesses primarily from the workplaces and educational environments they have been a part of before they started their business. The organisation the entrepreneur has personal experience of, and the environment surrounding this organisation will be of importance for the new organisation that the entrepreneur creates. Here the local region plays a prime role through being the place where these entrepreneurs have access to the resources (above all various networks) needed to start up the business. An interesting issue in my research work is therefore what importance the existing regional business structure has, and what importance Chalmers has as a "parent organisation" for those businesses born at the incubator.

### **The incubator as a place for knowledge transfer**

In an article by Miner et al (2001), it is demonstrated that the incubator is a component of the university's role as a driving force for regional growth. As such the incubator constitutes a place for "*knowledge transfer*" (2001, p. 111).

According to the authors, there are many claims that have become generally accepted without being questioned, such as:

- every university can generate new businesses

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<sup>11</sup> Innovation from Latin *innovatio* a derivation of *innovare*. *Innovera* from Latin *innovare*; renew, create something new from. Source: Svenska Akademiens Ordbok on homepage <http://g3.spraakdata.gu.se/saob/>.

- belief in one recipe which is not to be questioned – and Silicon Valley is the foundation of recipes that follow
- new university-based businesses generate economic growth through new employment opportunities.

Their empirical material illustrates that the universities can have importance for starting new businesses, but this is not to be taken for granted. Nor are there any guarantees that those businesses that were set up via the universities give rise to local growth in the same region as where they started. If the businesses move away from the region, they may instead become part of another region's local growth. According to Miner et al, the universities must not only focus on generating businesses, but also on their own performance, as well as those specific local factors providing the prerequisites for increased growth. The same authors argue that the most important activities that the universities can carry out are to search for those special local sustainable qualities that can penetrate the efforts of the university to generate new businesses. How is this knowledge used in the incubator? Or in the regional task of supporting a renewal of the existing structure of industry?

The importance of *networks* for creating growth is taken up in the same article (Miner et al 2001) through examples from the biotech industry in USA. That which had the greatest importance for growth was the network of relationships developed over time. The networks, and not the individuals, have functioned both as a driving force for discovery, and as a place for the collective memory within which earlier knowledge was stored. The authors argue that the universities may perhaps have a key role during the formation of the industries by providing a neutral platform for relationships between scientists.

The importance of networks has been drawn attention to by my supervisor and I in the first paper we wrote (Strid & Birgersson 2002), but then in relationship to the traditional industrial districts. We considered that these districts illustrate self-generating innovations systems, which should be the objective for the incubator to be a part of. In these industrial districts there is both entrepreneurship and networks present as important elements for the explanation of their successes. Of further interest is that these are geographically well defined.

Silicon Valley is an example of such a district that has functioned over a period of time, linked to a geographical area, the university and to innovations. Bengt-Åke Gustavsson in *Kreativa miljöer, Silicon Valley* (2002) has drawn attention to the importance of culture and the physical built environment for the success of Silicon Valley. Referring to Malecki and Oinas (1999) the cultural aspects and importance of the local identity are underlined. Because cultures are unique constructions and thus impossible to copy, this may be a reason why one neither should strive for nor attempt to start off from Silicon Valley as a recipe for how one should build up regional development. The unique thing about the culture of the Silicon Valley, according to the authors are founded on three factors; 1) a 'start-up' and venture culture 2) the culture of money, and 3) youth and rebellious culture.

Gustavsson (2002) describes the importance of artefacts and physical space, among other things with reference to one of the researchers who has studied Silicon Valley, Anna-Lee Saxenian. According to Gustavsson (2002, p. 70), one of the first things that struck her when she came to Silicon Valley was *'the impermanence of all the facilities'*. All the walls were temporary because the design and layout was continually changing. This, according to Saxenian, was a major contrast to the general notion (in USA) that a business is identified by its (physical) building.

*Density and proximity* is another aspect taken up, and, according to Gustavsson, constitutes an important asset for businesses in spite of us being in the age of telecommunications. He also takes up other researchers who indicate the importance of physical proximity, and argues "the physical place is thus still, in purely practical terms, but also symbolically of great importance" (2002, p.72, my translation).

The importance of a social context for technological dynamics is taken up by Murmann & Tushman (2001). They argue that social institutions can hinder or facilitate the delivery of new technological design. A sociological attempt at entrepreneurship research, according to the authors, would shift the focus of the researcher closer to "the creation and exploitation of entrepreneurial activities" (p. 202), and argue that entrepreneurial activity is carried out by existing organisations.

### **Summing up**

There are many myths about entrepreneurship, but they often deal with the image of a person who with a lot of work, great creativity and colossal belief succeeds in creating a successful business with his/her own bare hands. This is a subconscious image and is not directly referred to in connection to the incubator. In here entrepreneurship is more about how the technicians shall become business- and growth-oriented in its execution. To be growth-oriented has been an unquestionable point of departure in literature, but especially during recent years it has been pointed out that not everyone that starts businesses is such.<sup>12</sup>

This orientation in entrepreneurship provided me with support for investigating the process the prospective entrepreneurs go through when they shape their businesses. The issues about what they actually do when they have finally come into the incubator demanded interviews with both the new businesses and the business developers. It is obvious that this process in itself is an advanced knowledge process. From the business developers, their customers, and advisors and in contact with the other businesses at the incubator that perhaps may have come a bit further on the path to shaping their businesses, they shall learn how to run their business in everyday life. At the same time, they must

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<sup>12</sup> This has been pointed out among others by professor Per Davidsson at Jönköping International Business School, for instance in a seminar at Entrepreneurship and Small Business Research Institute (ESBRI) in Stockholm, Sweden. Information about the seminar is published at the homepage <http://www.esbri.se/forelasning.asp?link=visaforelas&id=89> 12 October 2003.

also develop their technological idea in order to become a product possible to sell.

From the problems, that Landström (1999) argues belong to various disciplines, I understand that my questions touch on several of these, and this has given me a problem to acquire a holistic image as to what entrepreneurship actually is. At the same time, there is support in entrepreneurship as an academic subject for the importance of networks, which my interview responses soon indicated as being a key issue. There is also support for interpreting the importance that the business incubator has significance for providing proximity and density, but also that it may be seen as being too 'close'. The walls are perhaps not, or perhaps should not be, always interpreted as the bounds and identity of the business incubator.



### 3. Method

The investigation of the business incubator at Chalmers has been carried out in the following stages:

1. Understand the incubator as a historic and spatial phenomenon, search for important concepts, among other things via courses and scanning for literature. Visits to every business incubator associated with universities in the region. Based on this material, the first paper was written.
2. Introductory interviews to investigate how the incubator functions in concrete terms, both from the perspectives of the entrepreneurs and the facilitators. Developed key issues and figures. Participated in the regional competence network for incubators, *Inkubatorkompetens*.
3. A preliminary review of the material from the investigation in two new papers, which provided a continued development of the issues.
4. Increased number of interviews. Objective: that all the entrepreneurs and facilitators should be included. Continued development of questions. Alternated interviews between facilitators and entrepreneurs; compared different points of view. A preliminary attempt at a simple social network analysis.
5. Final processing. Attempt to answer my research questions.

#### 3.1 Papers

Together with my supervisor I have utilised the work to formulate papers for international conferences as a method for promoting my learning process. At the same time, it became an exercise in expressing oneself in the international research community. These papers have primarily contributed to developing the concepts that have been used in the investigation.

The conceptual task has been partially carried out by means of literature and courses, searching and making myself familiar with the concepts that are used specifically with regard to business incubators. In my research environment, the development of concepts is regarded as a basic part of the research task. This is carried out in discussion with my supervisor and other researchers in the network I have been introduced into, and this takes place simultaneously with the development of the empirical material. This constitutes an interaction between concepts and empiricism, where they both develop each other.

This is a means of developing concepts and models that are practiced in my research environment. Lindahl (2001) argues that in this manner a transfer of experience from other examples takes place, and an exchange of experience between the researchers.

Design theory is also a tool that is used in my research environment for looking at one's own knowledge process. Design theory indicates the dialogue with the object, and is especially applicable for describing how one acquires knowledge

through praxis. By means of text and imagery I give expression to my own thoughts and those of others, which in turn 'answer back' and provide a reason for reformulation. In this way research can be seen as a dialogue and design process (Birgersson 1996). The papers constitute a part of this dialogue, and are important parts of the task of making reformulations and developing conceptual terms.

### 3.2 The investigation

The objective of the investigation was to interview all the entrepreneurs and facilitators at the Chalmers business incubator. An important point of departure for this work was to alternate the interviewed businesses and facilitators in order to attempt to record the knowledge developed from each interview, and utilise it in the following interview. In my opinion this is what happened. In principle, after each interview I had to revise or develop my questions, so that the next interview encompassed the new knowledge or a new aspect of a question. The method described was also a way of further deepening the understanding and knowledge about the knowledge processes taking place in the incubator. These interviews focused on providing answers to the two overall questions about how the facilitators regard the knowledge process, going from idea to business, and how they plan the incubator as a support process. The interviews were also intended to investigate how the entrepreneurs regard what they get and what they need in the incubator.

In the final processing of the interview material I have compiled it so that both the facilitators' and the entrepreneurs' image of the incubator is presented. I have processed this material by comparing with their various perspectives, having attempted to see them in the light of the concepts I developed together with my supervisor in order to draw attention to how the knowledge process in the incubator needs time and space. This led to questions about how the facilitators organise their work in these spaces, and how the entrepreneurs take their place in these on the path into the sphere of business?

The work of the investigation became increasingly focused on what different networks the businesses and the business developers cooperate in. With such a focus more questions about networks need to be formulated. An orientation in Social Network Analysis (SNA) was presented during a course, and the implementation of such could be assumed to provide further information around how an incubator functions<sup>13</sup>. I began a simple investigation in order to try to get a picture of how and with which companies businesses interacted and created networks. I also carried out a simple variant of such among the business developers, among other things linked to the question of who, or which, they turned to when in need of other competence. This analysis has not been entirely implemented. I have therefore chosen not to present any conclusions. Though, this attempt strengthens the trend in the other material of the importance of networks for the knowledge process.

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<sup>13</sup> Professor Sven Åke Hörte, Halmstad University, and professor Bengt Johannisson, Växjö University, in the course Entrepreneurship and territorial dynamics, made this presentation in April 2003.

An initial attempt has also been carried out to try to catch what images the businesses and the business developers have of various built environments for activities. They were shown pictures of eight different exterior and interior environments. They were asked to indicate which of these images corresponds most with 1) the environment they are in, 2) which they would like to move into and 3) which they would not like to move into. Even this part of the investigation is incomplete, and is therefore not presented in more detail.

In a continued extension of the investigation, when the regional perspective will be given more attention, I assume a network analysis can provide interesting results with regard to showing similarities and dissimilarities between the incubators and in different parts of the region. Even a review of the pictures of different working environments should be able to contribute to increasing the knowledge about incubators. I should like to continue to develop both these tools in my next stage of the investigation.

### **Interviews**

The purpose has been to learn how, and above all where, technological ideas contribute to businesses at the incubators, by investigating Chalmers Innovation's two centres, Stena (adjoining the Chalmers area) and Lindholmen. Interviews were the methods chosen for gathering in information for the investigation. A total of 23 entrepreneurs, who represented the same number of businesses (of 27 possible), and the entire incubator staff (9 persons) were interviewed. These have been interviewed according to a question formula that has been continually developed.

During the introductory stage of the investigation, a preliminary investigation was carried out in order to test and develop the question formula. Five businesses in different phases of the incubation process, from one newly moved in to one that had moved out, were interviewed. These businesses were chosen among those that responded to a general enquiry and enrolled themselves on their own initiative. At this stage I also carried out shorter interviews with the facilitators at the incubator. The intention was to get a general idea about their working tasks in order to learn how they worked in more concrete terms.

As a part of the question formula various figures were used. These figures have been an attempt to catch what the advanced knowledge is comprised of. The intention was to show what sort of businesses found their place in the incubator, and how well these corresponded to the demands of the incubator with regard to businesses having to have high technological competence as well as good prospects for growth. Two different figures were used in the attempt to ring in the business's view of their own enterprise. The first figure indicates how the business regards its activity from the point of view of its product and process. They had to place themselves according to a scale indicating more or less advanced knowledge and technology. The other figure is an attempt to place the business's organisation according to the degree of knowledge of technology and degree of enterprise. In the work with the interviews these figures have functioned as a way to start of the interviews.

Another figure I have used is how large the businesses perceive they will be when they leave, or after they have left the incubator. The idea with this figure was also to see how the image of the company that exists in the incubator and the entrepreneur's image of its own company correspond to each other.

Through carrying out and processing/analysing the first round of interviews, I could develop the basic assumptions before continuing interviews with more businesses. The interviews would also reveal if the figures used were possible to utilise, and if they were a good instrument to work with.

During the next stage the goal was to interview every facilitator and entrepreneur there was or had been at the incubator. The questions were further developed. This procedure has meant I have had to contact the companies again for complementary details. After each interview I have written out a complete report based on my notes and impressions. Then the material has been sorted and compiled so that both the images of the facilitators and the entrepreneur of the incubator have been presented.

### **The investigation method**

The investigation is an important part of my learning process. It has involved alternating between developing concepts and interviews, including the compilation of these. My ambition has not of course been to make explicit *all* the knowledge of the facilitators and the entrepreneurs, but rather to draw attention to the relevant aspects that can give rise to the feeling of seeing ones own practice in a new light!

Depending on its purpose, research can be said to be explorative, descriptive or explanatory. Explorative studies aim to investigate and attempt to understand a given phenomenon. They are often of qualitative nature and the selection may be allowed to be small and unrepresentative as the purpose is to generate as many insights as possible. What then is a qualitative method?

According to Eneroth (1984), the qualitative method is a 'discovery method', which may be compared with a research trip, where the main problem is not one of measurement, but rather more one of discovery. This is also a gathering concept for an approach consisting more or less of one or some of the following techniques: direct observation, participatory observation, interviews as well as the analysis of written sources (Holme & Solvang 1991). The purpose is a deeper understanding of the problems being studied. A comprehensive image of the context the problem is contained within is to be achieved through the information gathered. Characteristic for this method is proximity to the source of the information.

This corresponds to the way I have worked and what my original goal was. I have used the pre-understanding I had about the Chalmers incubator<sup>14</sup>, and what business incubators can be, to search for literature and choose courses

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<sup>14</sup> Before I started my post-graduate studies I worked among other things with an evaluation of the premises that are now Chalmers Innovation Stena. Besides this I have carried out other projects focused on business development and the built environment.

that taught me more about this phenomenon. As I learnt about incubators I became increasingly aware of what I was after and what I needed to investigate closer. It was if all my surroundings were involved with incubators, new businesses, entrepreneurship, innovations and creativity. It is like going into to an unfamiliar and gloomily illuminated room. In order to be able to orient oneself one has to turn on the first light switch to be seen, often the switch nearest the entering door. This usually leads to a ceiling light that makes the room sufficiently lit up so that it is possible to orientate oneself. However, if this does not provide sufficient light to illuminate all parts of the room, or is out of function, other lights have to be turned on. This is how I should like to compare my experience; that everything that had anything to do with an incubator was to be found in the gloomy room, and as I learnt something new lights were turned on, which in turn revealed more gloomily illuminated corners.

With the qualitative method the goal is to describe the qualities of a phenomenon (Eneroeth 1984). The researcher seeks to understand how qualities come about based on observations carried out. The goal is to gather and organize these observations to something comprehensible, i.e. to create concepts about reality. This is based on a knowledge model where one starts with certain observations of a phenomenon from which one (inductively) adheres to certain qualities that in the end provide us with a concept about the phenomenon. When the researcher makes explicit that which has been drawn attention to, they can become tools for discovering the world in a certain manner. The conceptual inductive model means that from certain observations of the phenomenon in reality, one adheres oneself to a concept with a certain validity (induction).

A method for qualitative research is ‘grounded theory’<sup>15</sup>. This method focuses on theory generation based on qualitative data and on the *process* through which this takes place. It also emphasises the importance of the research task not being based on any determined theory that will steer the gathering of data. Instead, the theory is the result with focus on the precision of the concept (Johansson 2002). The collection of data in this case is based on so-called theoretical sampling, which means both that the theoretical ideas evolve during the course of the research and that these shall steer the collection of data.

My work has involved such an interaction between the conceptual construction and the empirical material. This is a leaning process where the work switches between the two all the time, a constant interaction. This is connected to what Bengt Starrin (1994) says when he points at that the issue of the scientific analysis must have a higher rank than the method and the way of collected data. He is critical to that he calls ‘method fixation’ and point out that qualitative analysis is not about pure induction, but instead about abduction, which is: ”a continual and very rapid interaction between observations and ideas and between parts and the ‘evolving’ whole” (Starrin 1994 p. 26). I have understood that abduction might be a relevant way of describing my method, but have not had time to digest this completely in this thesis.

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<sup>15</sup> Glaser & Strauss 1967.

In Nilsson & Uhlin (2001, p. 29 my translation), Uhlin argues that innovation systems, clusters and other forms of spatially defined socio-economic systems are complex of necessity” (my translation). He bases this on the sociologist Niklas Luhmann’s argument and says that “complexity is about shortage of information; a complex system can never completely see itself or its surroundings” (p.27, my translation). With this Uhlin argues that: “ The complexity of society can thus not be observed with less than being carried out in a reduced manner. Every attempt to formulate a theory of complexity is in this way about reduction, which means that the theory must unavoidably be self-reflecting. According to Uhlin Luhmann therefore sees the theory of complexity as a theory that *simulates* complexity in order to explain complexity. And it does this by creating a flexible network of concepts that can be combined in many different ways, and which thus can be used to describe many different kinds of social phenomena...” (p. 27, my translation).

The authors also argue that one cannot go in and study complex systems, such as the social ones, from only looking at the parts. It is not possible from this to generalise and provide a real image that describes society. Complexity in social systems can instead be understood through various narratives about the different parts of the system<sup>16</sup>. I have in actual fact only read what they have written, not as yet gone into it in any depth, but I think it is in agreement with how I see my task. It would be an interesting area to pursue further to use in the task of understanding the incubators and their importance in a regional or national innovation system. This coincides with another of my interests; to attempt to link the ambitions of architectural research to see ‘the whole’ with the corresponding in economic research.

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<sup>16</sup> This is also argued by Holme & Solvang (1991).

## 4. Presentation of the findings

### 4.1 Paper 1: Spatial Aspects of the University Business Incubator

The first paper is a search for the relevant concepts able to aid the illumination of the spatial aspects of the ‘incubated’ activities the universities are involved in with regard to facilitating the birth of new businesses. This provided us with a preliminary image of the business incubator as a *meeting place*, on the one hand, between traditions based on science and technology, and on the other hand, traditions based on business knowledge. In this way, the university incubator can be viewed as a number of premises in one or several buildings near the university with the purpose of *initiating* and *stabilizing* such meetings, and providing a place for a regular activity for making technological ideas become businesses. When this functions, the participants experience the incubator as a specific *place* and the spatial functions are taken for granted. The fact that spatial functions fall out of focus when they function best for the users gives rise to difficulties for those working to create and manage built structures for various kinds of activity. It is difficult to speak about spatial qualities as such, because they are integrated in the everyday activity.

We distinguished three phases that both in practical and knowledge terms are to be given support in an incubator:

*Phase 1*) to get into the incubator

*Phase 2*) to become a business

*Phase 3*) to grow out of the incubator.

Together these constitute an image of the incubator as a linear process. This image became a support for the research into my first question about how the business developers and the entrepreneurs view the process of forming a business from technological ideas from the university.

With regard to my second research question – Where does this knowledge process take place? – I turned to the literature about the traditional industrial districts. In these districts the entire region may be said to be an incubator where the culture foster the future entrepreneurs.

How businesses are developed and survive over a period of time in the industrial districts had to serve in the paper as a model for discussing a vision of a self-generating innovations system. Another concept that was taken up in connection with this is that of learning regions, which provide support for viewing the innovation system as a non-linear generative process. This also provided support for drawing attention to how entrepreneurial businesses interact with other businesses and organisations. This constitutes learning through interaction, which demands physical, social and organisational proximity between the participating actors.

## **4.2 Paper 2: Facilitating Business Incubators As A Place: The Case of Chalmers Innovation Stena**

In the second paper the focus is on the incubator at Chalmers. The purpose of this paper was to test the perspective to both see what type of scope for action the business developers provide the entrepreneurs at the incubator, and partly to see how the latter take their place in these. Through this we also tried to distinguish what constitutes the Facilities Management-perspective in the business incubator.

To support our focus on the spatial aspects we started calling the three phases *the Entrance*, *A room of ones own* and *the Exit*.

This paper is based on the findings of the interviews with five entrepreneurs from five respective businesses that found themselves in different phases in our linear model of the incubator as a process. The business developers were also interviewed about their work activities attached to the three phases. The interview material was compiled according to these three phases/spaces and was presented from the perspectives of both the business developers and the entrepreneurs. We were able to see that there are different activities that characterise the individual phases.

In the first phase, which we term *the Entrance*, the focus is on the meeting between the entrepreneurs and the business developers. During the second phase, *A room of ones own*, the focus is on the development of the individual business praxis. During *the Exit* we found an indication that the entrepreneurs did not consider it a matter of course to move out of the incubator. It became obvious that this last phase must be investigated in more detail, as it was at this stage that the image regarding space differed most between the business developers and the entrepreneurs. The problems related to the *Exit* meant that we wondered if the image of the process as a linear one was too simple. This motivated us to go on and focus on a generative knowledge process.

## **4.3 Paper 3: Studying University Business Incubators As A Place: The Case of Chalmers Innovation Stena**

In the third paper there is no additional empirical material. Instead it focuses on a new conceptual development. In this we made use of Nonakas & Konno's (1998) model of how knowledge development is an activity that takes space and time. The material that had emerged from the first interviews, and which became clarified during the production of paper number two motivated the choice of this model.

This model is a development of Nonaka & Takeuchi's (1995) argument about how knowledge is created in organisations. By combining this model, via a generative knowledge process, with our described linear model of how the entrepreneurs pass through the incubator we were able to develop our thoughts further.

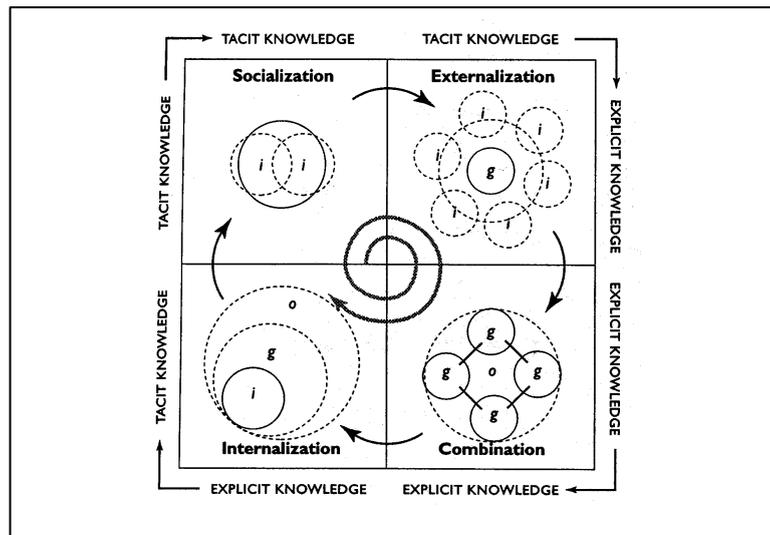


Figure 1. Nonaka & Konnos modell som visar principen för hur kunskapsspiralen fungerar med oartikulerad (och i praxis inbäddad) och artikulerad kunskap, från individ till individ, grupp och organisation. i=individual g=group o=organization.

*The Entrance* provides space for action for making explicit the technological ideas, and how these can become products or services as well as how this is combined with the knowledge of the business about how one establishes a business. This (*The Entrance*) most often takes place at meeting places within the incubator's premises, but also via telephone and Email. During *A Room of ones own* stage the combination and internalising of business knowledge around the technology-based idea is predominant, not least through the business having its own office space, which defines the business in physical terms. During the third phase, *the Exit*, the internalisation further strengthens the business through generating praxis, but at the same time the business also needs to be socialised into the business world outside the incubator.

It is first during the formulation of this covering paper that I started to realise that *Entrance*, *A room of ones own* and *Exit* are what I want to see as new concepts in attempting to encompass where the separate parts of a generative knowledge process take place. These concepts now became tools in my attempts to describe a third research question; how the incubator supports the knowledge process.

#### 4.4 A study of the meeting between technological know-how and business knowledge at Chalmers Innovation

Chalmers Innovation (CI) defines in its business concept the objective of the incubator: *that in close cooperation with research and education increase the birth and economic importance of embryonic business and discoveries based*

*on science and technology originating from Chalmers, the University of Göteborg and industrial concerns in the Göteborg region*<sup>17</sup>

How the business developers work when they attempt to bring about this objective in practise, and what the entrepreneurs consider they are provided with, alternatively lack, was what I was looking for in my continued interviews. The investigation of the incubator resulted in the following images of the work in the three phases.

In *phase one – to get into the incubator*, the business developers state that they support the entrepreneurs with four introductory meetings in order that the entrepreneur is able to gain access to the incubator, which at this stage most often means that part of the incubator comprised of the pre-incubator<sup>18</sup>. CI runs its own limited seedbed financing activity, which is linked to those demands placed on the businesses during the greater part of the first phase. This is primarily a requirement to produce a technological and business plan. The incubator provides support so that the entrepreneurs are able to fulfil these demands by providing the entrepreneur with daily access to a personal business developer, or coach as the entrepreneurs usually entitle them. Apart from this they have access to the combined competence of the incubator via the weekly meetings with the business developers.

The incubator provides the entrepreneur with space and service to carry out the work, i.e. office, computers, reception, social occasions, networks, postal services etc. They also have the possibility of choosing office space at two places, Stena (adjacent to the Chalmers area) and at Lindholmen. This choice is generally tied to the person that becomes the business developer for the business. By taking shares in the ownership of the business, CI is also able to offer reduced rents.

During this first stage the entrepreneurs state that what they utilise is seeking and gaining legitimacy through the trademark CI/Chalmers represents, as well as the possibility of financing the business idea. An office of ones own with all the necessities that are needed to set about the work of developing ones ideas, including the infrastructure and service, as well as a personal coach (business developer, and daily contact with such, are other important components that the entrepreneurs make use of. The entrepreneurs have given the impression that they lack the possibility of renting furniture and computers in a simple manner. Regarding the businesses at Lindholmen, they also lack a reception and all the service that goes with it.

During *phase two – to become a business*, the business developers state that they support the entrepreneurs partly by setting up certain demands so that the business shall be able to transgress from the pre-incubator to the incubator. These demands deal with setting up a company; that one person must work in the room the business rents at Stena (Lindholmen); the incubator takes a

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<sup>17</sup> Business programme for Chalmers Innovation, 1999.

<sup>18</sup> The pre-incubator encompasses roughly six months during which the project idea takes a more definable form, a preliminary stage to the incubator; see also The Investigation (Strid 2004).

minority share in the ownership; rent at market value, as well as a complete business plan. The work of the business developer continues but less intensively. During this phase, CI has also the possibility to provide start finance with certain conditions attached.

Contacts between different networks, e.g. to apply for and acquire capital, or to recruit experienced board members, staff etc. are a further segment of what the incubator offers during the second phase. The business developers also communicate contacts with customers if they can.

Training has been, and is, an important part of what the incubator has to offer, but during later years this has lessened in scope because it has been difficult to get the entrepreneurs to participate.

What the entrepreneurs state they utilise in this second phase is primarily ones own office. They argue that having an office space of their own provides a focus and manifests the business activity. The service, which includes reception and various associated services, means that they do not need to lay down time on other things than their activity.

Contacts with other businesses, in the same situation sitting next door, are important during this second phase. It is together with these businesses that the entrepreneur shares experience. At Lindholmen more businesses, than there are today, are needed if the entrepreneurs are to get full benefit from this.

What that the entrepreneurs state that they lack is sales and technical support directed towards their own product, but also a natural meeting place at the incubator.

During the last phase at the incubator, *phase three – to grow out of the incubator*, the business developers state that they support the entrepreneurs with a definite demand that the businesses shall move out within three years from being accepted. They have also started a network for managing directors, which include those businesses that have moved away from the incubator.

The entrepreneurs' state that they are in an environment they wish to remain in until further notice. The time limit, which is set out in the tenancy, is most often not in accordance with when the business regards itself to be sufficiently mature to take its place away from the incubator. Some businesses state that they need to be part of specific branch associated networks in order to be able to move away, others that they need premises with low rent but in close association with the incubator. A further requirement stated by a couple of businesses is that they need more activity-related premises.

I have summarised these interviews by discussing how the defined spaces for activity, *the Entrance*, *A room of ones own*, and *the Exit* that were developed in the papers, function.

### **How does the *Entrance* function?**

The incubator's business developer has created a point of entry, or entrance, in which the technician must be appropriate in order to come into the incubator. Around this space for action, based on the information provided through interviews and by focusing on the knowledge process that a meeting between technology and business development constitutes, my conclusions are that *the Entrance* involves distinctly *making things explicit* on the parts of both the business and the business developer. In other words, the entrepreneur is compelled to be precise in his idea, and the business developer defines the possibility for different forms of support for how the idea shall be developed to a business, e.g. through coaching, financing and training. Then together they must find an opportunity to *combine* what the incubator can provide and what the entrepreneur can develop in the business. This means that *the Entrance* involves an intensive *knowledge process* that generates trust, but also economic dependence.

Chalmers Innovation and its networks provide *legitimacy* for both the activity of the business and the business developer. In this the building is important for making the activity visible and stable. However, there is a certain difference between the two different centres, Lindholmen and Stena. At Lindholmen, CI's premises are part of a building with several tenants with different contents, which means that the activity is not visible in the same way as at the Stena centre.

### **How does the *Room of Ones Own* function?**

Here the entrepreneur acquires the opportunity for a stronger *combination* and *internalisation* of business knowledge in the technology-based idea. The businesses begin to develop their own routines, and different opinions arise as to what ones own business needs for support. The entrepreneur's own network, with associated businesses and customers, evolves parallel as the contact with the business developer declines.

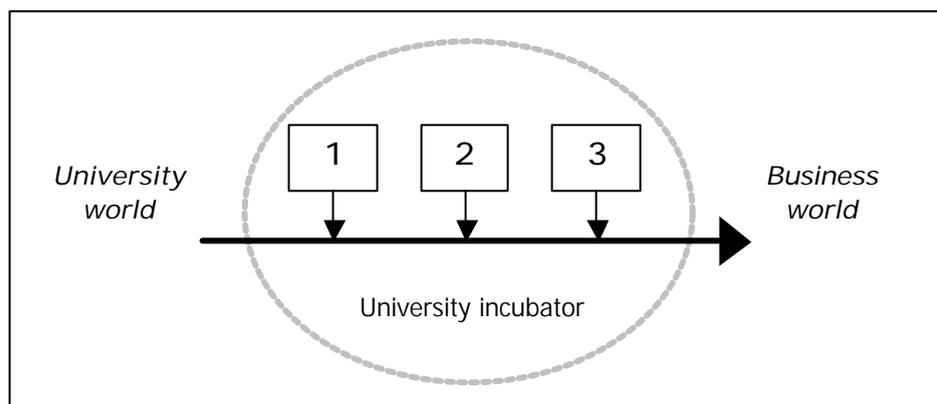
Even in this phase there is a difference between Stena and Lindholmen. To be an interesting knowledge environment generating long-term networks there are too few businesses present at Lindholmen at this time. Lindholmen also lacks certain forms of infrastructure and service. The individual office space functions well at both Lindholmen and Stena, but at Stena the buildings provide less support for social contact than at Lindholmen. The reception at Stena functions very well, both from the perspectives of business and in social terms.

### **How does the *Exit* function?**

The demands on the business placed by the incubator to quickly take its place in the business world outside are not related to the knowledge process within the business. A 'natural' exit would be when the business finds its own network within which its knowledge process can continue, e.g. customers, engineers, and other businesses. The *socialisation process* out in the business world does not yet function satisfactorily.

## 5. Discussion

How the transformation from idea to business takes place is the basis for the operational concepts my supervisor and I developed in the first paper (Strid & Birgersson 2002). In this we presented our first image of the incubator, which we saw as a linear process, where ideas originated in the university world 'come into' the incubator in order to 'come out' into the business world. In our model of the incubator the process of shaping businesses from technological ideas was thus simplified, and was presented as three phases in the meeting between the university world and the business world, see the figure below. The businesses pass through these phases in order to become independent units in the business world.



**Figure 2. A first linear model of the process to shape businesses out of technological ideas from the university (Strid & Birgersson 2002).**

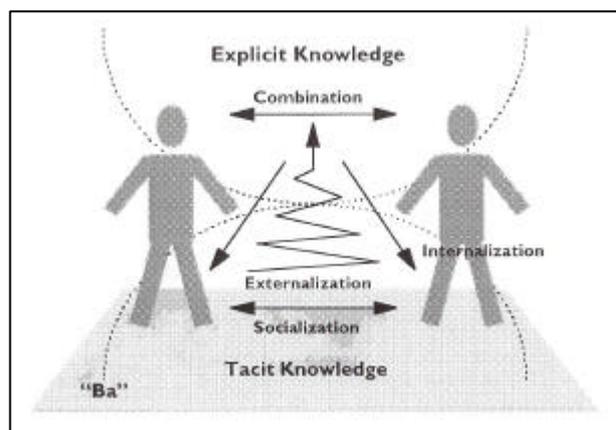
The first phase, in the model marked with figure 1, is where the technological ideas and skills enter the incubator and are judged according to their business potential. In phase 2, the development from idea to business takes place with the assistance of the incubator's business developers. During the third and final phase, the business starts to function independently in the incubator.

This model made us aware of how the businesses gradually take their place in the commercial sphere through the process of shaping the idea into a business. Through the continued work, with the first interviews and the second paper, this model was further developed. Because of this, the third phase became somewhat shifted forward in relationship to what we first assumed.

The interview material soon indicated that there is a problem in growing out of the incubator and finding a place in the business sphere. This initiated a discussion about how the transfer of knowledge actually takes place between the business developers and the entrepreneurs, and how the entrepreneurs on their part pursue the process further. In order to get help in answering these questions we made use of Nonaka & Takeuchi's (1995) model about how knowledge is generated in organisations.

A background to this model is Polanyi's (1958, 1966) research. Polanyi, with the expressions 'tacit knowledge' and 'explicit knowledge', wants to distinguish the differences between non-articulated and (tacit) knowledge imbedded in praxis and articulated (explicit) knowledge. Nonaka is familiar with both Japanese and American businesses. In Japanese businesses people's tacit knowledge is highly valid, while the Americans practise a Western view of knowledge where knowledge made explicit has high status. Together with Takeuchi, he developed a generative model for knowledge creation in large companies. This so-called SECI-model (see figure 1, section 4.3) has become well known and applied. The model illustrates the continual transference in a knowledge spiral between personal and living knowledge (tacit knowledge) and that in the situation articulated knowledge (explicit knowledge). In simple terms it can be described that during a change in praxis an exchange of explicit knowledge takes place. Then, knowledge is combined and internalised and socialised into a new practice, which in turn constitutes a basis on which to go further and meet more explicit knowledge.

The model has been mostly used as a tool for analysis within management and organisation theory for large companies. My motive for using this is that starting off from the SECI-model, Nonaka together with Konno (1998) have shown the importance of *the place* in the development of knowledge (see figure 3). It was through this model that I first became interested in Nonaka's and his colleagues' research.



**Figure 3. Nonaka & Konno's (1998) illustration of 'Ba', which they regarded as 'shared space for emerging relationships'.**

Their view of what it is that constitutes knowledge is in agreement with mine, and I consider that 'the mechanism' for a generative development of knowledge can apply even for small groups. Small businesses in their turn can be compared with units within large companies, between which networks of various kinds are communicators of knowledge.

By combining Nonaka's and Konno's model of *Ba* another step could be taken in the development of the linear model of how technological ideas are shaped into businesses at the incubator. This is presented in the third paper (Strid & Birgeron 2003). The three phases in the process became in this way

important concepts indicating the connection between the knowledge process and the space that this takes place in. *Entrance, A room of Ones Own* and *Exit* became concepts indicating *the place* where knowledge occurs.

## 5.1 How and where the knowledge process takes place

The concepts of *Entrance, A room of ones own* and *Exit*, shall at the same time make visible both knowledge and space, the social and physical entirety necessary in order that the knowledge process is to take place. *Entrance* is both process and space; not one or the other. I consider this is a matter of how the combination of knowledge and the development of knowledge can fall into place, which demands both *externalisation, combining, internalising* and *socialising* – a sequence that is also simultaneous, as there is a development of knowledge the whole time.

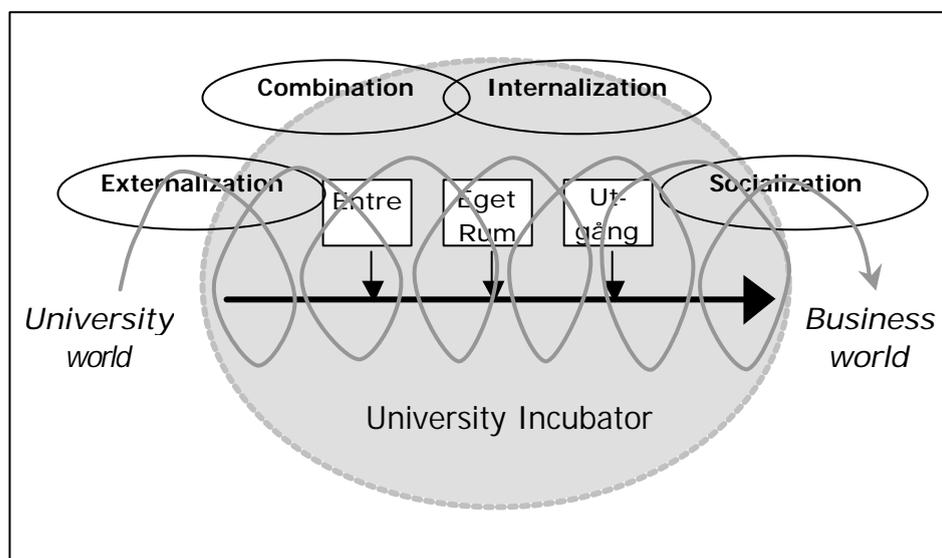


Figure 4. The linear model combined with Nonaka & Konno's model of the Concept of Ba that was developed in our third paper (Strid & Birgersson)

*Externalisation* occurs mainly during the *Entrance*, because the non-articulated and in praxis embedded knowledge (tacit knowledge), which both the technologists and the business developers have, must be articulated. In this way the *Entrance* constitutes the scope for action regarding the articulation of technological ideas and how these can become products or services. This knowledge shall not only be able to be articulated, but also *combined*. This is what the business developers do during the *Entrance*, partly by placing demands on the entrepreneurs and partly through expressing what they can offer in the form of knowledge about how to establish businesses. The entrepreneurs must be able to fulfil these demands and understand which different forms of knowledge they can get support from. Two of the latter are apparent by the entrepreneur right from the beginning. These are knowledge about opportunities for financing, and the legitimacy it involves being chosen as an incubator business. This combination of knowledge occurs at different meeting places in the incubator premises, such as for example the conference

room, the offices of the entrepreneur or the business developer, but also via telephone and E-mail.

*Combination* and *internalisation* characterise the knowledge process in the ***A Room of Ones Own***. The business developers continue to place demands, but to an increasing degree try to understand what specific demands each individual business has. The entrepreneurs *combine* their growing knowledge about the product and doing business, which has to be articulated during the meetings with customers and financiers. Creating everyday praxis constitutes a large part of the entrepreneur's *internalisation*, the knowledge expressed becoming a part of the business routine, a part of the non-articulated knowledge imbedded in praxis.

The combination and internalising of business knowledge in the technologically based idea occurs at the same meeting places as during the ***Entrance***, but most definitely at the business's own office, which defines the business in social and physical terms. An important part of the knowledge process also takes place together with other businesses at the incubator during training sessions and various social events, but also at more spontaneous meeting places such as lunchrooms and corridors.

*Internalisation* into a business practice is further strengthened during the ***Exit***. The incubator tries to stimulate this by setting up demands that the business should move out. They have also a network for all the businesses that have been or are at the incubator. Many businesses, in my opinion, are not focused on fulfilling the demand to move away. The network should have been able to be a means of *socialising* the activity into the business world outside the incubator, but those businesses that constitute the network have all been created in the incubator. The businesses need to be socialised into the business world in several different ways.

In order that the knowledge process shall be able to be generative a *socialisation* must take place, which in turn may lead to more *externalisation* and so on. How does the incubator support this final link before the new businesses have found their place in a business network able to support their further development of knowledge and growth?

## **5.2 How does the incubator support the knowledge process?**

At the ***Entrance*** stage the images of the business developers and entrepreneurs are largely in agreement with regard to the meeting of knowledge. This is of course a prerequisite, as the activities that do not live up to the business developers' knowledge and visions will probably not be accepted into the incubator. During the first stage of the process to shape the business from technological ideas, a knowledge process is initiated in which the business developer and the entrepreneurs attempt to make explicit and combine technological competence with business knowledge, their respective competences.

In order that this knowledge process shall be able to be managed by the businesses themselves in the commercial sphere, according to my earlier argument around Nonakas & Konno's model, there should be opportunities for internalising and socialising. Both these steps must be included in the process in order that they shall be able to survive as knowledge businesses. I consider this process starts already at the *Entrance*, but that it takes place primarily during *A Room of Ones Own* and *Exit*.

It is obvious it takes time and place to develop praxis around a combination of technology and business knowledge. It is also obvious that it takes a different length of time for different types of business.

When a business takes its place in *A Room of Ones Own*, its own network increasingly evolves. The entrepreneurs get to know other businesses in the incubator, and also begin to get to know their own customers. However, there are certain differences between the two places in the incubator, Stena and Lindholmen. At Lindholmen there is still not a sufficient number of businesses to provide any greater opportunities for finding business contacts within the walls of the building. The critical mass of entrepreneurs has not been reached. It is still too empty in the corridors. Nor has this been compensated for by creating outward links to businesses in the proximity of the incubator. Not even at Stena is there a sufficient number of businesses to encourage more than a few such contacts. It appears that the business activities are too different. Or, is it the case that such contacts can be encouraged more?

The networks the businesses create at the incubator are a beginning for the businesses to manage their own knowledge process, becoming part of ones own network and generative knowledge process. The networks the businesses become part of, however, are still associated with the incubator as a place with its proximity to the Chalmers' environment. What does this mean with regard to the possibility for the businesses to quickly find their place in the commercial world? There is an *Exit* that leads out of the incubator, but the ways out appears to be quite vague for most of the entrepreneurs.

I interpret this situation that some entrepreneurs do not see how their business can function outside the incubator; that they do not have a sufficiently large network (socialisation) outside the incubator that makes moving out a matter of course. If the incubator shall focus on shaping businesses out of technological ideas in a short time, it should also understand the *Exit*, e.g. how this space is connected to the different knowledge processes of the businesses, especially generative ones.

A 'natural' exit would be when the business is mature enough to pursue the knowledge process on its own, and be included in its own network supporting this. An example is when the customers become the more important network for the knowledge development of the business, and the business has found a suitable place that supports and develops these relationships with the customers. Another is if the present environment is insufficient for its own needs, and that the business seeks an environment for itself that manifests the networks that support its own development of technology and business. One

may also suppose that the businesses can move to environments where one finds similar businesses that in a more general way support the knowledge process.

My conclusion is that the incubator does not support the knowledge process at the *Exit*, but that this is a form of competence that the facilitators should be interested in, and where there is more knowledge to seek. What the facilitators have seen the need for is an *Exit* in the meaning of allowing the businesses in the incubator to meet and exchange knowledge with the businesses that have moved away. This has been supported through the network for the managing directors of the businesses. When I referred my conclusions to the facilitators they could immediately visualise a need for ‘gang-planks’ leading from the incubator to new environments. The businesses need to switch over to a new place so that the knowledge process is developed at their own pace, and outside the innovation system seen as a support activity. For some of the businesses the incubator could very well function as a part of the business world.

It is possible to draw parallels between this problem and the problem of getting in sufficient new ideas to the incubator. Here the facilitators are aware there is an interesting place situated outside the incubator but in the campus area, namely the school for entrepreneurship. Within the campus, in a corresponding manner, there could also be space provided for the growth of business – a business environment for technologically oriented entrepreneurs. This can be linked to the argument that I mentioned earlier about the importance of proximity to different organisations. The earlier organisations constitute an important resource that the entrepreneur uses in order to set up business. The Swedish incubator report (Falkeström & Larsson 2000) indicates that it is important to have proximity between the incubator and those businesses that have moved away from it, both as model cases and in order to share experience with each other.

By getting more business networks onto the campus – in an environment full of networks able to foster technological know-how – ‘the parent organisation’ can function for a greater part of the supporting networks, which for instance the industrial districts illustrate the importance of. Without the network these small businesses would not have managed to be sufficiently flexible, which is necessary during, for example, changes in the business cycle or industrial change. The network’s knowledge is greater than that of the individual business.

If I change perspective and see how the incubator functions as scope for action for the facilitators’ knowledge process, I consider the incubator is a part of their generative knowledge circle. The incubator provides legitimacy and stabilisation in the network of competence that the region has built up for the business developers, but also through other networks for incubators and innovation systems in Sweden and on the international scene. The building has been important for the establishment of the activity, and with Stena and Lindholmen, especially the business developers have an *A Room of Ones Own* that function for their competence development.

The business developers' own competence development is primarily linked to the businesses' *Entrance*. There of course they also noticeably share place with each other; they are near each other. The business developers' own generative knowledge process thus takes place (occurs) at the incubator, which is a component in several networks. However, the businesses have to move away in order to continue their knowledge process. For those businesses that remain and socialise as businesses in the incubator, the incubator has changed as a place because it has become part of their space in the world of business. In order that a business shall not become an activity in need of constant support or a 'student business', there should be a 'supplement' to the incubator. The facilitators at Chalmers Innovation can see the need for such a 'Growth Park' near the incubator. Growth Park here means different business environments of varying standard in which the businesses could find an environment after the necessary time in the incubator.

There are thus in principle different ways of getting knowledge processes to become generative. Through, for instance, various 'gangplanks' out to different business environments, or through developing more entrepreneurs and business environments within the campus. These are in themselves interesting possibilities to develop further.

### **5.3 The relationship of space to the development of the activity**

In order to establish the incubator activity it was important to provide it with its own premises. In this way the incubator became an activity in its own right in a building separated from Chalmers, but nevertheless in close proximity. Having ones own building is of both symbolic value and provides legitimacy, which are important factors for the entrepreneurs and for the facilitators of the business incubator. The building symbolises Chalmers' strategic investment in business development, which is important for bringing in an inflow of ideas and capital to the incubator.

The built environment, with associated services, is currently a defined FM-task. It is thus not an integrated part of the business development, neither for the businesses nor for the incubator. In focus for what constitutes FM at the incubator today is a good workplace environment and a social meeting place. In purely practical terms this means that the facilitators are split into two groups. The business developers have responsibility for the development of knowledge, i.e. carry out the process to develop the businesses together with the entrepreneurs. The other group is responsible for the businesses getting keys to their rooms, making sure that there is coffee, organising social events, etc.; in other words see that the building and the services function in a supportive way.

My investigation shows that the incubator is a place for the necessary meetings between the entrepreneurs and the business developers, but also for internalising the knowledge and the development of praxis. The latter is difficult to describe because it is not possible to see this process from the outside. To illustrate this I turn to Göran Lindahl's (2001) explanation of the concept of *configuration*.

Lindahl argues that “the suitability of space is something people can only understand in relationship to their own activities” (2001, p.37, my translation). In order that in a certain context find out what suitability is, according to Lindahl, *participation* is the key. It is by involving those working at the place that suitability for a certain purpose can be expressed and discussed, and in this context Lindahl introduces the concept of *configuration*. According to Lindahl “configuration creates and is created by those activities that are carried out in space” (p. 117, my translation). Configuration is thus both time and place bound. In this way, *configuration* describes the relationships between activity, people, tools and space. It is therefore necessary to come near to the organisation in order to understand “*space as configuration*”(p. 118, my translation).

It is this configuration I have tried to catch in my interviews with the businesses, and by trying to see how their new activities take place in the business sphere. The fact that a discussion about this important step in a generative knowledge process does not take place to any greater degree is probably because it is difficult to describe and it is difficult to register from the outside. This process is also individual in the meaning that different entrepreneurs/businesses take various periods of time and require different space in order to establish business praxis.

My investigation shows that spatial proximity means something regarding socialising, but that the ‘physical’ walls tend to set the limits for this. I consider that the facilitators of the business incubator should be able to utilise more opportunities for socialising within the walls of the building. But also understand there is a need for ‘gangplanks’ to other buildings and environments able to provide further support to the businesses and facilitate them growing into generative innovation systems.

Uhlen states that Maskell et al’s (1997) model for knowledge formation and learning in networks characterised by trust, represents the business level in his argument about how ‘local capabilities’ are developed. The other level is constituted by the place. Uhlin claims therefore that the whole argument deals with the interaction between the businesses and the place. It is in this interaction that ‘localised learning’ is developed. According to Nilsson & Uhlin, this model is the core in Maskell et al’s ‘philosophy of learning’. What I have found in my investigation supports this argument.

My investigation has focused on how the businesses’ knowledge process takes its place in the built environment. It is above all during the *Exit* there are differences in what facilitators provide and what the businesses receive. The businesses are more different at the *Exit* than at the *Entrance*, which puts other demands on the facilitators during the final phase, and would involve a different role than that they have today. This new role shows the need to go from regarding the businesses as customers/pupils to instead regard them as colleagues in the later phases of the incubator process.

If I look at the business developers' knowledge process, the incubator is a space that gradually manifests their knowledge process in a larger network; a supporting innovation system. This raises the issue of what innovation system is in focus. The support system and how it is structured or the businesses and their network? Or both? Uhlin takes up the problem that the innovation challenge, as well as the cluster challenge "does not take up the issue of what learning of the second order – 'deutoro-learning' or 'double-loop learning', i.e. the ability of a system to learn by itself – actually means" (Nilsson & Uhlin 2001, p. 36, my translation). I agree that the point is how the businesses are to become a part of a generative learning process.

My investigation, which has tried to promote the importance of configuration - taking place - indicates that FM is a function that in this context could find more tools to make space inside and outside the incubator to support 'double-loop learning', and through this develop a generative innovation system. If this is going to be able to happen, FM must be integrated in the business developers' strategic task around how the incubator shall be developed. This is in line with how FM seen as an international field of competence has developed, which I have described in section 2.1. From what I can see the operational side as a separate function, focused on flexibility, working environments etc., functions rather well, but the possibility of seeing the strategic value of the built environment is not fully utilised.

#### **The task of the construction client in the university business incubator**

In the project for creating an effective seedbed environment<sup>19</sup> for businesses emerging from good ideas from research and education, The Chalmers Innovation trust became the construction client. The construction client's task was to set up a business incubator close to the Chalmers University of Technology. Prior to the implementation, synergy effects between business development and refurbishment of the premises were aimed for. However, through the choice of how the detail design and construction works were carried out, the processes of construction and developing the activity were kept apart<sup>20</sup>. CI trust is now the owner, but is not otherwise involved in the care of the building. The latter means that the demand to quickly get the businesses to become independent units outside the incubator is to a certain degree in conflict with the need to cover the costs through rentals.

My investigation of the business incubator may in itself be a contribution to clarifying and improving the relationship between the building and the activity. This constitutes a basis for the draft or programme, which is of use for those developing business incubators. This may also be a useful aid when commissioning and building new properties and associated services for new business incubators.

I see a need for an extended role for the construction client in order to create environments for knowledge intensive businesses after they have been through

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<sup>19</sup> *Chalmers nya Innovationscentrum med ChalmersInkubatorn. Förslag till genomförande, 1995-06-16, Göteborg.*

<sup>20</sup> This is described in my investigation *A study of the meeting of technological know-how and business knowledge at Chalmers Innovation.*

the incubator. This places demands for cooperation between various actors in the construction and property branches in order to be able to establish different environments for these businesses, both on the Chalmers campus area and in the city and region.

#### **5.4 How the knowledge process goes further**

The question I have to ask myself is if my concepts have provided me with 'too powerful glasses'? Have I drawn too big conclusions from my findings?

Firstly, I want to point out that my arguments still only deal with one case. I do not attempt to present any general results, rather it is only aspects my conclusions illustrate. I have presented my findings for the facilitators at Chalmers Innovation, and they could immediately see that they had not thought about 'gangplanks' leading away from the incubator. My presentation also aroused a debate about how one tends to create space based on the images of larger companies more than entrepreneurial activities. This also initiated a discussion about Chalmers as a whole, and that what is needed is more business environments around the business incubator, a so-called *Growth Park*, different places for the business to come to after the incubator.

The business incubator has a somewhat unusual FM-perspective. A satisfied customer is the one who moves away quickest from the incubator, i.e. the one that in the shortest time has the ability to develop sufficient knowledge about running the enterprise in order to manage the activity outside the incubator. In order to fulfil this, the incubator should 'cluster' itself to other landlords and facilitators in the surrounding business world. However, this needs to be a network of actors facilitating that the prerequisites for every individual business can be given an opportunity to find a place that supports exactly their requirements. How can this be investigated further?

The description of the facilitators' perspective in my investigation reflects more the business developers' perspective than that of those that work with the building and associated services (FM). How the management of this environment takes place has not been devoted sufficient attention before I began working on the covering paper. This is interesting. In my work I have described that when space functions it is no longer visible in the daily work. This is reflected in my investigation, and this also shows the business developers' view of FM. A means of encompassing that that is not made visible can be to work with imagery, for among other reasons to search for that which is difficult to describe, but also to illustrate the different images to be found among the users of the incubator. This I want to work further with.

The intention from the very beginning has been to study all the eight business incubators affiliated to universities in West Sweden, the region Västra Götaland. This will be carried out as eight case studies in order to provide a broadened empirical basis with regard to the direction of the activities, university competence, commercial structure, different construction clients and managements.

These business incubators have different prerequisites than the incubator I have already investigated. These different prerequisites will give rise to a further development of methods, and thereby give me reason to once again study CI, but then through different glasses than those I had earlier. In this way, I shall continue to develop concepts and models for investigating how knowledge processes take their place, and how the business developers construct equivalent space for action. For assistance I want to continue with methods for interpreting the spatial aspects of social interaction, i.e. in among other ways by carrying out network analyses and then combining these with space-syntax analysis.

.... *“Joy is sometimes a blessing, but it is often a conquest. Our magic moment helps us to change and sends us off in search of our dreams.*

*Yes we are going to suffer, we will have difficult times, and we will experience many disappointments – but all of this is transitory; it leaves no permanent mark. And one day we will look back with pride and faith at the journey we have taken.*

*Pitiful is the person who is afraid of taking risks. Perhaps this person will never be disappointed or disillusioned; perhaps she won't suffer the way people do when they have a dream to follow. But when that person looks back – and at some point everyone looks back – she will hear her heart saying, “What have you done with the miracles that God planted in your days? What have you done with the talents God bestowed on you? You buried yourself in a cave because you were fearful of losing those talents. So this is your heritage: the certainty that you wasted your life.”*

*Pitiful are the people who realize this. Because when they are finally able to believe in miracles, their life's magic moments will have already passed them by.”*

*Paulo Coelho(1994, p. 8)*

*By the River Piedra I Sat Down and Wept*

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