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Technology Transfer
A case-study of the prominence of place
and reciprocity in the global economy

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Summary

This thesis presents a case study conducted within a Norwegain company, Raufoss ASA and their process of technology transfer in relation to establishing a new plant in Montreal, Canada. The research methods have mainly been observations and semi-structured interviews during a three year period from 2000-2003.

In this thesis I deliver arguments for the importance of place and the prominence of reciprocity in the global economy. Globalisation represents an enabling structure for technology transfers to occur, at the same time such a technology transfer is also affecting globalisation.

Place is regarded as important for understanding this technology transfer, and the individuals involved in this project are seen as carriers and representatives of places. Through this argumentation I show that the cultural and institutional heritage at different places involved in such a technology transfer is considerable affecting the process at several levels. The learning processes underline the reciprocity of this process. The actors perspective of learning gradually change from what can be called a one-dimensional character, towards what can be characterised as reciprocal or interactive learning, as those involved got more experience during the project.

Those involved perceived technology in a broad way and included knowledge, skills and attitudes when they defined it. But when enrolling the network at the plant in Montreal, they were not able to follow-up their intentions. They fell into what I have labelled the technical trap and focused too much on the technology. This is explained through recognising that they are trained to handle technical equipment and not the socio-cultural issues. A more holistic approach and background to these challenges would therefore be preferable, to meet the reciprocal challenges that the global economy requires.

Preface

Writing a thesis is a long journey and it is partly lonesome road. But at the same time you meet a lot of interesting and enthusiastic people that inspire and encourage you to go further. These people deserves my deepest and sincerely thankfulness. Along this road I have meet a lot of people, that has been of great inspiration for me. All cannot be mentioned here and my greatest apologies for that.

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I would always like to apologies to everybody for my absence during these years. I hope I can make some of it up again in the future to come.

Sverre Konrad Nilsen   Trondheim December 23rd 2005.

Section 1

Introduction

1. An Overview

1.1 From case to case to case

The industrial consequences of globalisation are a theme that has been my interest field all through my studies and research work. Among these consequences are an intensified competition and a steady increasing degree of industrial reorganisation across national borders. Originally my research project was labelled 'international acquisitions and mergers'. The intention was to study how different geographically located units within an international company would adapt to and effect the development within the new mother organisation. This project was supposed to be done in cooperation with a department within the Raufoss ASA group. Raufoss ASA had at that time (2000) recently, as a response to the global challenges, acquired a company with several units in five different European countries.

In the early phases of this project everything was going smoothly. I had started to work with and oriented myself towards the unit in the Raufoss ASA group. But suddenly it became hard for me to get information, and the situation became rather uncomfortable. But quite soon afterwards I was told "off the record" that the management had decided to sell most of the units and activities that I had planned to study. This meant that I was losing my case.

This period was not wasted, however. I had learnt a lot about Raufoss ASA and their different organisations. I had discovered a lot of interesting literature on the issues of globalisation and industrial development. I had experienced a more operative side of globalisation that attracted me. What stroked me the most was how production lines at different places, that produced similar products, performed differently. For me this was a starting point of developing an interesting thought: Is place an important factor for the performance of industrial production?

Still, I had to find a new case. One of the professors at the research centre at Dragvoll Gård where I had my office, put me in contact with another Norwegian company,

Fundo Wheels, producing aluminium wheels for the automotive industry. I met with this company and we agreed on that I should set my PhD thesis on their process of establishing a new production line at their sister company in Bahrain in the Persian Gulf. The new working title of my thesis was 'technology transfer'. I started gathering information, but first, in spring 2001, I spent two weeks working on the production line at their plant in Høyanger to become familiar with their production process. During these two weeks I took notes and afterwards started conducting interviews, both in the local organisation and in the local community. I was more or less finished with my empirical studies in Høyanger and we were starting to plan for my trips to Bahrain to continue the empirical work there. Then it became clear that the company was in severe economic trouble and was heading towards bankruptcy. Two things became rather obvious that i) they had to cancel their plans of establishing a new production line in Bahrain, they couldn't justify the costs, and ii) they had to refinance the company. I was losing my case again.

These two stories can serve as an illustration of the intensification and the pace of change in the global economy. Even if I had learned a lot and my thoughts about globalisation and the operational consequences for industrial activity were developing in an interesting way, my situation was rather frustrating. I had now lost two cases, on which I had spent quite a lot of money and time. The positive side was that at this time I had gained some experience with working with another company and doing research on a process of technology transfer there.

In the autumn 2001 the Raufoss ASA group had decided to set up an establishment in Montreal, Canada. The establishment was supposed to be carried out through their daughter company - Raufoss Chassis Technology (RCT)[1]. They made contact with me and wanted me to join them in this process. As one of their representatives expressed it; *"We want you to join us, so that you can help us to ask the questions we do not ask. You have a different background and see things in a different way in opposition to us, and our technical point of view. In this way we think this could be fruitful cooperation for both you and us."*

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[1] In the thesis I do not make clear distinctions between Raufoss ASA and Raufoss Chassis Technology, because these are just formal distinctions. I find it more important to make distinctions between the actors involved within these companies and the Canadian organisation, as shown in chapter 9.5.

This invitation was just what I needed at that time. We agreed on a plan for the fulfilment of this project after just a few discussions. This cooperation was in both my and Raufoss ASA's interest. I was able to utilise some of the experience I had achieved in my work with Fundo, and Raufoss ASA was able to introduce me to a case that was important for them. At the same time they got a chance to salve their bad conscience for the first case that fell through.

1.2 Developing the scientific approach

At this time I had moved from a focus on international mergers and acquisitions and how different geographical location affected such an international cooperation, to a focus on technology transfer from one place to another. Either way, these approaches were, in my opinion, related to each other. Globalisation formed the background and the consistent idea in this has always been how social and cultural phenomena at different places affect organisational or business related processes between places. In this way I didn't have to make huge changes in my original research plans, the fundament was more or less the same. I developed a few research questions in cooperation with Raufoss ASA, who after a short while became my main contacts in this process. We concluded that my overall main concern should be how technology transfer can be done from my perspective and at what degree would the places involved affect this process. This was practically done in the way that I developed my research questions and then Raufoss ASA agreed. What was more important in my view were the agreements on how this study was to be carried out. They accepted and encouraged my desire for being involved in the processes of this technology transfer. As long as I agreed that the business development was the most important aspect for them and was to be prioritised, they had no problems with me being thoroughly involved and asking questions on the processes. I was licensed to talk with whomever I wanted, in both the Norwegian and Canadian organisation. It was also agreed that I could directly contact and make appointments with those people I wanted to interview. Raufoss introduced my project to the Canadian Management who would be responsible for introducing on me further, should I need that sort of assistance.

Before I elaborate further on the scientific approach and get into the research questions, I will give a brief introduction to the background story of the establishment in Montreal.

1.3 From Raufoss to Montreal

At 08.21 on December 20th, 2000, an announcement ticked in at the Oslo Stock Exchange[2]. The chief content of the announcement was that Raufoss ASA had been awarded a contract with General Motors (GM) for supply of aluminium wheel suspensions to their American production platform[3]. Approximately six months previously Raufoss ASA had been awarded a supply contract to General Motor's European platform EPSILON. To meet the supply to the EPSILON production platform, Raufoss ASA was building a new factory at Raufoss. The company had previously produced aluminium wheel suspensions at Raufoss but not in the volume the new contract involved (see chapter 9). This made it necessary to establish a new, modern factory to meet the requirements of the GM contract. The contract was of a considerable size with a value of several hundred million Norwegian crowns a year, and a duration of seven years.

Thus a new contract had been signed for deliveries to GM, the American market of the world's largest car manufacturer. It was certain that, these deliveries could not be served from Raufoss in Europe. This was due to the considerable distance between Europe and North America, the distance was too far and the risk of delivery delays was considered too high. It was necessary to establish some form of production on the American continent. The form of the chosen solution was an important and essential

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[2] "The Raufoss Group has received a promise of order from General Motors North American Car Group (GM) for delivery of wheel suspensions to several of GM's American manufactured cars. The order has an annual value of several hundred million Norwegian crones in full batch production and is a continuation and expansion of the cooperation established in connection with deliveries to GM Europe announced in November 1999. Batch production for North America is expected to commence in 2002…" (Stock Exchange announcement 20 December 2000)

[3] Production platform is understood as the way GM has chosen to organise its production. This philosophy is based on the idea of producing as much as possible on the various models identically and letting the aesthetics and amount of extras and engine rating constitute the difference between the models. What you "don't see" on the car should be identical. GM has one platform for Europe adapted to the European market's wishes and needs, and one platform for the American market adapted to its wishes and needs.

question. The different solutions ranged from the establishment of a proprietary factory to possibly licensing the production to a joint venture partner. Another issue was where the production should be located if a new purpose-built factory was to be established. The American continent is of a significant size, and there were a host of different alternatives for localisation. When choosing a production location for the European market, the solution was fairly easy as the production environment at Raufoss was the only real alternative. The technology was developed at the innovative automotive environment at Raufoss. This automotive milieu has a history of innovating automotive products in aluminium. Today there are approximately seven companies who serve the automotive business in one way or another at Raufoss. In Norway there are no other such agglomerations of related companies serving the automotive business with more or less related products.

Based in this automotive community at Raufoss, Raufoss Chassis Components (RCC) was now facing major challenges. Following a sourcing process RCC decided that the sister factory in North America would be located north of Montreal, Canada. The city of Montreal has approximately 2.5 million inhabitants and is located in the Quebec province in south-eastern Canada. RCC gained access to an industrial site, including buildings, in an industrial area near Boisbriand, 30-40 km north of Montreal. A local management were hired almost immediately to manage what would become the Canadian organisation Raufoss Automotive Components Canada (RACC). With the localisation issues solved and newly hired management for RACC in place, RACC and RCC were ready to start the planning process.

1.4 The purpose and general research questions

Establishing a new factory on a different continent represents a series of challenges. Technology transfer is a series of complicated processes that involve individuals, organisations and places. In addition those involved go through several complicated learning processes that I want to learn more about. When it comes to technology transfer, a lot of studies have been carried out, but mostly in a macro oriented and quantitative way (i.e. Ivarsson and Alvstam 2003, 2004, 2005, Ivarsson 2002, 2002a). My approach is a lot more micro oriented and focuses on the critical processes and

actors involved. It is hard to see how the more macro oriented studies capture what I regard as the essence of technology transfer, namely the actors involved and the range of complicated transformation and learning processes they go through.

My approach is inspired by Gertler's (1995, 1997, 1999, 2001) studies of technology transfer and technology implementation. Case studies of implementation of technology in new contexts and technology transfer show that these are difficult processes (Gertler 1995). The origins of the difficulties are often of a more profound character, than what is initially realised (Gertler 2001). This is very well documented in Gertler's (1997) article on technology transfer from Germany to Canada that especially triggered my interest. Here he addresses the challenges related to the regional culture and institutions in both the host country and country of origin. This implies some kind of reciprocity in the technology transfer. In that relation Morgan delivers a more general, but important perspective when he states (1997:495):*"we are now beginning to appreciate that globalisation and localisation, far from being mutually exclusive processes, are actually much more interwoven than is generally acknowledged"*. With this perspective in mind and inspiration from Gertler's studies I will try to dig even deeper into the challenges concerning technology transfer in this thesis.

In my case a considerable amount of technology developed at Raufoss would be transferred to Montreal. The technological equipment that would have to be set up in Montreal would mainly be a logistical challenge to deal with. In addition, one would need to find good solutions and working methods for a range of other challenges. A substantial amount of activities would have to be coordinated across the Atlantic, varying from specific and definite activities like fitting of machines, to more complex and diffuse activities such as skills transfer, learning and further development of existing solutions.

Technology transfer of this kind can be understood in different ways. An essential aspect is how one understands the concept of technology and how one defines technology. One definition of technology is to view it as physical objects. Such a definition reduces technology transfer to just being an issue for logistics. A somewhat broader definition is that presented by McKenzie & Wajcman (1985), where technology is defined as physical objects that perform tasks. An alternative to this view is Levin's

(1997) definition that also ties technology to an element of knowledge. Levin maintains that technology also comprises the knowledge of how the physical objects should be operated or handled to perform certain tasks. This understanding also implies that technology can be coded in a cultural setting and that it therefore must have a meaning in a cultural and social context. Hence technology requires cultural comprehension, knowledge and skills. This means that technology transfer is a much more complex process than just an issue for logistics. This discussion will be elaborated further in chapter 6.

Including cultural comprehension, knowledge and skills, technology can be interpreted in relation to Latour's understanding of technology. In Latour's inscription concept (1991) he argues that technology is inscribed with social meaning. This is a result of the technology having been designed in a social setting that will have left, or inscribed, social marks on it. This understanding of technology can also be seen as an argument for the existence of place-specific technology. In other words, technology most often will have been developed in the social setting of a specific place, and this place, through its social setting, will have inscribed signs and symbols in the technology, giving meaning to the participants that are an active part of the specific social setting.

Based on the argument above one can legitimately claim that technology is place-specific through the inscription of social codes in the physical objects (see also chapter 3). To handle and understand the physical objects demands knowledge and understanding of the actual objects, in addition to the contexts in which they were developed. Based on this it can be said that the operators of these physical objects must have knowledge of this context, meaning that people in this context can act as translators with decoding skills. This means that they become representatives for places that are inscribed in the technology, and thus it is reasonable to assume they also hold considerable decoding skills. Decoding skills in this context are skills to make the codes inscribed in the technology implicitly or explicitly comprehensible.

I have now briefly accounted for an approach to technology where I have also incorporated people as important aspects in the understanding of technology. This has been done by looking at the level of the individual, while at the same time involvement on a collective level has been suggested by arguing that the social context is important

and then linking this to place. In the field of geography place is a central concept and this will be reflected upon in this thesis. At this point I wish to introduce Thrift's (1997) notion of place where place should be understood as "passings that haunt us". This approach suggests that individuals will be characterised by the places they live or reside, and simultaneously they will characterise these places through their very presence. Further this will involve an understanding of the individuals becoming characterised by, and carriers of, places. In this context individuals can be regarded as actors representing places. This will be elaborated further in chapter 3.

This leads to an understanding of technology, places and individuals as actors in a tightly woven network. Such an actor-network reasoning (Latour 1987, Law 1992) seems as an interesting starting point to understand the complexity of challenges related to the globalisation of the economy. At the same time this forms the basis of a framework for analysis of transfer processes. Such a tightly woven network including technology, places and individuals indicates interaction and reciprocity in the relations between these factors.

Based on this background the **main purpose** of the thesis is, firstly; to address the challenges related to the technology transfer process, and, secondly; to discuss how the transfer process are, and should be, carried out.

The research questions of the thesis are elaborated on the basis of the theoretical framework that are presented and discussed in section 3. These questions will address the transformation processes this technology transfer represents. Each of the chapters in this section underpins one of the research questions. The questions are:

- **In what way do the historical trajectories at different places, understood as cultural or institutional aspects, affect the transfer process?**

- **How is learning perceived in this process of technology and knowledge transfer, and how is the learning carried out in practical work?**

- To what degree are the enrolment of the actors and the actants seen as equally important in this technology transfer? And whether they are treated differently or not, why is it so?

In this introduction chapter I have outlined a comprehension and possible frame for analysis of these questions. However, in the establishment of the new factory, this process is highly unlikely to be a one-way process directed from Raufoss, where the staff in Montreal remains passive recipients. Technological development is often a complex process with contributions from several actors (Pinch & Bijker 1987). This implies that the context or social system where the technology and production process will be implemented also will be an important actor in a potentially successful technology transfer. This leads to my last research question:

To **what degree is place and reciprocity important and prominent in this case of technology transfer?**

Through analysing how the different places interact with each other I will be able to make some statements as to their contribution to this process. I will alternate between analysis on the levels of place and analysis of the more inter-human character in the interactions between the various actors in this process. By doing this I wish to throw light on the correlations between the place concept as the level of analysis, meaning the geographical perspective and its implications, and the actual inter-human processes that take place in the interaction between representatives from Raufoss and Montreal.

1.5 Presentation of the thesis

In this chapter I have presented the background for the thesis and how I resulted in having the case I have been studying. The chapter ended with an elaboration of a presentation of the purpose and the research question that I will try to answer in the thesis.

In *chapters 2-7* I elaborate upon my theoretical position. In *Chapter 2* I discuss what globalisation is about and I address what have been the main forces that have been active in changing the economy into a global one. This leads into *chapter 3* that takes

the discussion from the global level and into a discussion of regionalisation and place. This is done by going from the global level and through a discussion of regionalisation as an alternative way of understanding the economy before the discussion ends with an argumentation of how place is understood and different perspectives on the concept of place. *Chapters 2-3* are mainly based on discussions within the discipline of geography.

In *chapter 4* I present my theoretical position concerning the concept of culture. Here I give a brief introduction to culture and how this can be understood. Institutionalism is also presented as an approach in this relation. The chapter ends with a presentation of creolization.

Chapter 5 is devoted to the concept of learning and presentations of several learning theories. Here I present different perspectives of how knowledge is created.

In *chapter 6* I discuss different ways of understanding technology. Actor Network Theory is part of this discussion. How technology is developed is also an important aspect in the discussion along with the question of how technology is transferred or disseminated.

In *chapter 7* I present my methodological approach. Here details of the data material are presented and I discuss the quality of the data achieved. The fieldwork is thoroughly presented, and I also reflect upon some theoretical and empirical considerations.

Chapter 8 gives an understanding of the background for the automotive industry and its development. The development of this industry has had severe consequences for Raufoss and their development. This development is important to bear in mind when we are trying to understand both Raufoss' position as a company and why Raufoss had to establish a new plant in Montreal.

Chapter 9 is an empirical presentation of the background of the case. This includes the history of the company Raufoss, in addition to a presentation of the product and the production lines that are at stake for this technology and knowledge transfer. Further, the search for location alternatives in North America is presented. At the end of this chapter I give a presentation of the most active and important actors in this transfer process.

Chapter 10 is the first analytical chapter, but it is also an empirical presentation, where the transfer process of knowledge and technology is the focus. This is a more or less step-by-step presentation of the process from the starting point with planning and preparations and towards the start of production in Montreal.

In *Chapter 11* the cultural issues are analysed. Here I analyse how culture has played a role in this transfer process and I present some important differences in culture and which affects these have had on the process.

Chapter 12 presents an analysis of the learning processes. The starting point where Raufoss considered this to be a one –way learning process, and the acknowledgement of this being a reciprocal process is essential in this analysis. Another important issue here is the different emphasis on the technical training and the socio-cultural training.

In *chapter 13* I analyse and discuss the technology and knowledge in the light of an actor network approach. How they recruited the personnel and built the Canadian organisation are central aspects. Getting the technical equipment and deliveries in place are also important issues here.

Chapter 14 is the final chapter where I draw my conclusions of this study in relation to whether I am capable of answering my research questions. And further I present some interesting research issues that could be an opportunity for further investigation concerning research in technology and knowledge transfer.

Section 2

Globalisation and

place

2. Globalisation

Globalisation has become a well-known term in recent years, mostly used to describe the global economic development but also the geographic extent of economies. The term is also used to describe the global extension of other phenomena such as ecological challenges like pollution or social and health issues such as the spread of HIV. The notion of globalisation is being used to describe a variety of factors, among them economic expansion and the following integration of economies. Most authors and commentators have accepted that the world has gone global in one way or other. In everyday speech there is considerable confusion and a variety of meanings attributed to the notion of globalisation. One common interpretation is that globalisation is something mysterious and uncontrollable. Or like Amin & Thrift (1997:147) has put it, it is often seen as *"an 'exogenous' force which threatens local and national identities, integrities and autonomies"*. This is especially evident in political rhetoric.

In academic literature there is less confusion, and the term is used more consistently. Nevertheless, the understanding of globalisation is more polarised (Dicken et al. 1997). Consequently, it is necessary to discuss and present a suitable definition of the term for the intents and purposes of this chapter and thesis. My basis is that globalisation provides an important backdrop to understanding the transfer of technology. In this chapter I will discuss the phenomenon of globalisation in the view of some well-known authors on this matter. On the basis of this discussion I will try to present an understanding of globalisation that is relevant in my perspective: to explain how the general, global development in the automotive industry is affecting the situation of a Norwegian car-component producer, and further how this car component producer meets some of the challenges. After arguing for how globalisation should be seen as an important backdrop and an enabler for technology transfer, I will, in chapter 3, discuss how regionalisation and, in the last instance, place become important factors for understanding the transfer of technology.

2.1 Modernity

If globalisation is a new and important societal change, it is important to put the phenomenon in a wider perspective. Such a perspective can be found in Anthony Giddens' "The Consequences of Modernity" (1990), which is recognised as a considerable contribution to social science. Giddens argues that several important changes took place in the social life and organisation of Western Europe in the seventeenth century. These changes subsequently developed worldwide, driven by the forces of industrial and political revolutions in Western Europe. The discontinuity of modernity is in this relation linked to a certain period of time and with an initial geographical location (Giddens 1990, 2003W).

The discontinuities that represent the transition from traditional society to modern society is recognised by the sheer pace of change, scope of change and the intrinsic nature of modern institutions. Modernity's pace of change is one of the most obvious discontinuities; this is particularly conspicuous in the technological sphere, but also in other fields. Even though traditional societies were also dynamic societies, they could not match the rapidity of the changes in the modern society. The extent of the changes in modern society was also much greater than what was known in traditional societies. When new areas of the globe came in contact with each other, this led to new types of social understanding and social change. The third discontinuity that separates the modern world from the traditional world is the intrinsic nature of modern institutions. Some of the modern world's institutions were simply not present in traditional societies. The political system of the nation-state is one example, the production system's dependency on inanimate energy is another.

Thus, I understand modern society as that which emerges in Western Europe around the seventeenth century, a society profoundly different from traditional society in the way that changes are faster and more comprehensive and that its institutions are considerably new and different. In other words, our society transformed into something completely new around the seventeenth century.

Another central aspect of modernity is the disembedding of social systems. The disembedding mechanisms of social systems are evident in the creation of symbolic

tokens and the establishment of expert systems. To illustrate what he means by symbolic tokens, Giddens uses money as an example. He argues that money illustrates how social relations are lifted out of the local context of interaction by the use of the symbolic token. Likewise, our trust in expert systems is another example of the same phenomenon. Modernity distances us from the social relations we were previously dependent on interacting within. The question is whether it is possible to understand this also as the beginnings of globalisation and a global society?

2.2 From modernity to globality?

My question above raises   another question; does Giddens´s understanding of modernity also represent a common understanding of globalisation, or globality, and a starting point for what is recognised as globalisation? When reading the daily press and observing political debates, a common understanding of globalisation seems to be the increase of speed and the expansion of social processes. This is, more or less, the same as what Giddens argues to be the important discontinuities of modernity. And he does in fact claim that modernity is inherently globalising (Giddens 1990).

Based on this perception it can be difficult to distinguish modernity from globalisation or what we might call globality. One attempt is made by Giddens (1990:64) himself: *"Globalisation can thus be defined as the intensification of world wide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa."* Hence, according to Giddens, globalisation represents an intensification of social processes worldwide, among them the effect that something happening in one place affects other places. This is how I understand globalisation in interrelation with modernity and not in opposition to it. As Giddens also considers, globalisation can be seen as a consequence of modernity, but also a prolongation of modernity. This leads to an understanding of globalisation as an intensification of central aspects of modernity.

The intensification

To use the term intensification to describe some of the main factors of globalisation makes sense for my perspective, and it also opens up for including and giving right to the claim that globalisation is a process that has been going on for a long time. Consequently, if we take communication as an example, communication technologies have improved increasingly in the last decades to bridge distances. However, according to Harvey (1989), this happened in the end of the nineteenth century as well, when new enabling technologies such as the telegraph, telephone, train and steamship contributed to increasing speed in the communication between people. In our days we have also experienced new advanced enabling technologies that help us increase the speed in our communication. Through the 1980s and 1990s the Internet and e-mail have been some of the main catalysts and examples of this development. These technological developments have contributed considerably to what Giddens (2003W) claims is an example of the intensification of social relations across the globe.

I find Giddens' reflections on this issue as quite general; he discusses the issue on a societal level, and his discussions are most relevant and interesting. There is a need for a more profoundly spatial discussion and a more precise discussion of what this means in economic and industrial terms. In the following I will discuss more concrete the different aspects of globalisation and different positions within the globalisation debate. When using the term globalisation I will, in the rest of this thesis, primarily focus on the economic globalisation.

2.3 "Pro- and antiglobalists"

In understanding globalisation with industrial development in mind, the different opinions are easily connected to different political views. The business gurus and neo liberals are quite often found on, lets call it a pro-globalisation side, and those on the political left on the more anti-globalisation side[4]. This division has led to a polarised debate pinpointed by Dicken et al. (1997). The reason why it is interesting to link these two sides to political standpoints is that, the two sides understanding of and

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[4] This is a rough separation between these two sides, that will be explained later on.

argumentation for or against globalisation is more or less based on the same points. Korten (1995:131) summarises the ideal world of the pro-globalisation side, or what he calls the "global dreamers", in this way:

- *"The world's money, technology and markets are controlled and managed by gigantic global cooperation's.*
- *A common consumer culture unifies all people in a shared quest for material gratification.*
- *There is a perfect global competition among workers and localities to offer their services to investors at the most advantageous terms.*
- *Corporations are free to act solely on the basis of profitability without regard to national or local consequences.*
- *Relationships, both individual and corporate, are defined entirely by the market.*
- *There are no loyalties to place or community."*

This vision or ideal world is fundamental in the "global dreamers" understanding of the society we are aiming for or, at least, moving towards. The paradox in my point of view is that this is exactly the same society that the anti globalisation activists fear. The argumentation presented at the demonstrations in Seattle, Prague, Geneva and Gothenburg, during the first few years of the 21st century, seems to be based on a fear that the society envisioned by global dreamers is likely to become a reality.

It is, however, more important that the "global dreamers" present globalisation as a condition. This can be interpreted as if, in the global dreamer's eyes, globalisation is a higher-level of societal development. A second point is that they in their approach speak of globalisation as a homogeneous phenomenon; it is an all-encompassing condition that affects the life of everyone in one way or another. The scarlet thread in this approach is that the world is seen as a common marketplace with a common consumer culture. According to this understanding the world has become one, with no room for diversity or the need for different development. This interpretation is based on the understanding of the global condition as a fulfilment of the complete market economy.

This approach and understanding of the global development is of course leading to reactions on the anti-globalisation side. Important questions to ask in this respect are then: is the vision or the ideal world of the global dreamers likely to become a reality, or at least; do we see any sign of this becoming a reality?

To answer these two questions I will rely on Dicken et al. (1997). They deconstruct globalisation and present an alternative point of view and approach to globalisation. They argue that globalisation is a process rather than a condition. They summarise their approach in six principles (Dicken et al. 1997:165):

- *"Globalisation is a complex of processes, not an end-state or "new order".*
- *Globalisation is a contradictory process, not an unbending force or a unidirectional trend.*
- *Globalisation will proceed hand in hand with uneven spatial development; it is not the opposite to it.*
- *Globalisation processes, just like any other, do not float in the air, but are realized in specific institutionally, historically and geographically specific sites.*
- *Globalisation implies qualitative as well as quantitative change, in the sense that there are changes in the relationships between scales, social structures and agents.*
- *Globalisation involves the complex diffusion, rearticulation and reconstitution of power relationships, not simply a zero-sum redistribution among nation states and the TNCs"*

This understanding of globalisation is quite opposite to that of the "global dreamers", which is based on the ideal types of infinite mobility of capital, the prevalence of unregulated market forces, the attainment of absolute power by transnational corporations, the demise of the national state and homogenisation in social, political and economic conditions. Dicken et al.'s (1997:161) argumentation strives to be an alternative argument to the *"undertheorized empirical claim and counter claim which*

have characterized aspects of the debate". The main argument and contribution in their approach to globalisation is their focus on globalisation as a process. In answer to the questions raised above, the world that the "global dreamers" are dreaming of and the one that the anti-globalists fear do not seem to becoming a reality according to Dicken et al. (1997). In their perspective both the pro- and the anti-globalists perspective is far too unbalanced, and globalisation is a more complex issue than presented in their argumentation.

2.4 Enablers

Seeing globalisation as a process more than an end-state or new order has important impact on how to understand technology transfer. To fully understand the process of economic globalisation, however, it is also important to understand the background for the process and also to understand the forces that maintain it. When trying to identify the background for economic globalisation, one immediate thought that comes to mind is trade across national borders. But as Glasmeier (1999:9) argues; *"There has always been some level of trade across national boundaries for as long as national boundaries have existed"*. Hence, globalisation has to be understood as something more than just simple trade across national boundaries. This is also in accordance with Giddens' discussion as I have presented in chapter 2.2. Amin & Thrift (1997:147) indicate that *"globalisation can be traced back at least four centuries from the rise and subsequent expansion of capitalism across the world"*. At the same time they argue that an intensive globalisation took place in the early 1970s as a consequence of the break up of the Bretton Woods system, which regulated the financial control of the national economies. According to this, the time before this intensive globalisation can be seen as a time with various degrees of- and perhaps non-intensive- globalisation.

What has changed then?

To understand globalisation fully it is necessary to know what forces are operating in the global economy, thereby actively shaping the development. However, there is not a clear cut between the forces that are underpinning and reinforcing the global economy and what might be seen as the foundation and basis for the global development. This

will be elaborated further in the following sections. There are several authors contributing to the discussion of forces operating in the global economy, Glasmeier (1999) is already mentioned and I will also rely on Amin and Thrift (1997), Martin and Schumann (1998) and Harvey (1989) .

The deregulation of the Bretton Woods system is often mentioned as one possible starting point for the intensive globalisation. The liberalisation of trade across national boundaries, and the general opening of markets world wide, through lower tariffs and non-tariff barriers, has reduced the protection long enjoyed by firms located especially in the western world and Japan. Through the liberalisation these firms have been exposed to a competition that was unthinkable only a few decades ago (Glasmeier 1999).

This liberalisation has created a new market, namely the fast growing financial marked. When Bretton Woods collapsed, it opened up for speculation in different nations currencies. The further liberalisation of the financial markets opened up for speculations in a lot of other financial services or assets. This has resulted in increased centralisation of the global financial structure (Amin & Thrift 1997, Martin & Schumann 1998), and it has increasingly led to a development where *the financial capital has become an independent force in the modern world* " (Amin & Thrift 1997:148, Harvey 1989). In fact, the power of the global financial forces has started challenging the national economies. This became especially evident in several incidents in Europe during the 1990s (Martin & Schumann 1998), but the Brazilian economy has also been challenged by these non-governed uncontrolled financial speculations. Despite this undesirable financial speculation, especially expressed by so-called globalisation sceptical organisations such as Attac, the deregulation of trading across national boundaries has also eased the trade in the more material industry. The more specifically spatial effects and its relevance for the automotive industry will be discussed in chapter 8.

Another factor that has been important in the creation of the global economy is the technological change of the last thirty years, and the following dramatic reduction in communication and transportation costs. "*This has lessened the need for manufacturing plants and other major service centres to be close to either the headquarters or their*

markets" (Glasmeier 1999: 10). The technological change has opened up for a more dispersed organisation of the economy, and according to Glasmeier's quotation, the need for proximity regarded to headquarters and production plants have been reduced. This is also commented by Amin and Thrift (1997:148, my underline) when they sum up one of the factors rising up in the name of globalisation; "*the internationalisation of technology, coupled with an enormous increase in the rapidity of redundancy of given technologies*". The technological change and the internationalisation of technology are important aspects of the development in the economic and industrial sphere. The technological change and the price reduction on transportation and communication can be seen as an enabler for internationalisation, as Amin and Thrift speak of, or globalisation which I prefer to say, of technology. Anyway, this development opens up for – and eases – the breakup of industrial production processes into sub-processes that can be located in different nations.

Another tendency we can see in the industrial development of the last thirty years is the dramatic internal restructuring of transnational firms (Glasmeier 1999). As a response to the changes in their external environment they have had to go through considerable changes themselves. The have gone from internal vertical integration of production *"towards more flexible patterns of "multi-source" international production that requires less ownership and more reliance on strategic alliances, short term contracts, and the shipment of components from many different international sources to as many different markets"* (Glasmeier 1999:10) This quotation, in my point of view, is based on the special business situation of a firm with a high volume product for homogenous markets around the globe in mind. It does not necessarily apply to the automotive industry. Thus, we must be careful to generalise from the case of one business situation only. Amin and Thrift (1997) are concerned about the internal structure of the companies as well as about the development in general. They claim that we can se a major rise in transnational oligopolies. The tendency seems to be that firms at a much earlier stage of their development have to be globally oriented, and that their national market share is becoming less important, when they head towards the "global market".

Finally there has emerged an economic diplomacy and, parallel to this, states and regional governments have developed new economic strategies (Amin and Thrift 1997, Glasmeier 1999). On a supranational level an economic diplomacy has evolved,

constantly developing and negotiating international trade agreements. World Trade Organisation (WTO), Organisation for Economic Cooperation and Development (OECD) and the International Money Foundation (IMF) are the most prominent actors in this relation. These organisations are laying the basis for further development of trade between nations. The most striking change may still be the reactions of new strategies of national and regional governments according to the new challenges they experience. They have realised the new competition arising and are becoming increasingly aware of the changes taking place internationally, and in response they have developed new economic strategies. This implies new marketing strategies designed by national or regional professional "place-marketing" firms. Examples of this are the Irish Development Agency (IDA) in Ireland or SGF (The Société Générale de Financement du Québec) in Quebec Canada. These are professional Place marketing businesses owned by the national or regional government. Their objective is to attract industries, often predefined, to the area and negotiate the financial solutions, in some cases taking direct part in the financial solutions. This activity seems to have been important both for Ireland and Quebec.

2.5 Summing up

In this chapter I have presented a discussion of globalisation. The starting point was Giddens' discussion of modernity. Through the discussion of the intensification of an already existing global process I turned the focus towards different positions within today's debate of globalisation. I ended the chapter by focusing on what I call the enablers, which is what has made this intensification possible. The changes in the global economy have led to new national and regional strategies. These new national and regional strategies exemplifies that economic activity in the global economy are taking place in actual places, regions or nations.

The enabling forces and the following intensification of the global economy have lead to increased interaction across national borders. In clear words this is what makes technology transfer possible. Being able to transfer technology and production systems in this global context becomes important for businesses to stay competitive and being able to satisfy costumers around the world. The implication of this argument is that they

have to be capable of transferring their technology and production system from one place in the world to another in an efficient way.

This argument has a couple of consequences for this thesis. Firstly, there is need for a further elaboration on how this intensification of the global economy has localised consequences. And secondly how is place perceived as an important factor in these processes of transferring technology from one place to another in the global economy. There are several theories that argue for an economy that is being more regionalised because of these changes taking place at the global level. I will now turn to a presentation and discussion of these theories.

3. Regionalisation

In a situation where we can allow ourselves to operate with notions like "global dreamers" when referring to the pro-globalisation side and also claim that the anti-globalisation side is afraid that the "global dreamer's" world will come true, it suggests that we are not quite there yet. This allows for a perspective that assumes another possible direction for the development, or at least a complementary alternative. Regionalisation might be seen as such an alternative perspective. This is addressed as a paradox by Amin and Thrift (1994), when they point to the phenomenon that the globalisation has led to a rise in the interest for, and an increasing emphasis on, the local and regional circumstances. In my interpretation of Amin and Thrift (1994) they do not see globalisation as opposed to regionalisation, but rather as two parallel processes that have to be seen in relation to each other.

I will give an outline of different contributions that argue for a more regionalised economic development. Such an argumentation is needed as a tool in the attempt to clear out my standpoint concerning what does place mean in our globalised world. Several authors have presented different theories on a more regionalised development of the economy. The first to emphasise the regional dimension was Marshall (1919) with his notion of industrial districts. Others are Perreux (1955) with his growth pole theory, and Porter's cluster theory (1990, 1998 and 2000) represents further development in this direction. In the following I will present Asheim and Isaksen's (2000) regionalisation thesis, and then I will present Maskell et al.'s (1995) theory of the localised capabilities. Through my argumentation of regionalisation I will end up with my way of viewing place in the global economy.

3.1 The regionalisation thesis

In chapter 2 I have discussed globalisation and its background. The perspective of globalisation as a process of homogenisation and a world wide sourcing process focusing on the lowest possible input costs is also often referred to as neo-fordist development. In this perspective globalisation may have a tendency to be interpreted as

"the end of geography" as the importance of national and geographical boundaries is reduced as a consequence of the liberalisation of trade. The regionalisation thesis or the post-fordist development is often seen in opposition to globalisation, but might also be seen as an integrated part of globalisation. At the same time regionalisation indicate that other production factors that are far more place-specific, is becoming more important in the new global economy. These factors are often "non-economic" factors that are creating competitive advantage and different regional economic development and growth rate (Asheim and Isaksen 2000). This makes regionalisation a perspective with focus on economic activity that are depending on resources that are specific to particular places, and which cannot be imitated easily by places that lack these qualities (Storper 1997). Porter (1998:78) points at the essence of this when he states: *"the enduring competitive advantages in the global economy lie increasingly in the local things – knowledge, relationships, motivations – that distant rivals cannot match."* Regionalisation is thus a perspective that emphasis that the firms and their competitiveness are embedded in local economic, social and cultural structures. According to Asheim and Isaksen (2000) the regionalisation thesis has four main building blocks: innovation, interactive learning, localised learning and clusters. These are presented below.

Innovation

It is a common assumption that today's economy is less predictable and standardised than it was in the days of Fordism. This change in the economy requires new strategies for being competitive. Innovation and learning are seen as two key issues in this relation. One consequence of this is that the ability to learn and to innovate is crucial to be able to determine the competitiveness of firms, regions and countries. The increased focus on knowledge assets and learning abilities in the construction of competitiveness is important in gaining local and regional development. At the same time these factors are acknowledged as new production factors and are becoming new important location factors changing the industries' geographical patterns (Malmberg 1997). Innovation and learning are in this way new and important factors that need to be understood and taken into consideration when analysing regional uneven development (Asheim and Isaksen 2000).

Interactive Learning

The second building block is interactive learning. Interactive learning is the conceptualisation of innovation as a complex interactive non-linear learning process. This view involves a critique of and an alternative to the linear innovation process model, which focuses more on radical technological innovation (see chapter 6). It is recognised that much innovation is incremental rather than radical, and often a result of organisational learning rather than formal research and development work (Porter 1990). This view of innovation is based on the idea that the innovative performance of an economy is depends on the firms' ability to utilise the innovative resources of each other and of research institutions and the public bodies. This view makes networking, interactive learning and co-operation strategic important factors in promoting competitiveness. This type of co-ordination of the economic activity, based on trustful co-operation, is rather different than the principle of hierarchical control that was dominating under Fordism. This way of co-ordinating the economy seems to be important for the knowledge accumulation and diffusion, at least in two ways. The first is that networks between firms seem to encourage new knowledge through an extended specialisation between firms. The second is the importance of informal social institutions (see chapter 4) in the work of creating the learning processes and innovative activities. This links the innovation process to humans, through the understanding of communication and human interaction as vital aspects in innovation activities (Asheim and Isaksen 2000).

Localised Learning

Stating innovation as a social process where social institutions play a vital role is leading to the next building block, localised learning. Seeing innovation as a social process implies that these processes are influenced by a context. The historical and cultural context of these informal institutions and the social processes become important and are linking the innovation processes to a place. In this term learning can be seen as a localised process and not a placeless activity. Learning is then to a large extent shaped by the historical trajectories of the local milieu, and the local institutions created through its history (Nilsen 1999, Dale and Nilsen 2000). Knowledge is often divided into two different types, explicit (Nonaka and Takeuchi 1995) and tacit knowledge (Polanyi 1966) (see chapter 5). Tacit knowledge is often constituted through

practices and routines and is also an important dimension that contributes to the argumentation of linking learning to a local activity. The learning processes are thus to a large extent localised, and the regional perspective and dimension becomes evident as Asheim and Isaksen (2000:170) state: *"The competitiveness of firms is partly seen to depend upon the stock of knowledge and the learning ability in the regional milieu."*.

Clusters

The fourth building block in Asheim and Isaksens (2000) argumentation is clusters. Whether it is clusters in Porter's terms or more agglomerations on a general basis might be an issue for further discussions that I don't want to elaborate further here. The main issue is the focus on the agglomerations or clustering of firms in certain places where *"...close inter-firm communication, socio-cultural structures and institutional environment may stimulate socially and territorially embedded collective learning and continuous innovation."* (Asheim and Isaksen 2000:175). With references to Maskell et al. (1998:59) they point precisely at the essence of this argumentation: *"The proximity between the different actors makes it possible for them to create, acquire, accumulate and utilise knowledge a little faster than their cost-wise more favourable located competitors"*. This underlines the point that regionalisation, as an interactive localised learning process, are important for firms' competitiveness through innovations and are an alternative to the cost focused approaches that are emphasised by the neo-fordist globalisation perspective.

3.2 Localised Capabilities

In their outline of regional competitiveness and learning Maskell et al. (1998) emphasise embeddedness of firms in local economies through what they call localised capabilities. According to their argumentation firms become competitive by utilising–directly or indirectly - important assets and possibilities in their place of location. These localised capabilities are important resources that give the firms advantages in relation to other firms in different localities. Maskell et al. (1998) refer to all such regional or national resources that influence a firm's competitiveness as localised capabilities of the area in question. The localised capabilities are influential according to the firm's

development and they are also important in restraining the space of a firm's possible actions. This becomes clear when they argue (Maskell et al.1998:51); *"No firm can pursue strategies that entirely disregard the quality and character of the capabilities in the region and country of location"*. What is pinpointed here is that a firm's strategies must – to some extent – be anchored in the localised capabilities. Of course firms can pursue strategies that are not anchored in the character of the local environment, but their ability to succeed will be affected by the local capabilities. On the basis of this Maskell et al. (1998:51) conclude that: *"No firm is thus unequivocally footloose, located in any environment what so ever"*. Every firm is, in this respect, embedded in their own environment and local milieu though the localised capabilities. What then, are the localised capabilities?

The localised capabilities consist, in Maskell et al. (1998:53) outline, of four main elements:

- *The institutional endowment*
- *The built structures*
- *The natural resources*
- *The knowledge and skills*

Institutional endowment can be understood as the areas contemporary patterns of behaviour, and habits of both action and thought. These are elements of the social system that are durable and of a persistent nature, thereby contributing to a routine of action and behaviour. The institutional endowment of a region includes more or less all the social actions in relation to the supply of capital, land and labour, including the markets for goods and services. A region's institutional endowment is a result of historical processes and constructions. This leads to the hypothesis that a region with a certain industrial history is also able to develop an institutional endowment that supports this specific industrial activity (Nilsen 1999, Dale & Nilsen 2000).

In this connection the knowledge and skills of the region are of importance. When the institutional endowment has been developed together with the industry, it implies that so has also the region's knowledge and skills. The knowledge and skills of the area, and

the institutional social system have developed and is a result of history. So are also the built structures and the natural resources. The built structures we see in a region today are the result of earlier actions and decisions, and in that sense they are historically constructed. The natural resources in an area are also definitively a result of historical processes.

The localised capabilities are in this sense a heritage from earlier times. History is in this way affecting today's development and the possibilities firms face in their activities. These localised capabilities are, in different degrees, compatible with the needs of the market economy. Based on the fact that every place has its own history and development, this can be seen as a major contribution to the different strengths and weaknesses between regions in an economic sense. The heritage of a region is contributing to today's development and actions.

Another way of understanding the region is to relate it to place. In the following I will argue place to be the more concrete notion and a more meaningful way of understanding spatiality. Place is one of the central issues in the discipline of geography, and in the following I will try to give an outline on how I regard place and how it affects the way this thesis is put together.

3.3 The concept of place

As the outline of globalisation suggests, I am critical to the attempt of viewing the world as a placeless space where everything has become or is becoming the same. Holloway & Hubbard (2001:22), states that: *"Some commentators have even predicted the "end of geography""*, by referring to an argumentation where all places becomes more or less the same through the globalisation of the economy. This is a view that has been debated among geographers. As shown in the globalisation debate I am sceptical to the idea of the global dreamers, and I will argue that there are reasons to be sensitive to a more fragmented development. Place is one of the central issues in geography. In my outline of the conception of place and how place is to be viewed in this thesis I will rely on Agnew (1987) and the three principal meanings of the term he presents. The three principal meanings of place are, in his terms: place as a "location", "sense of

place" and "place as locale". In my further presentation I will, to some extent, rely on Agnew's approach. I will also, however, rely on Dale (1994) and Berg and Dale (2004), who has taken Agnew´s ideas further, and I will elaborate on this by introducing my own approach.

Place as location

One perspective that has been identified is seeing place as location. This perspective, however, reduces place to be a spot on the map. Hartsthorne (1939) with his conception of the world as a fascinating mosaic of places can be seen as a representative of this view. When viewing places as distinct points of the earth's surface he is definitively seeing place as a location. But this view can be taking a step further. Place can also be seen as a backdrop to social activity. This puts place in the position where it provides a background for social life. As such, place functions as a frame around the objective, physical and material conditions of social interaction. As Entrikin (1991) points out, place is viewed from the outside in a decentralised way. It is described in a rational manner and this rationality is contributing to reducing place to nothing but a location. The objective description is a goal in itself, with focus on the measurable side of places and their visible characteristics and differences (Pred 1984). Within economic geography analyses of the location of economic activity, based on cost and market conditions, is an example of this point of view.

Sense of place

The understanding of place as experience was developed within the American humanistic geography in the 1970s (see Relph 1976, Tuan 1977, Buttimer 1976). Sense of place is essential in this perspective, and the subjective and experienced dimension of place is emphasised. What is important is not what places are like for "real", but how they are experienced. People's actions are based on how they experience a place, not necessary how it really is. What people feel and sense is seen as important points of reference. Thus, in order to understand human action it is regarded as important to understand human experience. In this perspective place is understood from the inside, as something that must be experienced.

This approach to place is inspired by both phenomenology and existentialism. The phenomenological aspect is evident in the perspective of place as an experienced phenomenon. Like Tuan (1977:149) put it; *"Space is transformed into place as it acquires definition and meaning"*. At the moment when the geographical space becomes meaningful through human experience and interpretation, it is transformed into place. This, as mentioned above, links place to human experience and human interpretation. This perspective focuses on how people interpret their relationship to the area in which they live their lives. Places become meaningful and important when people have a relationship with and a connection to the place (Tuan 1977). In an existentialistic perspective this involves how people feel connected to places. Place can then be seen as something that represents security and familiarity and is an important part of our identity construction. Where our construction of identity is concerned, place seems to be an important factor. One often describes oneself as an inhabitant of a certain place. I, for one, identify myself as "Trondheimer". Because I am born in Trondheim and raised here I identify myself as an inhabitant of Trondheim. And by identifying myself as a "Trondheimer" I separate myself from other places. Trondheim is the place to which much of my identity is tied, and because of my history I feel some kind of familiarity to this particular city. Like Relph (1976) argues place represents a safe and familiar basis for our existence, and that we orientate our lives and experiences around it and in relation to it.. Hence, place is central to human existence (Simonsen 1993).

Place as Locale

Another way of viewing place is to see it as the Giddens (1984) inspired concept "locale". By locale we understand the settings in which social relations are constituted. In this perspective it is assumed that people that live in the same place develop more or less the same way of experiencing that place. This makes place a collective phenomenon through the activities and ideas of the people present (Dale 1994). As such, place has to be understood in light of the context it represents, in opposition to an understanding based on universal laws and principles. The duality of structure, based on Giddens´s (1984) understanding of structure, is an important issue in this respect, implying that structures are directly involved in human action at the same time as being a result of human action. According to Pred (1984) places are created and recreated

through social interaction and are not static. The continuous creation and recreation by the people living there give places vitality. But this can also be viewed the other way around, like Relph (1976:34) so precisely have stated it: *"people are their place and a place is its people"*. The interrelation between places and people are evident and the dynamism between them is an important understanding. This issues places as a rather dynamic feature in constant development rather than a constant statically frame. The dynamic qualities of a place are determined by what we may call social practice. Social practice refers to the repeated social activities of a place that give locale its meaning. In other words: a place is constituted through its social practice. Locale in this sense is the context in which social practice and interaction appear (Giddens 1984, Simonsen 1993). Place then becomes the meeting place where different people's daily activities meet in time and space (Dale 1994). In this approach individuals are seen as both subjects and objects, viewed in light of the context they appear in, or are a part of, not just as specified subjects or objects (Pred 1984).

Another way to view place is to see it as something between the universal and a specific locality. In this perspective place is seen as encompassing both general and place specific features. This locality perspective on place is present in studies on economic restructuring and changes in business structure. General economic restructuring processes have a tendency to produce different outcomes in different places, because the place-specific terms are different (Dale 1994). In this argumentation there is an implicit assumption of places as specific and particular features, with unique developments paths, at the same time they can be understood much likely as "locale" and its contextual approach. The general economic processes meet place specific traditions, institutions, attitudes and cultures, and this makes the results dependent on the place.

3.4 Place meets place

Social constructions

In a "locale" perspective places can be seen as social constructions and as meeting places. In this context I find Doreen Massey (1991, 1993) and her "Global sense of

place" highly relevant and important. In her outline she points out that places are becoming more like network inspired meeting places that stretch far beyond the local arena. This is exemplified by a description of her London neighbourhood. In this description material, social and cultural representatives, from different places around the world, meet in the streets of London. In my interpretation her London neighbourhood is then constructed in this setting. These representatives from different places in the world become bodily actors and representatives for these places in the streets of London. The representatives bring their places with them into London and then construct their new neighbourhood in London to what particular place it becomes under the influence of all the different representatives present in this neighbourhood. The actors, in this perspective, become carriers of place, and together they take part in the construction of places. The result can be a place-specific mixture, a creolisation or an hybridisation (see chapter 4).

Passings that haunts us

Another author that presents a perspective relevant for my purpose is Nigel Thrift. With his "Steps to an ecology of place" (1999), he represents a view that I find much in accordance with, and relevant to, Massey's perspective. Thrift argues that places can be seen as *"passings that haunt us"* (1999: 310). By this statement he means that places are dynamic and *"taking form only in their passing"* (1999:310), and that places haunt us, but we also haunt places. With this he wants to get beyond and further from notions like context and setting. The way I understand Thrift is that he is pointing at durability as an important aspect of place. This durability implies the continuous interaction between people and place. But in addition I see Thrift as inspired by Latour[5] and his thinking. In relation to this I find it appropriate to interpret him in a Latourian way as well. His contention that places haunt us and we haunt places, can be interpreted in a Latourian manner: places inscribe us and we inscribe places. The inscriptions made are then important for further actions and paths of development, both individually and in terms of place. In this way we carry place with us in our life journey, and places are affected in the same way by our presence - both when we are in a place and when we have moved on from a place.

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[5] I will come back to Latour and his writings in the chapter 6.

This takes me to an important point in my conception of place, the interaction between a place and its people. I have earlier quoted Relph (1976:34), as one of the representatives of the humanistic geographical perspective, with his famous quotation *"people are their place and a place is its people"*. This point is an important aspect of the interrelated way we have to view places. When working with places we must take people into account, and the other way around. To understand a person is about understanding where he comes from, also in terms of place. This means that to understand a technology transfer where people from different places meet, is to understand the places they come from, and not only their organisational background.

This connection between community and place is interesting in regards to Wengers (1999); "Communities of practice". This work is interesting both in the perspective of seeing technology transfer as a process of transferring communities in some way, but also in the way that people must be understood as parts of places or communities. Wengers outline of "Communities of practice" will be elaborated further in chapter 5.

3.5 Summing up

Where does this outline of globalisation, modernity, regionalisation, place and individuals take us? In the last two chapters I have tried to argue that important features of modernity are similar to the important features of what is labelled globalisation. In other words, it is difficult to distinguish between globalisation and modernity. Despite this, it seems reasonable to talk about intensification in certain areas of society that we can label as a result of globalisation. Even though the terms modernity and globalisation can both be viewed as arrogant and, in my point of view, they tend to glorify and exaggerate the importance of western society and its progress. At the same time they are helpful when trying to understand recent development in society. Most importantly, we must understand globalisation as a contradictory, complex process (and not an end-state) that goes hand in hand with uneven spatial development that are realized at specific sites causing qualitative as well as quantitative changes (Dicken et al. 1997). Even though there have been some changes in several areas: liberalisation of trade across national boundaries, increased growth in the financial market, technological change that has contributed to dramatic reduced communication and

transportation costs, and an internal restructuring of transnational firms, there has emerged economic diplomacy, and states and regions have developed new economic strategies. These events has encouraged and made technology transfers possible.

One of the consequences we can spot is that globalisation also can be understood as a process of regionalisation, where the importance of and the focus on regional and local activities are increasing. This can be seen as a paradox, but is more likely to be understood as one of the contradictory processes of globalisation that Dicken et al. (1997) argue for. Within economic geography this has been emphasised by the focus on regionalisation as an alternative and additional conception of globalisation. This increased focus on regions and more place specific areas involves a concretisation of the global level and discussion. Places are important aspects of the global development. The global development is taking place through the interaction between the people and place.

Seen in this perspective, places become more prominent and important. When understanding places as social constructions that are constructed by the individuals and the materiality present, as well as by its history, places become continuously changing phenomena. In this way they can be understood as *"passing that haunts us"* (Thrift 1999:310). Places are in this respect constantly constructed and reconstructed by individuals alone, in interaction with other individuals, and by materiality and history. We can be a part of places we have been to and places we are in now; we mentally change a place to something else when we arrive, than it was before our arrival. Likewise, we, as individuals and groups, change when we arrive and experience new places. In addition to carrying places with us when we move around in the world, the places we have been to before are, in one way or another, inscribed in us. On our way or on our journey we meet people inscribed by other places. These meeting points are interesting and important events in the global society, because this means that when people meet, places meet.

So in the last two chapters I have argued that globalisation can been seen as an intensification of modernity. The global changes that I have referred to, has been important enablers for this intensification to happen. Technology transfers between places in different countries are a direct consequence of these global changes.

Regionalisation, as I have presented it in this chapter, can be seen as an alternative to globalisation as a homogenous process and are linking this development to places. In other words globalisation is taking place. The discussion of place that I have elaborated shows the importance of place in this picture, but at the same time also the important role played by individuals, understood as carriers of place. Globalisation is then taking place through human everyday action.

Section 3

Transformation

processes

4. Cultural distinctions and institutionalism:

In this chapter I will rely on two theoretical concepts, culture and institutionalism. Culture is a highly relevant issue in this thesis. At the same time I have previously worked a lot with the concept of institutionalism that I also find relevant in this work. However the distinction between these two concepts is rather vague, since they more or less overlap. I will argue for a broad definition of these two conceptions. In applying such broad definitions, however, it is important to unpack and identify the different components of the concepts. Through an unpacking of these concepts I will try to come to a useful understanding of them.

4.1 Culture

The complex concept of culture

One of the huge and important concepts in social science is culture. A lot is said about culture and, for sure, a lot will be said in the future. In 1952 Kluckhon and Kruber identified 300 different definitions of the concept culture. The number of academic publications has risen dramatically after 1952; this reflects that culture is a complex notion and often hard to grasp. You can't physically hold it in your hands, you can't point it out, and you can´t feel it in any distinct way. It is necessary to try and make this notion more clear and understandable. Amundsen (2003:36, my translation) is inspired by Alvesson & Björkmann (1992) when he concludes that there is relative consensus that culture can be characterised as follows:

- *Culture often refers to a collective phenomenon*
- *Culture is historically defined*
- *Culture is socially constructed, i.e culture is created by humans and lived by a group of people.*
- *Culture is qualitative by nature, and not easy to measure.*
- *Culture is inertial, hence changes are slow.*

I think this quotation illustrates one of the challenges posed by the notion of culture, namely that it is complex. At the same time it is helpful in the way that it expresses some of the complexities of the concept. In other words, it suggests that the concept of culture is possible to handle when it is defined properly.

A direct and concise definition of culture is given by Hannerz (1992:3):

"For culture,……., is the meanings which people create, and which create people, as members of societies. Culture is in some way collective. "

This implies that culture is relational. It is not connected to one object or one person but to the relations between people and artefacts, and to the interpretations and translations of symbols. Because of the danger of objectifying culture, I prefer to focus on the creation or the construction of meaning as Hannerz has stated above, and what might be seen as culture. The constructivist approach clarifies the differences between the understanding of social systems as organisations on the one hand, and technical systems, which are not able to construct their own meaning and interpretation of the situation, on the other. By focusing on this constructivist aspect of culture I am trying to avoid an objectifying and stereotypical approach to culture that might result from relating it to organisations or social systems only. This means that I am trying to develop an analytical approach to culture that embraces this constructivist approach and at the same time is operational for understanding the meeting point of different cultures.

In this context I find Hannerz (1992) and his three-dimensional model valuable in my effort to clarify what I mean is an important feature of the culture notion. I interpret Hannerz´s three dimensional model as interrelational (1992:7):

1. ***Ideas and modes of thought*** *as entities and processes of the mind – the entire array of concepts, proportions, values and the like which people within some social unit carry together, as well as their various ways of handling their ideas in characteristic modes of mental operation;*
2. ***Forms of externalisation****, the different ways in which meaning is made accessible to the senses, made public;*

3. ***Social distribution***, *the ways in which the collective cultural inventory of meanings and meaningful external forms- that is 1 and 2 together – is spread over a population and its social relationships.*

The first aspect of Hannerz' model is the traditional cultural perspective, which most of the research, the writings, and the daily use of the notion refers to. It is probably the differences in the ideas and modes of thought, the ways of thinking and differences in how various people perceive the world that often comes to mind when talking about culture. The second aspect of the model focuses on expressions, how the ideas are expressed through action, through language, through the way we dress and through the way we react. It is these expressions that are interpreted as cultural symbols. These externalisations represent the expressions of constructed meaning of ideas and modes of thoughts. The third aspect is telling us something about dissemination, and to what extent cultural ideas and expressions are distributed.

It is important to keep in mind that the forms can be similar even if the meaning attached to the form is different. This means that things might not turn out to be what they seem to be. One example can illustrate this: Todays youth has its rap culture with origins from the afro-American dominated areas of New York. The rap sub culture emerged as a musical expression similar to a capella, and the texts were about how tough it was *"living up in the hood"*. In my home town, Trondheim, despite being a small city with very few afro-americans, there are also rap artists. These rappers emulate the ways of their New York counterparts. They dress the same way, use much the same language and the same moves, and they sing songs about the same issues. They seem to be carriers of a global rap culture. When we look closer at them, however, their ideas and modes of thought are quite different. It is hard to adopt the ideas of the Afro-American in the Bronx area when you are a white youngster in a well suited home in the safe area of Trondheim. Commercial interests throughout the globe have distributed Rap music. What has been distributed is in fact *the form* and the externalisation rap music, but the ideas of rap music is more difficult to spread even though they try hard by using all the artefacts the originals do. So even if the form rap is the same around the globe, there are reasons to believe that the idea rap varies a lot. This means when we see rappers throughout the world today we see *the global form*

rap, and probably *not the culture* rap, because it is so much more differentiated than we like to think.

Social construction and construction of meaning through interaction

Social constructivism is one direction in the social sciences. The term was introduced by Berger and Luckmann in their book "The social construction of reality" (1966). The essence in this perspective is questioning what is it that is nature and what is culture. Secondly, a central aspect is that the social should be understood as both constructions and evolution. In my perspective this implies a dynamic element in this approach to reality. I find this relevant in this work, both in regards to my perspectives on place (see chapter 3) and to my perspectives on technology (see chapter 6). But also it is relevant to my approach on culture and the construction of meaning. This will be elaborated further in this section.

When people with different backgrounds come together in close cooperation, they start interacting with each other. This implies interpreting (Berger & Luckmann 1966) the different actions of others. In this social interaction meaning is constructed through daily actions. The next step is that meaning is externalised through form, and a pattern of interaction is constructed. When a group has constituted their ideas, like beliefs, values, meaning and concepts, they externalise them through their actions, and through this externalisation the ideas are distributed to a greater group of people. Hepsø (2005) has developed a model inspired and based on Berger and Luckmann (1966), see figure 4.1. I find this model interesting and highly relevant for developing an understanding of what is going on in processes of interpretation, and how meaning is established between individuals in groups.

Construction of meaning

Internali-sation → Subj. reality → Externalis ation → Interpre-tation → Obj.-reality

(Hepsø 2005)
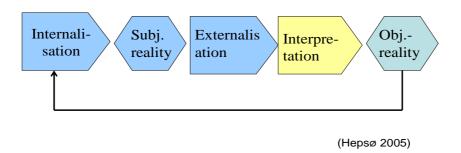
Figure 4.1 Construction of meaning (Hepsø 2005)

The main issues in this model are based on the notion that every individual has its own understanding of reality, a subjective reality. This understanding is externalised and then interpreted by other individuals. This group of individuals together construct an objective reality based on each others interpretation of their externalised subjective reality. This objective reality is then internalised into each individual's subjective reality.

These concepts of externalisation and distribution are important where technology transfer is concerned. When different people meet and start exchanging their different understandings, values, beliefs and meanings, they start processes of interpretation each others actions and messages. This exchange may turn out to be one of the core processes of technology transfer. When individuals externalise and exchange ideas and experiences through this process, they construct a new basis or foundation of shared ideas. When they collectively externalise ideas in front of other groups, they have started the process of distributing these ideas. Where organisations are concerned this process goes on continuously. Different sub groups distribute their ideas to other sub groups and vice versa. I argue that an organisational culture, like any other culture, is constantly constructed though a process of interaction between different groups or individuals. A good example to illustrate this is that you never step out in the same river

twice (Hannerz 1992). You can step out in a river twice but not the same river. Because the stream changes all the time the amount of water changes, rocks are moved and creates new streams, and so on. This is also the case with culture: it is constantly constructed in different ways and thereby constantly changing, even though it seems the same on a day- to-day basis.

Hannerz´s model can be understood as an outline of culture and its externalisation and dissemination. Meaning, values, beliefs and understanding constitute central aspects of a culture. In sum these elements might be seen as that which gives individuals in a population a common direction or a common interpretation of how the world should be understood. These cultural aspects are expressed or externalised in different forms, manifested as language or other more symbolic actions or artefacts.

Based on Hannerz model we may conclude that culture is constantly moving or changing. Cultural ideas and meaning are expressed and shared in a population of a certain extent. This is one approach to culture and a way of understanding this complex issue. Another theoretical approach to these issues can be found in what has been addressed as institutional theory. In my previous work (Nilsen 1999, Dale & Nilsen 2000) this is an approach that I have found useful in understanding human interaction, and it has influenced my dissertation work. Hence, I will present relevant aspects from institutional theory that will contribute to a relevant understanding of the cultural aspects tied to the transfer of technology and knowledge.

4.2 Institutionalism

One concept that has been used in a variety of ways and has many meanings, both in the field of economic geography and other social sciences, is the concept of institutions. Lots of papers tell us that "the institutional endowment" (Maskell et al.1995) or "the institutional setting" is crucial to the economic development of a region or a local community. There are few studies, however, that dive more deeply into the questions of what institutions are, how they are constructed and constituted, and how they work in a local setting. There are some scholars, however, like Scott (1995) and Karlsen (2000) that have done substantial research in this area.

In this outline I will start with a brief overview of what the concept of institution entails. Based on Scott (1995) and his clarifying analysis of the various institutional schools and traditions, I will argue for a broad conception of institutions, which includes regulative, normative as well as cognitive elements. As already state in the introduction to this chapter, it is important to unpack and identify the different components of the concept. Through an unpacking of this concept I will try to come to a useful understanding of it; this will involve Scott´s analysis (1995) as well as results from my own prior research (Nilsen 1999, Dale & Nilsen 2000) and analysis done by Dale (2002).

The concept of institution

Some authors use the concept of institution in the same way as in everyday speech: as a synonym for organisations such as schools, hospitals, firms, trade unions, political parties, and research centres, or as an expression of the basic structures of society, such as marriage, the family, the government, the constitution.

Others define the concept in more abstract terms, as formal, established, enduring social systems. This way of defining the concept can be found in studies on the process of institutionalisation, where "to institutionalise" means to formalise an activity or a relationship through a formal agreement or organisation. For example, "the institutionalisation of regions" (Paasi 1986, 1991) means to establish political, economic and cultural institutions that are capable of maintaining and reproducing territoriality and inherent symbolism. Examples of such institutions are the army, the police, schools and educational bodies, administrative organisations, and media. Similarly, "the institutional Europe", i.e. the European Union, is "defined through institutional structures that are constitutive of the European economic and cultural integration" (Paasi 2000:6). The two concepts of institution and institutionalisation signify approximately the same, institution is the noun, while institutionalisation is the verb.

Still others focus on power by defining and understanding institutions as the power structures of society, the political, legal, and economical laws and rules that regulate

labour markets and industrial relations. This understanding is found in the regulation approach, with its focus on the way accumulation and regulation systems in different countries result in different "institutional settings" for economic activity (e.g. Gertler 1997, Digiovanni 1996, Krätke 1999).

A quite different conception is found among a large and growing school of institutional theorists who are stressing that institutions are the collectively held beliefs, values, mores and rules that condition or constrain individual action. This approach has clearly parallels to the concept of culture. For these theorists, "to institutionalise" must be understood as the formation of values through habits (routines, practices). The tradition of institutional theory, which has been most salient within economics and sociology, is based on the last definition. Institutional theories, which tend to regard institutions in a wide perspective, with emphasis on the regulative and normative, as well as the cognitive aspects of institutions, has experienced a considerable revival in the social sciences during the past decades.

Some approaches

The geographers Amin and Thrift (1994:14), define institutions mainly as organisations. They talk about:

"a plethora of institutions of different kinds (including firms; financial institutions; local chambers of commerce; training agencies; trade associations; local authorities; development agencies; innovation centres; clerical bodies, unions, government agencies....., business service organisations; marketing boards)"

In their opinion, the social and cultural factors crucial for economic success are best captured in the term "institutional thickness". Four factors contribute towards the construction of institutional thickness in a region. Firstly, there has to be a strong presence of the kinds of institutions listed above. Secondly, the institutions involved must have a high level of interaction amongst each other. Thirdly, this high level of interaction must result in clearly defined structures of domination and coalition resulting in the collective representation of what used to be sectional and individual interests. Finally, a mutual awareness of being involved in a common enterprise or

"script" has to be developed. Their definition of "institutional thickness" is broadly in accordance with the concept of institution I am trying to develop here.

In taking this point of departure I am in accordance with, among others, Storper, who writes about formal public institutions, but states that:

"All institutions are not public, however, and many are not coterminous with formal organizations. Institutions consist of "persistent and connected sets of rules, formal and informal, that prescribe behavioral roles, constrain activity, and shape expectations" and overlap with conventions. For this reason institutions cannot be reduced to specific organizations, ..."

and

"Successful formal institutions then, have a hard organizational side, and a "soft" conventional foundation." (Storper 1997:268-269)."

This quotation of Storper´s is fruitful because it points at the distinction between formal and informal conventions as important factors concerning institutions. However, much of the literature on institutions within the field of geography does not go further than stating that institutions are important, without discussing the content of this concept in any depth. Often the concept seems to be used in several of the meanings presented above, even within the same paper or article. Especially do the tendency to conflate the concepts of "organisations" and "institutions" cause much confusion in the literature. Different kinds of institutions are then mixed together into an all-inclusive concept, embracing everything that matters in the environment of the firm. As noted by, among others, Lundequist (1998), it is no wonder, then, that institutions are important.

Unpacking the concept

Recent theorists have recognised the value of differentiating between the concepts of "institutions" and "organisations" (e.g. Scott 1995, Harrington & Ferguson 1999, Lundequist 1998). When talking about schools, universities, hospitals, firms, research centres etc., they should be referred to as organisations. Such organisations of course

can be seen as a *result* of wider institutions, as ideas to how various functions of society should be organised. Furthermore; once they are created, these organisations also develop institutions of their own: a company culture, a university culture and so on, which tend to set the formal and informal "rules" of how to act and behave in the different positions within the specific organisation. To "institutionalise" may in this sense be defined as *"to infuse with value beyond the technical requirements of the task at hand."* (Selznick 1957:17). Lundequist 1998 applies a metaphor, where he sees organisations as the players and institutions as the rules of the play. To develop this metaphor further I would like to put it another way. If we see the players as synonymous to the organisations, the rules of the play must be seen as the formal institutions; the informal institutions must then be seen as the players' understanding of how to perform during the game, how to play the game tactically and technically. Organisations are influenced by the way institutions (rules) are formulated, while at the same time the organisation (the players), through their activities, influence the formal institutions (or rules) and informal institutions (or how the game is played).

Even when differentiating between organisations and institutions, the concept of institutions is a very broad and rather "chaotic" one. The thinking and theorisation about the concept of institutions is far from institutionalised.

One of the scholars that have tried to tidy up in the various approaches to the concept is Richard Scott, a sociologist in the field of organisational studies. Scott (1995) gives a comprehensive overview of the development of institutional approaches in the fields of economics, sociology, political science and organisation theory, and the various meanings and usages that have been associated with the concept of institution in these fields. I find his way of thinking deeply clarifying. He starts up with a broad definition:

"Institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers – cultures, structures, and routines – and they operate at multiple levels of jurisdiction." (Scott 1995:33)

Scott argues that although there is value in such an inclusive and integrated definition, the disadvantage is that it *"knits together three somewhat divergent conceptions that*

need to be unpacked" (Scott 1995:34). There is a need for a distinction among the several components and to identify the underlying assumptions, mechanisms, and indicators for each of them. Scott bases his unpacking on the notion that different social theorists have identified and emphasised different elements as vital components of institutions. The disagreement is, according to Scott (1995), centred round three axes of controversy: (i) varying *emphases* on institutional elements, (ii) varying *carriers* of institutional elements, and (iii) varying *levels* of institutional elements.

The most important of these controversies is the varying emphasis that is put on the regulative, the normative, and the cognitive elements of institutions. These three elements are called the *"three "pillars"- identified as making up or supporting institutions"* (Scott 1995:35). I will briefly comment each of them, although also leaning on other authors than Scott.

The regulative aspects[6]

In one way or another, *"all scholars emphasise the **regulative** aspects of institutions; institutions constrain and regularise behaviour"* (Scott 1995:35). Economists have a tendency to view institutions as resting primarily on the regulative pillar[7]. They give prominence to regulative processes like rule setting, monitoring, and sanctioning activities. These may be formal, written rules as well as informal, unwritten codes of conduct. Institutions are mainly seen as political and economic regulations, functioning as constraints on individual choice and activity. Institutions have the main function of creating predictable conditions (Karlsen 1999). This characterisation is typical of the "new" institutionalism in economics.

This emphasis can be viewed as closely tied to the traditional object of study within economics; the study of behaviour of individuals and firms in markets. This perspective is recognised by its desires to create predictable and controllable conditions. It also reflects the economists classical conception of economic behaviour; seeing individuals

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[6] As already mentioned Scott (1995) uses the term pillar when talking about the different elements of institutions. I find it more relevant to emphasise the different aspects of institutions. This is done to underline that most often institutions consist of not just one of the pillars Scott talks about, but most probably of a mixture of the three aspects that will be presented in the following.

[7] "The economic historian Douglass North, for example, features rule systems and enforcement mechanisms in his conceptualization." (Scott 1995:35)

and organisations primarily as pursuing their self-interest through instrumental, expedient behaviour, all the while calculating the costs of rewards and penalties. Rules or collective expectations, if there are any expectations in this perspective at all, are obeyed because it is in the actor's self-interest to conform.

In his influential criticism of Williamson's work on transaction costs, Granovetter (1985) argues that this kind of thinking about economic behaviour is *"an atomised, undersocialized conception of human action, continuing the utilitarian tradition."* (1985: 483). He claims further that (1985: 487): *"Actors do not behave or decide as atoms outside a social context, ……. Their attempts at purposive action are instead embedded in concrete, ongoing systems of social relations."*

In addition to this I find it relevant to return to the quotation of Scott (1995) mentioned above where he says *"the regulative aspects"* (:35, my underlining). I think it is important to realise that understanding the regulative pillar is not just a matter of understanding laws, rules and other more or less obvious regulating issues, but also to emphasise the regulative aspects of social conduct. These may often be rooted in old formal regulations, or they can also be a social heritage from previous times (Nilsen 1999, Dale & Nilsen 2000). Being open for the regulative aspects of institutions is also a way to reduce the danger of being related to an under-socialised perspective.

The normative aspects

Other theorists see institutions as primarily resting upon the *normative* pillar, emphasising the normative system of prescriptions, evaluations, and obligations that influence social life. These norms specify how things should be done; they define the appropriate values, goals, means, behaviour and a lot of expectations to social conduct.

As with regulative rules, normative rules can be formal or informal. They impose constraints on social behaviour, although at the same time they empower and enable social action. They prescribe rights and privileges as well as responsibilities and duties. According to this view, *"Actors conform not because it serves their individual interests, narrowly defined, but because it is expected of them, they are obliged to do so"* (Scott 1995:39). When the regulative pillar is based on a logic of instrumentalism,

asking "What is my interest?" the normative pillar is based on a logic of appropriateness, asking "What is expected of me?".

The normative approach to institutions can be traced back to some of the classical sociologists as Durkheim and Parsons, who saw shared norms and values as the basis of a stable social order. In the early works, and especially in Parsons', there was a tendency to view role-regulated behaviour as deterministic, or "over-socialised" as Granovetter (1985) terms it. Actors were perceived to "adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy" (Granovetter 1985:487).[8]

Selznick's conception of institution is a good example of this kind of thinking, and highly relevant to my study. Selznick (1957, 1992) sees the institution as a supplement to the formal structure of the organisation. In his view "organisations" are transformed into "institutions" over time. This process of institutionalisation is *reflecting the organization's own history, the people who have been in it, the groups it embodies and the vested interest they have created, and the way it has adopted to its environment."* (Selznick 1957:16).

Individuals take their own personalities, values and interests into the organisation. The values of the organisation are then the sum of the values of its members. At the same time the members are going through a process of socialisation; a parallel of the institutionalisation process that are going on at the organisational level. The social commitments that are formed through the social interaction within an organisation provide the basis for its stability and integration. These processes give an organisation its identity, and an organisational culture emerges. In this process, which Selznick (1992) labels "thick institutionalising", the organisation becomes infused with value. It also becomes filled by commitments to its self-maintenance and a struggle to preserve its values.

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[8] The terms "under-socialized" and "over-socialized" are parallel to the dichotomies of "homo economicus" vs. "homo sociologicus", methodological individualism vs. collectivism, and voluntarism vs. determinism. These are traditional dichotomies that often have been caricatured.

Scholars who stress the normative aspects of institutions do not necessarily view actors as *"slaves of social conventions", but can see them as "reasonable people adopting to the rules of institutions"* (Scott 1995:39). The conception of human motivation and behaviour must encompass aspects of rationality as well as of rule-following, and the normative rules have to be selected, interpreted and reflected upon. This means that in addition to understanding the normative as expectations from the surroundings, it must also be seen as a normative map of the individuals regulating its decisions as well. The point is that norms may be set by the surroundings, but the individuals may as well have a defined norm system of their own to follow. On the basis of this decisions are taken. It is important, as well, to state that the individuals' construction of the situation is depending on a combination of collective and individual experiences and expectations. Through negotiations and interpretations of this mix of experience and expectations the foundation is laid for decision making.

The cognitive aspects

A third group of institutionalists gives greater attention to the *cognitive* elements of institutions, stressing the importance of symbols (words, signs, and gestures) in shaping the meaning we attribute to objects and activities. This is the main focus of the new institutionalism within sociology, which can be traced back to Berger and Luckmann (1966) and their emphasis on the creation of shared knowledge and belief systems rather than rules and norms as the basic guidelines to human action. A basic point of this institutional school is that if we are going to understand or explain actions, we must take into account the interpretations and meanings attached to them. Individuals in interaction collectively construct meaning; they are creating a common frame of reference. Common cognitive frameworks mean a common way of understanding and interpreting a situation or an action, and it allows repeated, routine action.

Of utmost importance is the creation of categories, typifications, and classifications (of people, groups, goods, services, behaviour etc.) A common system of classification, or shared definitions, is seen as basic to the stability of an organisation or a society (Douglas 1986). Many such classifications are taken for granted. They are seen as *"the way things are"* and routines are followed because they are *"the way we do it"*, overlooking that they in fact are social constructions. While the normative pillar

emphasis the social obligations as the basis for compliance, the cognitive pillar stresses the way situations are framed and social identities defined (Scott 1995). Social identities can be understood as *"our conception of who we are and what actions make sense to us in given situations."* (Scott 1995:44).

In understanding the cognitive pillar it is important to include and understand the social constructivist approach as well. The way I understand this is that these need to be seen as closely interlinked, and to be viewed in relation to each other. In an institutional analysis the constructivist approach is a good supplement to the normative approach. And the normative approach also legitimises the constructivist approach in relation to not becoming over social-constructed.

Summarising institutionalism

The three institutional aspects, or "pillars", vary greatly in content. Partly, the variation is a matter of substantive focus, and partly it is linked to more profound differences in underlying assumptions that are important to be aware of. On the other hand, the division between the normative and the cognitive "pillar" is not necessarily sharp. As noted by Karlsen (1999), the "taken for granted" is not only a cognitive matter, it can also have strong normative connotations, being embodied in language and social practice.

It has to be stressed, however, that Scott's distinction among the regulative, normative, and cognitive pillars is an analytical one. At the concrete, empirical level all the three pillars will be of importance, and partly interwoven. As he puts it:

"The distinctions I have proposed among the three conceptions – the three pillars – of institutions are analytical in the sense that concrete institutional arrangements will be found to combine regulative, normative, and cognitive processes together in varying amounts. However, particular institutional forms will vary in their composition, some resting on primarily on the regulative, some on the normative, and some on the cognitive pillar." (Scott 1995:144).

The way I see it, using institutions as analytical tools is complex. And in this relation they should be handled with care, and it has to be expressed that to understand the

institutions is first and foremost about identifying them. To tell whether an institution is regulative, normative or cognitive is difficult, even though it seems important to do so if the issues at stake are an operational approach to institutions.

4.3 Creolisation: the third culture

With inspiration from linguists, the concept of creolisation has emerged in cultural studies. When Hannerz (1992) introduces the creolisation concept in his "Cultural Complexity", he simultaneously warns against the danger of exaggerating the use of this metaphor. It is, however, an interesting metaphor that I find relevant in a study involving different cultures. The essence of the metaphor creolisation is the amalgamation that occurs when different cultural components are joined in new, and often unpredicted, ways, often resulting in new meanings and different cultural forms. This might be seen as the rise of a third culture. Another approach to this can be found in Pieterse (1995) and his concept of hybridisation, when he refers to the making of global culture as a global melange. What is essential in these perspectives is, in my view, that there is a constantly ongoing process between different actors from a diversity of cultures; via this process the making and development of something new and different often comes about. This new and different culture is created, however, on the basis of the cultures that meet. Their meeting is characterised by dynamic negotiations, where the different cultural forms of externalisation (i.e. symbols), ideas, and modes of thought are translated and interpreted. In my opinion this perspective acknowledges and represents a view of vital and dynamic local cultures that collectively constitute whatever can be called global culture, if any at all. In many ways such an approach acknowledges the local embedded character of culture, at the same time as it incorporate culture in terms like Castells (1996) global flow. In my perspective it is important to understand what might be an end result of a process were actors with different backgrounds work together over a time period. This is highly relevant to my approach to place elaborated in chapter 3, and what happens when place meets place. In this way it is an important perspective to include in this analysis.

4.4 My perspective on culture and institutionalism

In trying to work out a perspective on culture to provide me with a useful approach for my purpose, I have relied heavily on Hannerz (1992) and his three dimensional model that regards culture as consisting of: 1.Ideas and modes of thoughts, 2. Forms of externalisation, and 3. The social distribution of these phenomena. In addition to this I find Hepsø's (2004) interpretation of Berger and Luckmann (1966) – where she ends up with an understanding of how meaning is constructed – relevant to my perception of how the actors in this process of technology and knowledge transfer construct meaning in an environment of cultural plurality.

Culture is thus a phenomenon that is constantly changing and is constructed day by day; at the same time the phenomena is also historically anchored. On the basis of this I have recognised that institutionalism that has been an important approach in my previous research, also is an important understanding to keep in mind. I regard the normative, cognitive, and regulative pillars as important factors in trying to understand different ways of acting in a cultural complex setting. At the same time I have stated that it might be hard to distinguish between these three pillars. By defining culture as the ideas underlying our expressions and the way this is distributed in a population, I have equipped my approach with a relevant analytical tool.

By this approach to culture and institutions I want to elaborate the role these play in such a transfer process. What I am searching for is more precisely:

In what way do the historical trajectories at different places, understood as cultural or institutional aspects, affect the transfer process?

This research question will be analysed in chapter 11.

5. Learning

5.1 Some theories of learning

In this dissertation I view the process of technology transfer with emphasis on the interaction between the participants involved. As stressed in Section 2, this process can be viewed as a process of interaction between places and is based on the global economical changes that we have witness recently. This includes challenges of a cultural character, as indicated in the previous chapter, and it will also, as I will argue in chapter 6, to some extent include technical artefacts. Another perspective, too, has to be included in order to say something about what is going on between the participants. Learning is in my opinion a fundamental process in understanding how a production system is transferred from one context to another.

When learning is a fundamental process for understanding how the transfer is made, it is most likely also relevant in the process of understanding how these places interact. My main argument in concluding the place debate in chapter 3, is that individuals must be understood as representatives of place, and that places are constantly changing in relation to the people that are present. Every dialogue or interaction between two individuals is in this perspective also a dialogue and meeting between two constantly changing places. On this basis I will outline some theoretical perspectives on the importance of learning and what learning is about. In light of these perspectives I will see if it is right to assume that learning is also a fundamental process when places interact.

In this process I will first rely on Wenger (1998) and his "Communities of practice". Further I will present some of Schön's (1983) perspectives on the reflective practitioner and *"learning by doing"*, which, in my opinion, seems to be an important aspect of this transfer process. I will also present Argyris and Schöns (1996) arguments related to organisational learning and their model of single- and double-loop learning. At last I will present the main thoughts of Nonaka and Takeuchi (1995) to give some input on how knowledge is created and how a divide between the four different ways of

handling knowledge can be anticipated. These ways of handling knowledge seem important to the way knowledge is created and handled in this transfer process.

Communities of practice

I have outlined place to be embodied and represented through people, and in chapter 6 I will also include place to be embodied and represented through artefacts. This implies that when people interact with people or artefacts from a different place it is an interesting meeting point. At least related to the place discussion it is a very interesting meeting point. This suggestion, however, requires consistent argumentation, and I find it important to provide a credible explanation of how people can interact with both people and artefacts. A discussion on this can be found in Wengers *Communities of practice; learning, meaning and identity* (1998), where he presents an argument that I find interesting. By giving a short introduction to Wengers argumentation I will elaborate on how people and artefacts are important in the learning processes.

The central element in his social theory of learning is, as the title of the book suggests, communities of practice. The term communities of practice should according to Wenger be viewed as a unit. By using this term he distinguishes it from other and more complex and less tractable terms like culture, activity or structure, and he also defines a special type of community – a community of practice. To associate community and practice he uses three dimensions to describe the relation between them. These three dimensions are; *mutual engagement, a joint enterprise and a shared repertoire*. Mutual engagement means that a community is created through a practice based on doing things together out of engagement in a specific direction or field of interest. By joint enterprise we understand a common initiative for the community, an initiative that reflects a direction. This includes both agreement and disagreement, it is not necessary for the community to agree in every situation, disagreement can also be viewed as a productive part of the enterprise. The shared repertoire is the community's resources for its efforts in negotiating meaning. These resources include routines, ways of doing things, stories, symbols, and other things that the community has produced or adopted and included in its practice. In this way the shared repertoire is related to, and can be understood as, cognitive aspects of institutions like I have presented in chapter 4.

Even though Wenger (1998:52) likes to see the term as one unit, practice is inevitably important in this connection:

"Practice is about meaning as an experience of everyday life."

Communities of practice presuppose stability of membership over some time and also that they have been acting as an integrated community for a period of time to sustain continuity. In this perspective practice is social practice, and is always related to a social context.

Social practice is important in communities of practice, and participation is a central element in this context. Participation, or lack of participation, in transfer processes is a relevant issue concerning the creation of ideas, the development of solutions, the local adoptions and the implementation processes. Wenger (1998:52) presents a model of dualism between participation and reification.

1) *meaning is located in a process I will call negotiation of meaning*
2) *the negotiation of meaning involves the interaction of two constituent processes, which I will call participation and reification*
3) *participation and reification form a duality that is fundamental to the human experience of meaning and thus to the nature of practice.*

Reification means that the actors relate to abstractions as objects and objectify them. Processes of reification are transformations of abstract ideas to something concrete and objectified. Participation and reification are reciprocal to each other. The question of participation is a question of who is involved in the reification processes where the ideas and the abstractions for the changes are transformed into concrete solutions and practises. Wenger's argumentation is that reifications can be seen as a way of relating to artefacts, while participation is a way of relating to individuals. Reification means how the personnel relate to the machinery that arrives from Raufoss. Participation points at how the personnel from different social practises relates to each other. In this way Wenger's contribution serves my purpose in the way that it opens up for learning in relation to both individuals and artefacts, which is highly relevant for this thesis.

Wenger's model describes this way of learning. He introduces two new concepts to describe how learning is applied in relation to individuals and how it can be understood in relation to artefacts: brokers and boundary objects. Both hold the function of carrying ideas and understanding between different arenas. This presupposes that both the brokers and the boundary objects are present in different arena or in places. His model illustrates this as follows:
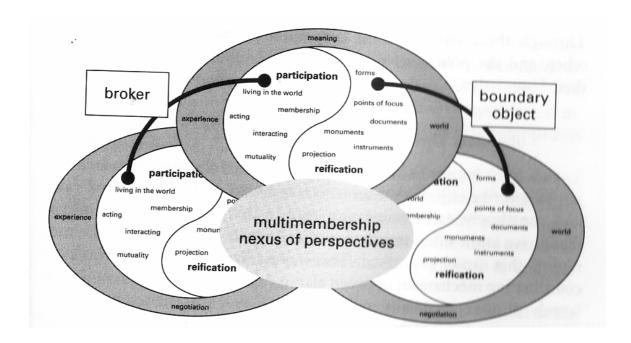
Figure 5. Wenger on participation and reification (1998:105).

This model illustrates how meaning and learning is developed between different arenas or contexts, as Wenger addresses it, or places, as I will prefer to apply it to. The brokers and boundary objects then become important actors in the learning processes between these places. The implications of this is that the learning processes is depending on how those involved relates both to the people and how they relates to the machinery or the technical artefacts.

The reflective practitioner and learning by doing

Schön (1983) delivers arguments on the reflective practitioner. In this he challenges traditional rationality, which he claims to be a technical rationality. He argues for a perspective based on reflection in action. In his outline of these arguments (1983: 49)

he argues: *"Our knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is **in** our action."* The reflections made in action are vital in Schöns argumentation. In regard to this, learning is also something that happens in action. But in Schöns argumentation the action performed encompasses more than learning, *"Phrases like... "learning by doing" suggest not only that we can think about doing but that we can think about doing something while doing it."*(Schön 1983:54). This is what he calls reflection in action, the foundation for his concept "The reflective practitioner".

Based on this foundation Schön claims that acquiring professional knowledge and skills can best be done by working with a skilled person. In this situation you learn when you work with the skilled person as you both work and reflect on what you are doing at the same time. This links the learning process to the place in which the learning is taking place. The place is where the skilled person is doing his job. Together with Argyris, Schön has taken "reflection on action" a step further with their single- and double- loop learning. This will be elaborated further in the next section.

Single- and double-loop learning

Argyris and Schön (1996) have distinguished two learning typologies; single- and double-loop learning. In their definition of single loop learning Argyris and Schön (1996:20) explain as follows: *"By single loop learning we mean instrumental learning that changes strategies of action or assumptions underlying strategies in ways that leave the values of a theory of action unchanged"*. An example of this is that an oven is set to have an exact temperature, and when this oven is measured there is a discrepancy. The temperature is then adjusted to what it is suppose to be. To avoid further discrepancy in the temperature in the future, the inspection routines are considered, possibly resulting in more frequent inspections of this temperature. The theoretical basis for the action is left unchanged, even though the temperature is adjusted when it is not in accordance with the instructions. This situation then is an example on a single loop learning episode.

Double loop learning is according to Argyris and Schön (1996:21) defined this way: *"By double loop learning, we mean learning that results in a change in the values of*

theory-in-use, as well as in its strategies and assumptions. The double loop refers to the two feedback loops that connect the observed effects of action with strategies and values served by strategies. Strategies and assumptions may change concurrently with, or as a consequence of, change in values." Returning to the temperature example, a learning process including a double loop would turn out in a different way. Instead of changing the routines through more frequent control of the temperature, the organisation might have to reconsider their methods and look for other possible ways of improving this situation. Such improvement might result in a change in the fundamental values of the theory-in-use and in its strategies and assumptions. This change in fundamental values and the new way of doing things represents the second loop in the learning process.

The theory of single- and double-loop learning is that the single loop, more or less, represents learning at first glance. By reacting to the visible and what at first glance seems evident, and then taking action from this is an example of single loop learning. The double loop demands a more critical view on the whole situation and raises questions of more fundamental character. The intention with these questions is to find new solutions that go beyond the actual solving of the problem. By the second loop the foundation that the situation relies on is brought into a critical light, and its validity is questioned, possibly resulting in changes to both fundamental values and strategy.

5.2 The creation of knowledge

One way to understand the kind of transfer process studied here is that there is crucial knowledge linked to technology, which has to be shared with the new organisation or, in Wengers (1998) words, community. The way the sender and receiver create this knowledge in common is one way of understanding this transfer. Nonaka & Takeuchi (1995) present a model of knowledge creation. The main assumption for their model is that knowledge is created in the interaction between tacit (Polanyi 1966) and explicit knowledge (Nonaka & Takeuchi 1995). Nonaka & Takeuchi (1995) define this process as consisting of four main processes; socialisation, externalisation, combination and internalisation (figure 5.2). In different ways these processes contribute to knowledge

creation on the borderline between what is recognised to be tacit and explicit knowledge.

	Tacit Knowledge	Explicit Knowledge
Tacit Knowledge	Socialisation	Externalisation
Explicit Knowledge	Internalisation	Combination

To is shown at the top; **From** at the left side.

Figure 5.2 Four modes of knowledge conversion (Nonaka & Takeuchi 1995:62)

Socialisation: from tacit to tacit.

Socialisation is in Nonaka and Takeuchi's terms based on acquiring tacit knowledge from each other by observation, imitation, and practice – not necessarily with language. An example of this is how apprentices learn their craftsmanship from their masters. A central element in this is that individuals can acquire knowledge from other individuals without the use of language. Nonaka & Takeuchi (1995) puts it this way:

" Socialisation is a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills"

The sharing of experiences is a key issue in their theory. They are strongly influenced by the German philosopher Gadamer's (1989) concept of fusion of horizons. In short, this concept argues that true understanding is a "fusion" of two people's interpretation of a situation or an object. When two persons share the same understanding of a situation or an object their mental models amalgamate. Sharing of experiences and understanding is important for the transfer of knowledge. Knowledge is often associated with specific emotions and contexts, and disconnected from these settings specific knowledge may make little sense. By being in a place with people who have

knowledge in certain situations, and where their knowledge becomes visible through actions, tacit knowledge is learned and transferred. This means that the location of the learning situation is also of importance in order to acquire tacit knowledge. To be in a place where knowledge is experienced through shared mental models in action becomes important in this context.

Externalisation: From Tacit to Explicit.

The next step in Nonaka and Takeuchi's model of knowledge creation is what they call externalisation. In their terms, externalisation is the process of taking knowledge from a tacit condition and make it explicit. This happens when the tacit knowledge becomes explicit by being turned into metaphors, analogies, concepts, hypotheses or models. In this process language is an important factor. This is all about expressing and conceptualising the tacit knowledge into images that make sense in interaction with others. Regardless of whether the language is spoken or written, it is a medium that is useful and important in the process of making knowledge explicit. Even though expressions through language may not be precise and adequate enough; they will either way help promote and trigger reflections and aimed interaction between individuals. Through this process of reflection and aimed interaction new metaphors will be tested and either rejected or accepted. The language then becomes a highly sophisticated and important tool in this process of creating shared mental models for making tacit knowledge explicit.

Externalisation presupposes that the tacit knowledge is expressible, and Nisbet (1969:5 quoted in Nonaka & Takeuchi 1995) argues; *"much of what Michael Polanyi has called tacit knowledge is expressible – in so far as it is expressible at all – in metaphor"*. It can surely be discussed to what extent tacit knowledge is expressible, but still: metaphors, analogies and models can be argued to be important tools in the process of making tacit knowledge explicit. It is definitively important in the process of creating reasonable expressions that make sense between people. These expressions become meaningful in the interaction between individuals. This relational aspect is, in my opinion, important.

Combination: From explicit to explicit.

What Nonaka & Takeuchi (1995) call combination is probably the most common way of perceiving knowledge creation. This is a process of systemising knowledge into understandable concepts: by exchanging and combining different kinds of knowledge, individuals with varied experiences create new knowledge Combination is mostly carried out through media such as documents, meetings, telephone conversations, or via computerised communication networks. This process is the one we most commonly associate with learning situations in schools and universities. When one type of explicit knowledge is combined with other types of explicit knowledge, new knowledge is created. When individuals from different levels or departments in the same company share their different knowledge, combination is likely to occur, and new knowledge can be created as a result. As this type of knowledge creation is a well established practice, it is a common way of defining what knowledge creation is. As we know, however, there are many different possibilities when the creation of knowledge is concerned.

Internalisation: From Explicit to Tacit

Internalisation characterises the process where explicit knowledge becomes tacit. This takes place when the knowledge goes from being explicit to becoming embodied. Internalisation is closely connected to a notion like "learning by doing" (Schön 1983), and can thus be understood as what happens when an action or an act is learned and become part of a persons own register. By this I understand internalisation to be essentially about the process of making knowledge personal. When explicit knowledge becomes tacit, it is helpful to support this process by verbalising the knowledge or documenting it in other ways. By documenting it , the internalisation of knowledge will be eased; additionally, this documentation is useful in spreading explicit knowledge to other people in the organisation (Nonaka & Takeuchi 1995). In the way I interpret internalisation, however, I find it more related to a personal register and embodied knowledge. In this perspective documenting this tacit knowledge is rather problematic. In my opinion the knowledge creation has then turned further to what has been addressed as the externalisation process at this point. This means that the process has continued through the model of knowledge creation, and subsequently gone directly from internalisation to externalisation. This may prove problematic for this model, or could at least be a possible point for criticism. This will be further discussed below.

The knowledge spiral

The knowledge creation model gives a good introduction and basis for understanding how knowledge is created. The four steps are important and are presented in an understandable way. Socialisation, externalisation, combination, and internalisation make sense in the attempt to understand the creation of knowledge. To make this model more operational, Nonaka & Takeuchi introduce the knowledge spiral. The knowledge spiral is an attempt to show the interaction between the four modes, and introduces time as a new dimension (place as location is an implicit dimension of the model). The model could be read in the following way: it starts with socialisation, also referred to *"as building a field of interaction"* (Nonaka & Takeuchi 1995:70-71); then the process moves on to the externalisation mode where dialogue or collective reflections are important features. The third mode is a combination where existing knowledge is combined into new knowledge and understanding. Finally the internalisation mode represents a mode where the knowledge is acknowledged and internalised by the individuals.

This step for step presentation of the four modes of knowledge conversion is too sequential and not sufficiently interactive. The knowledge spiral is an attempt to show how the four modes interact together, but, in my opinion, this attempt ends with making the model more sequential rather than interactive. Maybe my interpretation of this is too negative in relation to their intention, but I do not find Nonaka & Takeuchi clear enough on this subject to rule out other interpretations. Knowledge conversion can take the form of socialisation through externalisation and combination to internalisation, but it does not have to take this form, and most likely it does not take this form. Nonaka and Takeuchi's (1995) presents a theoretical model, with a questionable empirical support. It is hard to realise how their empirical presentation support this knowledge spiral. An unstructured interaction between these four modes is more likely to be a valid explanation and model of knowledge creation and conversion than a linear and sequential presentation. I will come back to this issue in chapter 6 where I discuss the interactive innovation model (see also chapter 3).
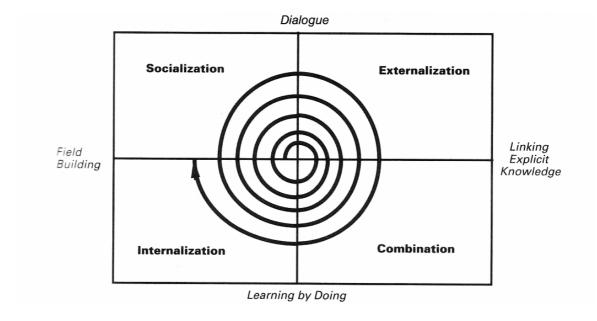
Figure 5.3 The knowledge spiral (Nonaka & Takeuchi 1995:71)

5.3 My perspective on learning

Artefacts and individuals are important in the learning process. At the same time, learning must be seen as part of a context; in Wengers (1998) terms it has to be related to a community of practitioners. This community of practitioners can be viewed as representatives of place; learning is place bound through its representatives. Through my presentation of learning theories I have argued that the practitioners are important in a learning perspective. Schön's (1983) book "Reflective Practitioner" presents the core argument and gives the operators in my case study a central role in the learning process. It is also, in my point of view, necessary to give everyone with hands-on experience an important role in the learning process. Both Schön and Wenger represent a direction that argues for participation as a core value in the learning process.

In relying on Argyris and Schön (1996) I have extend my learning perspective through their argumentation of single- and double loop learning. This argumentation implies organisational learning as an important aspect of the learning perspective. This perspective is also helpful in the attempt to understand learning in an extended perspective, where fundamental aspects of the context are challenged in the learning process. The double loop might challenge the context of the learning situation. For my

purpose these perspectives are highly relevant. In addition, Nonaka and Takeuchi's (1995) model on different perspectives of knowledge creation is important. The interaction between tacit and explicit knowledge is of great importance in transfer processes where both tacit and explicit knowledge is at stake.

My interpretation of Wenger (1998), Schön (1983), and Agyris & Schön (1996) has provided me with a backdrop for understanding learning. Their ideas are essential to how I approach the concept of learning. Nonaka and Takeuchi (1995) are also fundamental to how I approach learning, because they represent a concretisation of what is actually going on in the learning processes through their model of how knowledge is created, even though I am critical to their empirical support.

Operators and people with hands-on knowledge are important actors in the process of learning, both in terms of tacit and explicit knowledge. In this connection it must be emphasised that participation is important in the learning process, in example through learning by doing. Learning has to be viewed as a social process, taking place between individuals that represent places. Learning is the fundamental process where places meet, challenge and develop each other.

On the theoretical foundation I have thus far presented, I will attempt to create an analysis that can help me answer the research questions I outlined in chapter 1. To do so this chapter has raised certain issues that will be important for me to shed light on the analysis.

Firstly, I will question how learning is perceived in this process of technology and knowledge transfer, and, secondly, how this is carried out in practical work?

This research question will be answered in chapter 12. In my search for answers to these questions I will focus on what has been the intended way of creating learning processes, as well as on what has been the real learning processes taking place in the project. By comparing this result with the theoretical perspectives presented in this chapter I will try to articulate answers to how this learning could have been organised in an alternative way, and whether or not there are some discrepancies between what is theoretically predicted and what is practically carried through.

6. What is Technology?

Technology encompasses us all in our everyday lives. From the moment we wake up in the morning until we go to bed in the evening, technology is an essential part of our activities. It might have been easier to clear up the concept of technology by asking 'what is not technology', an observation that encourages me not to do so, and underline the need for clarification. Technology is an important issue in this thesis and also in society in general. In the same way as for the concepts of culture and institutions, technology is also a slippery term and a difficult concept to get a grip on, the interpretative load is considerable. Therefore I find it necessary to discuss this notion and then try to understand what we perceive it to consist of and how we understand it, in an attempt to end up with a suitable definition.

In this outline I will try to deliver an argumentation about technology as something more than just the technical artefacts. Relying on Levin (1997) and MacKenzie & Wajcman (1985), I will give an argumentation of technology that also includes knowledge. In the following I will try to include skills and attitude as important issues as well. I will also discuss briefly the difference between seeing technology as determined by technology itself or as a result of social constructions. To understand technology it is also important to understand how it is developed. Inspired by Pinch & Bijker (1987) and Asheim & Isaksen (1997) I will therefore present two different models to give an understanding of the development of technology. Further I will introduce Actor Network Theory to get a grip on how to view the actors in such a perspective. This discussion will mostly rely on Latour (1987) and Callon (1987), and leads to a discussion of how the transfer of technology can be perceived. The diffusion model will be examined in relation to Latour's (1987) translation model. To complete the discussion of technology, I will end with the introduction of inscription (Latour 1991) and de-scription (Akrich 1992). By this I hope to give a plausible argumentation for the relation between the technical artefacts and the human actors.

6.1 Physical artefacts

From one, rather unproblematic viewpoint, technology can be understood as *"the machines and equipment necessary for transforming raw materials to finished products"* (Levin 1997:298). This quotation argues for a quite common and, to a certain degree, mainstream understanding of the technology notion, namely as physical objects or artefacts. But as also Levin, amongst others, points out, such a tangible approach to technology has a limited interest and is most likely an oversimplification of the reality. If this approach is a fair conceptualisation, the challenges and problems linked to technology are then in fact material problems or problems related to physical things. Technology transfer will in this perspective, as Levin points out, be reduced to a question of moving things from one place to another. We have to go beyond this understanding and into a more complex landscape of seeing technology.

Machines that performs tasks

As already mentioned in Chapter 1, technology might be seen as physical objects that perform tasks (MacKenzie and Wajcman 1985). Dialling a telephone number and getting a response on the other end is using technological artefacts to achieve the goal of talking to a person over some distance. Or like Levin (1997) exemplifies, driving a car or programming a computer are other ways where humans use technological artefacts to achieve goals. This means human actions that use technological artefacts to satisfy the various needs. Human activity utilizes technological artefacts to change raw material into finished products. This means that it is not relevant to view technology as separate from humans and human activity. It is necessary to view these two as tightly linked.

Knowledge an important factor

Out of this perspective a new question arises, and that is how are the material artefacts linked to human activities? Both Levin (1997) and MacKenzie and Wajcman (1985) answer this point by claiming that knowledge is required in the process of utilizing the technological artefacts. The technological artefacts and the human actors may be linked together, but this demands that the individual actor has the required knowledge to operate the artefact. And if the individual doesn't have the required knowledge, the

artefact and the individual are not linked together. To operate one of today's complicated computer based industrial machines, highly skilled workers with the required knowledge to operate the machine are needed. Without the required knowledge the industrial processes might turn out to be complete chaos, or at least very poor results of the process. But this also implies that the skills and the willingness to operate the machines are represented. This leads into an understanding that extends the notion of knowledge.

The concept of technology

Both Levin (1997), MacKenzie &Wajcman (1985) and Pinch, Hughes & Bijker (1987) agree on an understanding of technology that includes knowledge. I will let Levin (1997:299) sum up their common concept: *"Technology is the material artefacts, how to use the artefacts to reach desired goals, and the knowledge of how to utilize it."* I find this conceptualisation interesting but not satisfying. The reason why I am not satisfied with this conceptualisation is that it takes human actions too much for granted. Is it so, that a person who is in possession of a technological artefact, an artefact that can help him reach the desired goals, and when he also has the knowledge of how to use it, will be able to use this artefact? The answer will at best be 'maybe'. My point is that this understanding of technology assumes that everyone that has the relevant knowledge also has the same skills and the same attitudes. I find that reasonable to doubt. For example, if you have a car, it is not enough to have knowledge about how to drive the car, even though it is required. You also need to have the skills to drive the car, and you need to have attitudes that are consistent with car driving. It is not enough with just the knowledge of how to operate technological artefacts; skills and attitudes are just as important. By a little adjustment of the quotation of Levin the conception will look more like this summed up; 1) Technology is the material artefacts, 2) how to use the artefacts to reach desired goals, and 3) the knowledge, skills and attitudes of how to utilize it.

This is a broad but at the same time necessary approach to what studies of technology have to be based on. Studies that do not take into account this complexity are in danger of simplifying the technology itself and also the context it appears within. Such a

simplification will, from my point of view, neither justify the technological artefacts, the constructors nor the operators of the technological artefact.

A social construction vs. determinism

The relation between technology and society can be presented from two different standpoints. These standpoints are, on one level, quite extreme, but that notwithstanding, they represent two different viewpoints on this issue. The first one is in some way technological determinant, and has its basis in the idea that the technology follows its own logic and thereby determines its use (Winner 1977). The other standpoint can be understood as claiming that it is society and its human actors that create and develop the technology and also use it the way they want to achieve their desired needs. From my point of view the technology determinant perspective is some kind of extreme, it can surely be relevant in some cases, but on a societal level I find the social constructed technology viewpoint more preferable. According to this there should be no doubt that technology is tightly knitted to human activity, which shouldn't surprise anyone, after all technology is human made. Technology as a physical artefact is not a self-creating and recreating process. I will in this elaboration give a more precise argumentation of how technology is socially constructed and constructed in an interactive process between different actors and social groups.
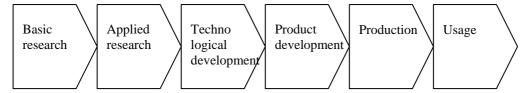
6.2 How technology is developed

The Linear model

When defining what technology is about this leads into a discussion of how it is developed. I have until now claimed that technology is socially constructed, even though I have not been precise on how this is carried out in a broader sense. Trying to understand how technology is created is much more about understanding how innovation is made.

The innovation literature represents quite an amount, but two main perspectives have been dominant. Traditionally, technological innovation and development have been understood as a linear process. In this understanding of technological development the

process starts with basic research, which leads to applied research, this research finishes with technological development, which leads to product development, this product is then produced and comes into use. I have deliberately sketched this process rather schematically. This understanding is characterized by sequential thinking and an impression that it is possible to work out detailed plans for the development of technological innovations. This linear model can be visualized as in figure 7.1:

Figur 6.1. A six-stage linear innovation model (Pinch & Bijker 1987:23).

The linear model is often related to the fordistic production forms (Andreasen et al. 1995) It is, as mentioned, recognized by the sequential approach but also of specialization and separation of the different contributors. Research and development within firms are separated from the production, and the communication between the actors is typically one-way communication. This separation also implies that the firms are less involved in the innovation processes. The innovation process is more or less driven by the Research and Development institutions, which are not in operative contact with the organisation's production departments to a very large extent.

The non-linear alternative

An alternative understanding of technological development and innovation is what Pinch and Bijker (1987) present as the multidirectional model. Their multidirectional model is more or less the same as what is elsewhere called the interactive innovation model (Asheim & Isaksen 1997)[9]. In these models the innovation process is understood as a non-linear process. These models have their basis in the criticism of the linear process, claiming that the linear model does not give a correct picture of how innovations are carried through. Another point in this criticism is that the linear process does not take into account interactive learning and the interaction between the different

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[9] The interactive innovation model is, as I am concerned, a far more used expression than the multidirectional model. But their mission and point is, the way I see it, the same.

actors in the development process. In the interactive model it is assumed that all different departments of the firms take part in the innovation process, and in addition it is assumed that the firm also interact with other firms and institutions in this process of innovation. Specialized R&D departments cannot carry out continuous improvement alone. Cooperation, interactivity and collective actions are important features in this interactive innovation model.

Another important aspect of this model is that it includes both the social and technical aspects of the process. This is a profound challenge in technology studies according to Pinch and Bijker (1987), namely the need for a way of studying technology that focuses on, and takes technology seriously. Like Layton (1977: 198, quoted in Pinch and Bijker 1987:21-22) argues:

"What is needed is an understanding of technology from inside, both as a body of knowledge and as a social system. Instead technology is often treated as a "black box" whose contents and behavior may be assumed to be common knowledge."

Both Pinch and Bijker's (1987) presentation and the interactive innovation model take these arguments into account. Pinch and Bijker focus on the *social groups* that contribute to the technological innovation. The social group is defined as the group of people working with the technological artefact. The social group decides which problems are relevant and which are not, and in this way they also define and constitute meaning into and of the artefact.

 "A problem is defined as such only when there is a social group for which it constitutes a "problem"" (Pinch & Bijker 1987:30).

In the interactive innovation model one crucial aspect is, as mentioned, that there are most likely several different social groups interacting, and in that way defining in common what are problems and not. These social processes involved in the development and the problem definition of the technology, constitutes one of the most crucial points of the interactive innovation model, namely the interaction between social aspects (and within and between social groups) and the technological aspects.

6.3 Transfer process

One central aspect when studying technology transfer is to define a transfer process. In this thesis I will try to work out a way of how we can understand the transfer process of technology. As a geographer, one of the most striking terms that come to mind is diffusion. In recent years other concepts or notions have also been discussed. In her presentation of these approaches Aslaksen (1999) distinguishes between transfer and diffusion. According to her, diffusion should be understood as one mode of technology transfer. The spread of a generic product to thousands of different consumers with the same purpose in mind, for example coca-cola where the purpose is to drink it, is such a mode. Transfer in contrast involves more complicated processes than just the spread of the product. According to Aslaksen the transfer concept is often related to disciplines such as economics, business management and engineering. It is more likely to involve transformation of products or tools.

Diffusion theory

I am not quite satisfied by letting the notion of diffusion go so easy. The traditional way of understanding the spread of ideas has been based on the diffusion model (Rogers 1962). In human geography there is a long tradition for understanding the spread of a phenomenon as diffusion (Johnston et al. 2000). Johnston refers to Sauer (1941) who argues that the understanding of diffusion through cultural traits can be traced back to Ratzel. Sauer argued that the specific contribution of geography was to create a reconstruction of how diffusion is affected by different physical barriers and the evaluation of these pathways. Many of these perspectives reappeared in Hägerstrand's "Innovation of diffusion" (1968). In this contribution diffusion is argued to be a spatial process. Within this model the information is spread and circulates through a regional system. Within this regional system there is resistance consisting of both physical barriers and individual resistance. It is assumed that this resistance is crucial in checking the transformation from information to innovation. The innovation that survives the resistance is then spread through diffusion waves (Gregory 1985). Latour (1987) also talks about a diffusion model, but without explicitly referring to the

diffusion theory and these authors. However I find these models similar to those Latour presents, and therefore I find his critique adequate for my purpose.

When Latour presents the diffusion model, he is concerned about what he addresses as its strange characteristics. His first concern is that in the diffusion model it seems like the people too *"easily agree to transmit the object, it is the object itself that forces them to assent."* (Latour 1987:133). The people's behaviour seems to be a result of the diffusion of the object or the fact or the machine, this means that it is the object that carries out this action. This must be understood as a more or less technological deterministic way of viewing how ideas or physical objects are spread.

This is related to his second concern, namely what is it that carries out the ideas and objects when they do not depend on the behaviour of people? Latour claims that the inventors of ideas and objects get a too central position in the diffusion model, a position that is problematic because it does not reflect in a proper way upon what it is then that carries out the ideas or objects. In the diffusion model the idea or the object is filled with energy by its inventor and then thrown out into society. Society and its inhabitants in this model represent resistance. So the spread in the diffusion model is a function of the energy it is given by its inventor and the resistance it meets in society. In Latour's critique of the diffusion model he also presents an alternative: the translation model.

Translation model

In opposition to the diffusion model, the translation model in Latour's (1987) perspective takes the people and society into account. Where the diffusion model sees the society and people as resistance, the translation model sees them as crucial contributors to the spread of the idea and the object. The object is in this way of thinking not given a starting energy from the inventor, but the people who are presented to the idea or the object and then find the idea or object interesting or relevant, carry it out. Then they present the idea for others who on their own evaluate the idea and either reject or accept it. If they accept, they might contribute to the further spread of it to others. The point is that in this perspective the people and society are not seen as

resistance, but they are in fact those who transmit the idea or object to others after having evaluated it.

The idea or object is in this way, in the literal sense of the word, carried out in society. What happens in this process can be described by looking at some of Latour's other terms. He claims that the idea's way through different groups and people is characterized by transformation (Latour 1987). In addition to these translations there also takes place an interpretation of the ideas at each level (Berger and Luckmann 1966, 1995). The ideas go through continuous negotiations (Latour 1987), which influence the extent of the spread. Different groups with different interests try to attend and claim the importance of their interests in the new situation that occurs when a new idea is presented (Brunsson and Olsen 1993).

Actor Network Theory

The Actor Network Theory (ANT) has in recent years become an important perspective that takes both the technical and social aspects into account when studying technology. When Callon (1987:93) introduces the term, he defines the actor network to be reducible to neither *"an actor alone nor to a network"*. Like other networks ANTs consist of both animate and inanimate actors and series of heterogeneous elements that are linked together over a certain period of time. In this way the actors of ANT can be distinguished from the traditional actors of sociology that excludes non-human actors as contributors and important features of networks. Even though an actor network is not a well-defined predictable and stable network. An actor network links both natural and social elements, and the actors can at any time redefine their identity and mutual relationship. In that way the actor network is able to bring in new elements to the network (Callon 1987). ANT is a way of trying to cope with both the social and technical aspects of society. It is in a way an attempt to be *" a more direct and less laborious way to write the strong programme"* (Latour 1988:23).

Latour (1987) point at the importance of building strong networks, and at the same time being able to build the networks in such a way that the actors choose to stay in the network. The building of networks is characterised as enrolling the network (Knutstad 1998). What is important in the process of enrolling the network is to create legitimacy

and common understanding of reality. This might be seen as constructing a common reality and a basis of facts that the network agrees upon. By constructing a common basis of facts or understandings the network is strengthen.

Inscriptions

One of the central notions within ANT is inscription. This refers to the different meanings linked to and attached within technical objects. Technical objects embody meaning, and a *"set of relations between heterogeneous elements"* (Akrich 1992: 205). This means that technical elements are constructed by the innovator or the constructor, with the basis in the constructor's understanding of the world and with his interpretation of how the technical object are supposed to be operated by the operators. This means that what gives meaning to the constructor, even though this can indeed be an unconscious process, will be inscribed in the technical object. These can be very advanced statements of high importance to the operator, statements that require a huge amount of knowledge and experience. But also fairly simple statements, like Latour (1991) shows in his story of the hotel keys and their rather heavy attachment. A heavy attachment that reminds, or gives a signal to the guest that it might be smart to leave the key at the hotel desk.

But as mentioned, these inscriptions might also be of a much more advanced level. When Akrich (1992:208) argues: *"A large part of the work of innovators is that of "inscribing" this vision of (or prediction about) the world in the technical content of the new object"*. The way I read Akrich is that she assumes the innovator to be fully conscious and that his action is intended. When the innovator inscribes the product, it is an intended act where his interpretation of the world is related to the product. I doubt an understanding of inscriptions as results of intended and fully consciousness acts. First of all I think inscriptions can be the result of an unintended action of the innovator. Second, in operation of advanced industrial machinery, with very complex relations between the machines and very different causal connections between the different machines and the results, these inscriptions might be very hard to see to an untrained eye or inexperienced operator. This means that the machinery itself can inscribe messages or sign into the product. These might be inscriptions that are not intended by the innovator.

De-scriptions

Akrich (1992) introduces the term de-scription in her outline of how technology users can be able to use new technology or not. What she is pointing at is the negotiation between the innovator and the end-user of the technology. In this process the inscriptions in the technology are continuously translated and negotiated between the central actants, in this case the innovator and the end-user. This process is what she addresses as the de-scription. I find this terminology useful and interesting. But I will also address a question to this use of the term 'script' including both inscription and de-scription. To me these terms are both very explicit, the innovator can quite easily give the script which I interpret to be quite obvious based on for instance the empirical studies of Akrich. In these studies the technical elements at stake are the technology transfer of a photoelectric lightning kit and generators. These examples are far less complicated than the technology and production line that are at stake in my empirical studies. What is inscribed in the technology, based on Akrich's empirical examples, seems quite easy to de-scribe, this process seem more or less to be possible to solve by handing over a piece of paper with instructions.

I think this is a too easy way of understanding this process. In my point of view the inscription and de-scription involve much more than the spoken words and the visualized artefacts. It is necessary to include terms like encoding and decoding in this process. The more advanced the technology is, the more tacit knowledge and cultural meaning will be present and encoded in the technology. These signals or signs in the technological artefact are most likely not inscribed by the innovator in a conscious action. Most likely a lot of the signs and signals in the artefact are put there unconsciously by the innovator or even by the technology itself. My point is that there must be room for understanding the inscribing process and the de-scription process in a more advanced way than how the empirical examples of Akrich suggest. To get a step further from inscriptions and de-scriptions, maybe encoding and decoding are more fruitful ways of understanding this process, and to capture the tacit dimensions and the unconscious signs of the innovator.

6.4 My perspective on technology

In this chapter I have defined technology to be something more than just the technical artefacts. Relying on Levin (1997), MacKenzie & Wajcman (1985) and Pinch, Hughes &Bijker (1987) I define technology to include knowledge of the technical artefact. In addition to this I claim that skills and attitudes to utilise the knowledge and the technical artefacts also must be included in such a conception. I end the first section of this discussion by claiming that I consider my perspective and foundation to rely on a social constructive perspective in opposition to what can be seen as a technological deterministic perspective.

Further, I have discussed how technology is developed. This is done by presenting the linear model and the interactive model, relying on Pinch & Bijker (1987) and Asheim & Isaksen (1997). Technology development must be seen as an interactive process between a pluralistic set of actors. In the extension of this discussion I present Actor Network Theory to get a grip on the actors and how they operate and how they can be perceived. In this discussion, relying on Latour (1987) and Callon (1987), I introduce the discussion of how transfer should be understood. I conclude that transfer should mainly be understood as a process of translation rather than diffusion. I end this ANT discussion by pointing to the relation between the human actors and the technical actants by introducing the concepts of inscriptions (Latour 1991) and de-scriptions (Akrich 1992). I also try to suggest that this should be taken a bit further by introducing encoding and decoding as potential relevant and more precise concepts in this discussion.

In this chapter the technical artefacts is linked with human activities and defined technology to also include skills, knowledge and attitudes. By using Actor Network Theory I have tried to make the enrolment of both the technical actants and the human actors as equally important. To establish a new plant at a new location might be seen as establishing or enrolling a new actor network. Several questions arise out of these arguments. The most important of these are:

To what degree are the enrolment of the actors and the actants seen as equally important in this technology transfer? And whether they are treated differently or not, why is it so?

These questions will be analysed and answered in chapter 13. In that analysis I hope to be able to contribute to an important understanding of central aspects of the dynamics of technology transfer. Based on the theoretical approach I have presented here, it is important to find answers regarding the relations between the technical actants and the human actors in such a process.

Section 4

Method

7. Method

7.1 Methodology

Methodology is about the tools and the procedures that science uses to achieve knowledge. Reflections of how to achieve this knowledge are of course also a methodological issue. This means that methodology encompass a critical evaluation of which tools and procedures should be utilized in a particular research project. And this is also an important issue; different research projects demands different methodological approaches. The main divide in methodology is set between quantitative and qualitative approaches. These two sets of approaches can be seen as two extremities of a scale (Grønmo 1982). Between these two we find a spectrum of different methodologies that have more or less quantitative and qualitative aspects within them. The quantitative and qualitative approaches are often seen as opposing each other, but they should rather be seen as complementary. Situations seldom occur where one of these approaches could have replaced the other (Grønmo 1982). Which one you chose is dependent on what kind of research question is at stake and what kind of study this should result in. If you, as a researcher, are searching for new knowledge, that might be diffuse and not very explicit, a qualitative approach is often preferable. This will enable you to develop new concepts and understanding of the field through interaction with those involved.

Acquiring data

Even if the data is based on a qualitative or a quantitative approach it is important to give an account of how the data is collected, or as I would like to put it: how the data is acquired. I do not like the term *'collect data'* although it is quite common. From my point of view collecting things gives too strong an association to picking up things, like for instance blueberries. When you pick blueberries, the only active actor is yourself; the blueberries are just passive victims of our actions. Collection of something implies that one of the parts is passive and the other is active, and for me this seems rather strange. The way I experience what I have done during this work is that I have acquired data. The people I have been working with have been very active and not passive at all. I have not picked or collected anything from them, but I have conversed with them in

interaction with them. In these conversations I have acquired information that I have turned into data by interpreting the information.

In the following I will elaborate how I have acquired the data that this thesis rests upon. I will start with my own background situation, or more specific the professional context I have been working within. This includes presenting some projects I have been working on during this study. These are projects that have been directly relevant for and a part of my study. Thereafter I will present the more traditional aspects of the fieldwork that have been carried out. This includes a presentation of the selection of respondents and the interviews. In a figure 8.1 I will document the time spent at the sites at Raufoss and Montreal. Then I will present some theoretical and empirical considerations on this study. I will end this chapter by discussing the quality of the data achieved and then conclude on the trustworthiness of this study.

7.2 The organisational context of the PhD work

Raufoss ASA has, since the autumn of 1997, been one of the core industrial members of the research programme, Productivity 2005 (P2005). This research programme is divided into three main projects, and my work has been done within the project "Extended Enterprises". Both my Master's thesis and this work have been carried out in this organisational context. The fact that Raufoss is one of the core industrial members in the project I am hired within has of course several advantages. One of the advantages is trust. The arena the "Extended Enterprise" represents has been useful in creating a good relationship with the firm's representatives in the project and has also given me good knowledge of the firm. This has been very useful in my further introductions in the firm. The cooperation with Raufoss in P2005 has resulted in considerable information for my case.

My first meeting with representatives from Raufoss took place at Raufoss back in 1997. In the summer of 1999 I finished my Master's thesis with the title "From the Raufoss Ammunition Factory to Raufoss Industrial Area; An institutional approach to industrial development and a reorganisation process" (Nilsen 1999: My translation). This Master's thesis was, as the title suggests, about the Raufoss Industrial Area and was

done in close cooperation with different firms at the Raufoss Industrial Area, among them Raufoss ASA. The Master's thesis constitutes a foundation for my understanding of this industrial milieu in general and especially of Raufoss ASA. This background has been important in my further work in this field. My relationship with Raufoss has lasted for seven years, and I know the company fairly well. Due to the relationship that has lasted for some time, I feel that I am a trustworthy person from Raufoss' perspective. This has of course eased my work with this thesis. To do such research in cooperation with the industry, trust is of high importance for the quality of the data material that you achieve.

Developing seminars and lectures

In addition to my connection to the Extended Enterprise-project, I have office space at Dragvoll Gård[10], where researchers from Extended Enterprise and other similar projects have been co-located. As a result of being part of the interdisciplinary research community at Dragvoll Gård several interesting opportunities showed up. One such opportunity was given by the "Corporate University"[11] who financed a project where the objective was to develop competence-giving courses for the industry. Raufoss ASA was willing to function as a laboratory for us in this project, and both Raufoss and I saw an interesting link between this project and the PhD work I was doing. The theoretical framework which at that time was the basis of my work became the central element of this course.

From January to August 2002 a colleague and I worked on a series of seminars, and they were developed in close cooperation with the Global Organisation Management 1 and the Canadian Management during this period (see chapter 9). In August 2002 we arranged two seminars in Montreal, which more or less became the kick-off seminars for the Canadian organisation, Raufoss Automotive Components Canada (RACC). Both the Canadians that were hired at that time, the Norwegian Ex-Pat Team and the Global Management 1 participated at these seminars. The first seminar was held in an outstanding environment in the boardroom of The Société Générale de Financement du

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[10] Dragvoll Gård is a separate building located 300 meters from the main campus at Dragvoll.
[11] "The Corporate University" was established by four big Norwegian education and research institutions. It was established in 2002 and the aim was to create courses for professionals and businesses. The goal was to become a commercial deliverer of such courses. This was not a success and the Corporate University was shut down in 2003.

Québec (SGF) (see chapter 9) in one of Montreal's skyscrapers. This set a special standard for the start-up activities at RACC. The day consisted of a few lectures by my colleague and me but mostly the participants took part in teamwork that we facilitated. The professional aspects for this day were a rather broad passage in how technology transfer can be viewed. We talked about culture, about the role of place in a global setting, communication and how knowledge is developed. The participants were divided into groups and given tasks to solve in common. The day ended with a dinner for all the participants in a good restaurant in the old part of Montreal.

The next seminar was held outside downtown Montreal at Radisson Hotel Laval. If the first seminar was mainly to get to know each other, this seminar had more and better discussions, and the participants started to go into depth of central issues concerning the transfer of technology. Some concrete results came out of this seminar that I will come back to in chapter 11. What is important to mention here is that the results of the teamwork, at both the seminars, was archived by me, and is used as part of the data material that this thesis is based upon. In summary, this material covers about 40 day's work, there were 20 participants present at each seminar.

We got very good feedback from these seminars. Two of the higher-ranking people at place in these seminars called the Executive Vice President of Raufoss in Norway and gave their honour to those who had contributed to this. We were very optimistic about the seminars to come. But in September when the next seminar was supposed to start, it had to be postponed. After several delays Raufoss had to withdraw from the contract because the workload of RACC was becoming too much. Their milestones were getting closer and they had to prioritise them[12]. At that time this was a bit surprising for us.

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[12] The manager for Global Organisation 1 resigned after these seminars in Montreal. He was more or less the Raufoss project owner and that was most likely one of the reasons why the project ended this way.

The Global Sourcing project

In the spring of 2003 my colleague and I were hired by Raufoss Technology[13] to contribute in their development of a new Global sourcing strategy for the plants in both Norway and Canada. During the spring we negotiated what the objectives should be for this work. And this gave me the possibility to combine data achievement for this global sourcing project and data achievement for this thesis. Another important issue is that the knowledge I had at that time and the data already achieved, corresponded to a large extent with the purpose of the Global Sourcing project, so in those terms it was a fruitful combination.

Several interviews were completed in Montreal the following June. This project was mostly carried out in cooperation with the Norwegian and Canadian purchasing department, the management of Global organisation 2 and the Canadian Management. During this process we also carried through 6 interviews at Raufoss. The project was completed in December 2003 when the report was delivered to Raufoss Technology.

7.3 Fieldwork

Selection of respondents

Reading other theses and research material there is often a description of how the first meeting took place and what expectations the researcher had for the people he or she should meet from the industry. This is not very relevant for me, for the obvious reason that my relationship with Raufoss was already established when this project started. I knew the dress code and I knew the key people. This is, the way I see it, an advantage. I could pick out my respondents myself. I knew who it was important to talk to at which point, and I also had knowledge of who it was strategically important to refer to when I introduced myself to new people. This is definitively an important advantage when you study industrial businesses. You have to know who is "in" and who is "out", and if possible know it before everybody else knows it. This is important in getting access to information at an early stage as possible. When you do research in an organisation

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[13] Raufoss Technology was a result of a reorganisation process in Raufoss ASA. The management in Raufoss Technology was similar to the Top Management 2. So Raufoss Technology was more or less the official name of the Global Organisation 2. For further presentation of these units see chapter 9.

based on who the switchboard operator puts you in contact with, you run a risk of getting in touch with people who are either not important or do not have the knowledge that is important. Or you get in touch with people that nobody else wants to talk to, because they often have a very open schedule. Based on this reflection I will claim that to have good knowledge of the organisation at stake is important both for efficiency reasons, but also to ensure a strategical well-founded selection of respondents where you as a researcher are in full control of the selection.

This last point is very important in my opinion, because by knowing the selection you also ensure a selection that is not picked for any other reasons than to contribute to your research. If you let others decide who to interview, you always run a risk of that they have their own interests in picking these respondents for you. They may agree too much in one direction or another.

The interviews

As already mentioned, I have partly based this study on interviews. These interviews have been done mostly by me and with only one respondent present. When there has been only me and a respondent present, I have used a tape-recorder. But several interviews have been carried out as preparations to the two projects mentioned, The Global Sourcing and the development of courses, as well, and when that has been the case, we have mostly been two researchers present. On these occasions we have not used a tape-recorder. No respondents have refused the use of tape-recorder and no respondents have refused to be interviewed.

I have carried out 65 interviews in total during this project. 47 of the interviews have been with personnel directly involved in the project. The remaining 18 interviews have been with persons with either good knowledge to the automotive business or experience with technology transfer projects or with good knowledge of both Canadian and Norwegian businesses. I have mostly used an interview guide, but I have tried to make the interviews to become conversations where I have relied on this guide, rather than following the guide from point to point.

One issue concerning the interviews has been that of language. Not all of those I interviewed spoke English very well. On one occasion I had to bring the interview to an end rather quickly because it was more or less impossible to understand what the respondent was trying to tell me. I tried hard, but unfortunately I had to give up. Language problems were also the case at some stages where I walked around at the plant in Montreal small talking with the operators. But in general these small conversations were a valuable information source for me. They had an important role in putting things in a down to earth perspective, when my reflections were going in a too-theoretical direction. But on some occasions when there were language problems, someone who was a native English speaker helped translate.

The extent of the interviews has, as indicated varied a lot. The one that I had to terminate because of the language issue stretched over about 20 minutes, but the most extensive interviews lasted for over two hours. Most of the interviews lasted for one to one and a half hour.

In addition to the interviews and the conversations with the operators I have got a lot of important information in other settings. As already mentioned I got a huge amount of important and well-founded information at the seminars. But it is also worth mentioning that I have achieved a huge amount of information by walking around at the plants in both Norway and Montreal. This includes walking around on the shop floor but also at the office departments. In addition to this I have got information from studying documents about the plans for the establishment of the plant in Montreal. These documents were given to me by Raufoss.

To sum up, the data material has been achieved through working closely with the actors in this process. This includes working closely with the actors at Raufoss both in Norway and Canada. But in addition to this there have also been a lot of other contributors to my understanding of these processes. During my work I have also, as mentioned in chapter 1, worked with Fundo Wheels with the aim of contributing to their technology transfer from Norway to Bahrain in the Persian Gulf. I stayed in Høyanger at Fundo Wheels for about a period of six months. I stayed there irregularly for 14 days at each stay during this period. I had a flat at my disposal. But when they went into a financial crisis they stopped the plans for establishing an extended

production line in Bahrain, and there my project also stopped. Irrespective of the project ending, this was a very important experience for me and equipped me with a lot of experience and increased my interest in this field.

Sites and dates of the data acquiring

Listed below are the documented stays I have had concerning this project at Raufoss and in Montreal. In total I have visited Raufoss for 39 working days and my trips to Montreal lasted for 26 days.

When	Where	What
October 4th and 5th 2000	Raufoss	Project meeting The Extended Enterprise
May 7th 2001	Raufoss	Meeting with key personnel
October 10th 2001	Raufoss	Interviews and fieldwork
October 22nd 2001	Raufoss	Interviews and fieldwork
November 11th 2001	Raufoss	Seminar and fieldwork
November 21st - 22nd 2001	Oslo and Raufoss	Seminar at the Canadian Embassy and interviews/meetings at Raufoss
February 11th–13th 2002	Raufoss	Interviews/meetings fieldwork
March 20th – 21st 2002	Raufoss	Meetings Plant Management Norway, Global Organisation 1 and Top Management 2

Method

April 2nd– 3rd 2002	Oslo and Raufoss	Preparations for the seminars and meetings with Global Management 1, Expat Team, RTIM, Plant Management Norway and Top Management
April 10th– 12th 2002	Raufoss	Meeting Global Management 1 and Canadian Management, and Interviews
April 24th– 25th 2002	Oslo and Raufoss	Seminar arranged by the Canadian Embassy and the Norwegian Foreign department, Meeting Global Management 1
May 14th – 15th 2002	Raufoss	Preparation for the seminars in Montreal, Meeting with Global Management 1 and Canadian and Norwegian Plant Management
July 1st – 2nd 2002	Raufoss	Preparation for the seminars in Montreal, Global Management 1
August 12th – 13th 2002	Raufoss	Preparation for the seminars in Montreal
August 13th -25th 2002	Montreal	Interviews and preparations including guide tours at the shop floor, and the accomplishment of the seminars
August 26th – 28th 2002	Raufoss	Project meeting The Extended Enterprise
September 10th –	Raufoss	Meeting Global Management 1, Top

11th 2002		Management 2
December 16th – 17th 2002	Oslo and Raufoss	Presentation of results for the Department of Research and meetings at Raufoss
February 25th – 26th 2003	Raufoss	Meeting Global Management 1, The Canadian Management and Norwegian Plant Management
June 12th	Raufoss	Meeting Global Management 2 and Plant Management Norway
June 13th - 27th 2003	Montreal	Interviews and Meetings, in general fieldwork
August 27th- 28th 2003	Raufoss	Meeting the Global Sourcing project, The Global Management 2
September 25th 2003	Raufoss	Meeting the Global Sourcing Project, The Global Management 2

Figure 7.1. Documented stays at Raufoss and Montreal.

7.4 Theoretical and empirical considerations

I use theory to enlighten the phenomena I observed in my cooperation with the industry. I have chosen to rely on several theories in my approach to this study, instead of relying on only one. For example I could have chosen to do a full Actor Network study in detail, by including every tool on the plant floor and every person in his interaction with both the tools and the other physical surroundings. To do this in detail makes you end up in a rather silly situation in my perspective. In addition you could

have ended up in a situation where you are in danger of just becoming a photographer and not a researcher. You end up describing what you see is going on, and this complex process leaves you without enough resources to analyse what you have been observing. Combining different theoretical perspectives gives you the chance to end up with an analysis that is more alive and captures more of what is going on, instead of trying to isolate what you observe into one theoretical perspective. Such a situation, like the example with the ANT perspective, will also very fast lead you into a more quantitative analysis and would not be in accordance with my research questions.

What I have chosen to do is to construct a theoretical fundament that is carefully put together on basis of the empirical experiences I have achieved during the research and the research questions I have developed. The theoretical fundament reflects the challenges that are evident in the empirical material. And in this research process the analysis of what is found in the empirical study is examined with the theoretical fundament in mind, and upon this process analysis are presented and conclusions drawn.

My approach has similarity with the type of approach that Alvesson and Sköldberg (1994) label abduction. According to Alvesson and Sköldberg (1994) abduction is an often-used approach in case studies like my own. It can be seen as a combination of deduction and induction. In abduction the case that is observed or experienced is interpreted and related to the theory which then is seen in relation to the case. This means that this process goes from the empirical observable to a theoretical examination and consideration before these findings are presented in relation to the case. During this process the empirical cases at stake are developed one after another, at the same time the theoretical framework is adjusted and developed further. According to Alvesson and Sköldberg (1994) this approach differs from the deduction and induction in the way that it involves understanding to a higher degree, and it is particularly relevant in studies that include organisational change (Sköldberg 1991). The abduction approach can be illustrated in relation to deduction and induction as showed in the model below (Alvesson and Sköldberg 1994:45):

Deduction	Induction	Abduction
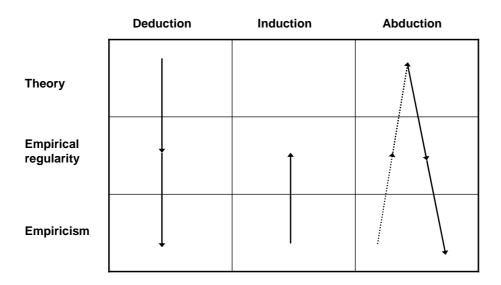
Figure 7.1 Deduction, Induction and Abduction (Alvesson and Sköldberg 1994:45)

Being able to have an interchanging view of the theory and the empirical case has been very important for me in the work with this thesis. For example, it was originally not the intention to include institutionalism in my theoretical fundament, but as I have worked a lot with institutionalism before, I recognised that this was affecting my thoughts and reflection in relation to the empirical material. Therefore, I found it important to present this theoretical perspective as well. The main argument and justification of this is that this perspective to a large extent was affecting which empirical material I found interesting. When this happens, it is my duty to elaborate and present this perspective, so the readers are able to evaluate what I do and why I do it.

7.5 The quality of the data achieved

The presentation of my methodological approach shows that I have had extended access to get information and the data material I have required in this study. My seven year long relationship with the Raufoss ASA group has also contributed to a deep insight into the life of this organisation and also its background and its relation to the

local community at Raufoss. Further, this long relationship with the company has also resulted in personal relations that have been of great joy and value for me, both personally and professionally. Such relations have been very important for me because they have enabled me to get confidential information at a very early stage. This has meant that I have been able to manoeuvre my way in the organisation on the basis of up-to-date background information. This has allowed me to go deeply into the organisation's challenges. I have become more or less a trusted insider in both the Raufoss ASA and RACC. To use Goffman's (1959) terminology of "backstage and "frontstage", I have been allowed to go backstage in the organisations and in this way I have been seen as a trustworthy insider. This has not been the case all the time; some have just wanted to show me the official stories and challenges (exposed theory see next page). When this has happened, I have most often been able to be invited in backstage after a while. This has been done after the person has found me to be trustworthy. Referring to other experiences I have had backstage or experiences of backstage content, have often eased the process of becoming invited backstage by people who at first wanted to keep me frontstage. Referring to the right people and stories is often important in the process of manoeuvring from frontstage to backstage.

When studying a dynamic process such as this technology transfer, to have access to updated information is essential. Just as essential is to have access to up-to-date backstage information. If as a researcher you only have access to up-to-date frontstage information, you are in danger of becoming a rather silly participant in a mummery you do not understand. To get backstage information will also be important to get a grip on what is really going on. At a frontstage level you are in danger of studying exposed theory rather than real practice (Argyris & Schön 1996). But even if I as a researcher have backstage access in the organisation, it might be exposed theory that is expressed to me. By examine different sources of information, it is possible to discover differences between exposed theory and real practice.

Taken into consideration the time I have spent with the companies and my access to backstage information during this process, in addition to the variety of information sources I have had access to, the quality of the empirical material must be considered to be good. But in addition to state that the data material is good it is also necessary to examine the validity or the trustworthiness of this material.

7.6 Trustworthiness

To say something about the value of the research it is important to examine the empirical material that has been achieved and also to say something about the value of the findings the study represents. Lincoln and Guba (1985) have created a set of criteria for evaluating the quality of the empirical material achieved. There are four basic criteria needed to establish what they call trustworthiness and these are: credibility, transferability, dependability and confirmability. I will in the following go through these concepts in relation to what I have done in this study.

Credibility

Lincoln and Guba (1985) present several different sets of factors to satisfy the criteria of credibility. The first argument in their presentation is *"Activities increasing the probability that credible findings will be produced"*. In this relation they present three important activities, one of them is *prolonged engagement*. It is assumed that when the researcher has engagement over some time, this will contribute to increase the credibility by reducing the gap between the exposed theory and theory in use. When the researcher is able to differentiate between exposed theory and theory in use, he/she has become able to get under the skin of the organisation and its members. Another activity is *sustaining observation*, in my opinion a factor that must be seen in relation to the prolonged engagement. Both these factors have an element of time consumption. In my work I have studied the company for a period of seven years and the process of technology transfer for about four years.

During this PhD-project I have stayed in Montreal for 26 days. This has been in two time periods; one, as mentioned, in August 2002 and the second in June 2003. I have also spent 39 days at Raufoss. In addition to these stays at Raufoss and Montreal I have been "present" not physically, but through communication on e-mail and through telephone. I had numerous telephone conversations with the Canadians to follow up on interviews or to gather information in one way or another. This was either done in relation to one of the other mentioned projects, or just for the purpose of this thesis. I think it is right to conclude that the time spent at these central places in this case is

enough, in relation to Lincoln and Gubas (1985) terms of prolonged engagement and sustaining observation.

The second argument in Lincoln and Guba's argumentation is *triangulation*. By triangulation they point at the need for the utilisation of several different methods, sources and theories to strengthen the findings in the material. In this chapter I have described the way the empirical material was achieved. From this description it is quite obvious that the empirical scope is founded on sufficient diversity, including documents, minutes, and interviews with both internal and external personnel, informal conversations and theories.

Another important argument in this relation is *peer briefing*. This implies exposing oneself and the work you do to colleagues or others that might be qualified in one way or other to comment on what has been done. This can, as suggested, be colleagues or reflected members of the organisation at stake. In my opinion a combination seemed to be the most efficient, this secured relevant comments and examination both from the academics and from the organisation in question. To include members of the organisation you are studying into the peer briefing, is what Lincoln and Guba (1985) call *members check*. I have combined these two operations, and in my point of view this has been an advantage. I have got feedback from both academics working with these types of issues, and I have checked my findings with members of the organisation I have studied. This is essential in establishing credibility. Through this, findings are exposed to those who are taking part in the daily reality that is described and those with working on these issues from an academic point of view. In my opinion a combination of these two groups contribute to give this study credibility in both relations.

A fourth argument Lincoln and Guba (1985) present is what they call *negative case analysis*. By referring to Kidder (1981) they argue that this is for qualitative data what statistical tests are for quantitative data. The objective of this is to continuously negotiate and renegotiate the hypothesis until it *"accounts for all known cases without exception"* (Lincoln and Guba 1985:309). This is and has been a continuous process during the four years of work with this thesis. Also in this process I'd like to address the advantages with combining this activity with the peer briefing and members check.

A fifth argument for achieving credibility is *referential adequacy*. Lincoln and Guba (1985) argue for the use of video recordings or cinematography to document happenings and episodes. In my study the use of a tape recorder has been an example of assuring the referential adequacy. By doing so it is possible to examine criticism raised on basis of other sources. Further Lincoln and Guba (1985:313) argue;

"Aside from the obvious value of such materials for demonstrating that different analysts can reach similar conclusions given whatever data categories have emerged- a matter of reliability- they can also be used to test the validity of the conclusions."

But as Knutstad (1997) pinpoints, this implies that the researcher presents the data material. If the data material is given under the promise of confidentiality, this becomes an unacceptable method. In my study the data material is not restricted by any other confidentiality than just the personal anonymity of those interviewed.

Transferability

In what sense a study like this is able to fulfil the demand of transferability is an important question, though it might be hard to answer. This study can be characterised as an example study (Schiefloe 2003) which implies focusing on one case to shed light on this transfer process. To what degree such a study can be generalized to others is dependent on the time and the context of the study. This means that the question of whether the findings in my study are applicable in another context or in the same context at another time, is as Knutstad (1997) emphasises, an empirical question. In this way it is difficult to evaluate this kind of research in accordance with the demand of external validity. Lincoln and Guba (1985:316) address this challenge like this;

"..he or she can provide only the thick description necessary to enable someone interested in making transfer to reach a conclusion about whether transfer can be contemplated as a possibility.".

What is recognised to be a thick description is not expressed clearly in the way I read Lincoln and Guba (1985). But what I interpret from this is that it is important that the case description is done in a comprehensive way, including substantial information

about both the historical dimension of the study and an up-to-date description of the situation based on different sources. The purpose of this description is twofold, first it is important to introduce the reader to the context the research has been applied in, and in this way make the reader able to access the case and its findings. Second, and of higher methodological importance is that the description *"provide the data base that makes the transferability judgements possible on the part of potential appliers."*(Lincoln and Guba 1985:316). To make a judgement on whether it is transferable or not is as Knutstad (1997) states not my job, this is the job of externals. My job is to provide the database necessary to make the judgement possible.

Dependability

Dependability is another factor that Lincoln and Guba (1985) see as important in the process of trying to establish trustworthiness concerning scientific studies. Dependability is about to what degree the findings and conclusions are dependent on the researcher themself. Lincoln and Guba (1985:316-317) present several arguments concerning dependability and link it to credibility when they argue:

"Since there can be no validity without reliability (and thus no credibility without dependability) a demonstration of the former is sufficient to establish the latter. If it is possible using the techniques outlined in relation to credibility to show that a study has a quality, it ought not to be necessary to demonstrate dependability separately."

Even Lincoln and Guba acknowledge that this argument is quite weak. It does not deal with dependability in principle, though it might be seen as a practical guideline. Either way from my point of view, the data and the findings of this research have been completed by me and must be seen as part of my point of reference. At some degree it will be hard to disconnect this from me, the individual. These data and findings must be seen as something that my respondents and I have achieved and constructed together. What I find important is to express my position, and in that way make it possible for others to evaluate my arguments and findings on the basis of that. Even though I have not given a wide discussion on different scientific positions and paradigms, I believe that I have presented a visible position of myself and my position. Either way some of the most important feedback concerning dependability is given by the organisations I

have worked with in this study. They have found my findings and arguments reasonable and recognisable. This should indicate that my analyses to some extent should be seen as reasonable.

Confirmability

When presenting different solutions for establishing confirmability, Lincoln and Guba link this to auditing. When presenting the audit trail they advocate a perspective where it is possible for somebody to go through the data material and reconstruct the findings done by the researcher, in this example, me. For me this seems like an odd perspective. As I have argued above, the material this study relies on has been achieved and constructed in a process with me and my respondents acting together. In this way it will be difficult to audit the material in a way that includes the process of achieving the material as well. In this regard, it is worth mentioning that the material is achieved under the promise of confidentiality. This makes it even more difficult to accept this audit trail as a reasonable and credible way of confirming this study. I find it hard to hand over the material achieved in this study to anyone who wants to check the confirmability. Besides that, in my point of view knowledge is contextual, and it would be hard and impossible for the one auditing this to get into the context this knowledge has been created in, and therefore such an audit would not be worth much.

My work with this thesis has been carried out over a period of four years. To reconstruct these years on an audit trail, seems meaningless to me. What is more interesting, like Knutstad (1997:146 my translation) argues, is whether

"i) I have been able to tell a credible story about this process, ii) if the argumentation and conclusions are credible and recognisable and iii) whether this is written in a form that the argumentation and conclusions might have value in other contexts."

Whether I have been able to fulfil these criteria is not up to me to decide. My job is to try to make the data material as visible as possible given the promise of confidentiality and also provide a wide range of sources to support my argumentation and findings. But as already stated, this is nothing that I can judge, but I will deliver my arguments concerning these issues.

Is this trustworthy?

Based on this discussion I will finally conclude that the material this thesis is founded upon must be regarded as trustworthy. The long relationship between Raufoss ASA and me as a researcher must count in this direction. This is an example of prolonged engagement that Lincoln and Guba (1985) see as important for the credibility of the data material achieved. This is even made stronger through my *sustained observation* over several years. The process of this technology transfer has been observed over a period of four years, while my relation to the company has a history of seven years. I have also used triangulation in different ways in my research, in the sense of using different sources in the search for information and data. Discussions with both research colleagues and colleagues at Raufoss ASA have been essential. But also the comments and the discussions with my supervisors have been important in this relation. This is in accordance with Lincoln and Guba's (1985) *peer debriefing* and *members check*.

When it comes to transferability I will rely in Schiefloe (2003), who states that this is dependent on the similarity between what has been studied and what it is suppose to be transferred to. As argued, dependability is inevitable, this thesis has been done by me and is my responsibility. Confirmability is a more difficult issue, first and foremost ethically, but also practically. Practically it is problematic concerning the impossible need for reconstructing the situations where the data has been achieved.

7.7 Summing up

In this chapter I have outlined the foundation for the data material and what this thesis relies on methodologically. I have done so by telling the story of how I was introduced to this field and how I came in contact with Raufoss ASA. This story also involves the first period where I was struggling to get the cases into the track I wanted (see chapter 1). When I had agreed with Raufoss ASA about my case, I developed my scientific approach.

The description of my relationship to the field also includes an outline of my own organisational context. This ends up into a close description of certain important

activities like the development of the seminars held in Montreal and the Global Sourcing project.

Further I go into a discussion of the methodology and the research strategy and design. This is further taken into a presentation of the fieldwork and how the processes have been carried out. The selection of the respondents and descriptions of the interviews is important in this presentation.

I end this chapter with a discussion of the quality and trustworthiness of the data achieved. This is examined in relation to Lincoln and Guba's (1985) concepts of; credibility, transferability, dependability and confirmability.

Section 5 Context and Case description

8. An overview of the automotive business

My outline of the concept of globalisation has so far been mostly about the societal changes and the forces that are important in relation to this. This is important for the scale of my study, and I will come back to this issue later in chapter 14, where I will sum up some of the findings in this thesis. This chapter is an attempt to put some flesh on the bone in terms of what globalisation might be about at a concrete level. By describing different phases in the automotive business I will try to present a picture of what the process of globalisation might be like for this business. It is important to understand the background for some of the exogenous forces that are at play, and are more or less forcing Raufoss to take part in this development (or to choose to not take part).

Different phases of the automotive business

Roughly spoken, the international automotive industry has developed through three different phases from its start-up in the early 20th century. With Henry Ford's introduction of the production line manufacturing, the industry became what is known as globally decentralised. This phenomenon was connected with the method of production that mass production entailed. This period lasted until approximately the 1980s and was succeeded by a period characterised by the Japanese principles of organisation. This period has again been followed by a third period characterised by restructuring and increasing competitor collaboration (Haraldsen 1994). In the following each of the periods will be elaborated on.

8.1 Global decentralisation

During the period labelled global decentralisation, Ford's introduction of the production line was a central element. There was focus on work processes (Taylor 1911) and improved organisation and operational management. In this period American car manufacturing was far more efficient than the European, which to a larger extent was characterised by smaller and less specialised companies. This gave the American

manufacturers a considerable lead over the European competitors. Towards the end of the 1920s the two large American manufacturers General Motors and Ford dominated car manufacturing with a combined market share of 90%. Ford developed its production from mainly concentrating on car assembly to an increasing focus on the production process. By carrying out a greater share of the production processes in-house, Ford sought control over the majority of the production processes. During this period vertical integration reached its peak with the opening of the River Rouge factory in Detroit in 1927 (Lamming 1993). GM chose a different production philosophy even though it was mainly built on Ford's production concept. GM introduced the multi divisional enterprise. The idea behind this was the establishment of more or less independent divisions operated as profit centres. Daily operations in the divisions were managed by the divisional management, while the divisions and allocation of resources between the divisions were controlled by GM's headquarters (Williamson 1981). In Western Europe GM and Ford had to establish separate production units as a consequence of European protectionism. At this point GM had operations in 16 countries, while Ford was established in 21 countries (Sadler 1992).

After WW2 this situation changed slightly. The era of protectionism was over, and there were efforts to restart the European economy. The European car manufacturers went from being small production units to introducing standardised mass production based on the principles from Ford. At the same time the European manufacturers targeted other niches and worked more on product innovation than the Americans (Haraldsen 1994). The European automotive industry recovered fairly quickly, and the increase in production helped the European automotive industry catch up with the USA by the beginning of the 1970s. In the course of 20 years, from 1950 to 1970, the market share of the American car manufacturers dropped from 85% to 33%. This happened despite an increase in output from 7 to 7.5 million cars in the same period (Hoffmann & Kaplinsky 1988). Simultaneously the output from the Western European car manufacturers increased formidably, from 1.1 to 10.4 million cars, which brought their market share from 13.5% to 46% (Hoffmann & Kaplinsky 1988). During this period some of the European manufacturers, mainly Volkswagen and Renault, started establishing themselves on the American market (Haraldsen 1994). By the beginning of the 1970s the European automotive industry had a market share of 10% in the USA (Sadler 1992).

8.2 Japanese Principles of Organisation

During the post-war period the European automotive industry was rebuilt on the principles of Ford. However, during the 1970s a new challenge arose. More and more Japanese companies started to capture market shares from the American and European manufacturers. Several possible explanations have been launched to explain how the Japanese were able to capture such large market shares. Since the 1950s the Japanese automotive industry had developed a form of mass production that can best be described as a transformation of Ford's original concept of mass production. This transformation of the production concept points to an adaption to the specific techno-economic and socio-institutional conditions in Japan (Cusumano 1985, Sayer & Walker 1992). During the post-war period in Japan it was impossible to obtain the necessary economies of a scale necessary for mass production. Simultaneously the situation in Japan was characterised by expensive resources and limited space, which in turn contributed to the development of a production philosophy based on minimal wastage and minimal warehouse stock (Cusumano 1985, Sayer & Walker 1992). Toyota is perhaps regarded as the primary driver of the development of the Japanese production system, or what Haraldsen (1994) calls the Japanese transformation[14]. The Japanese production concept was to a large extent marked by the organisation principles of JIT. This production philosophy is based on a systems mentality in regards to both the process and products of technological development. The automotive manufacturers look for innovation skills that go beyond the company's own skills and opportunities. In contrast to the Western and American supply- driven production philosophy, the Japanese philosophy is demand- driven. Through the exploitation of various innovations, both procedural and production technical, the production has become more flexible and able to keep up with changing trends in the market. The Japanese production system can perhaps best be described as flexible mass production (Haraldsen 1994). Another term used to describe the Japanese production system is lean production (Womack et al. 1990).

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[14] The Japanese transformation consisted of a series of innovations, both production technical and procedural, e.g. "Just in Time", vertical disintegration, team collaboration (keirutsu) and increased use of technical appliances (Haraldsen 1994).

The Japanese car manufacturers' entry and capture of large market shares from the American and European manufacturers shocked the traditional industrial communities, among others Baden Württemberg in south-western Germany (Cooke & Morgan 1994). Womack et al.'s book "the Machine that Changed the World" from 1990 has become a classic in understanding the Japanese transformation and the secret behind its great success. The book became many Western industrial executives' hope in a complex situation. In Germany alone more than 50 conferences, in the period from 1990-92, where based on this book. Prominent industrial enterprises like Daimler Benz, Volkswagen and Robert Bosch each purchased 1000 copies of the book to use it as a manual for its top management (Cooke & Morgan 1994).

As mentioned, the West-European and American automotive industries were exposed to increased international competition, which coincided with an incipient stagnation in demand, and diminishing returns. This put several car manufacturers under considerable pressure towards the end of the 1970s (Hoffman & Kaplinsky 1988). Japanese car production had increased from 165 000 units in 1960 to 3 178 000 units in 1970 (Hoffman & Kaplinsky 1988). The entrance of such an actor on the arena naturally caused considerable challenges for the established market, with the introduction of cars at substantially lower prices on a market in stagnation.

8.3 Restructuring of the European Automotive Industry and increasing cooperation

The Japanese entrance and formidable growth had impacts in the form of lay-offs and shut-downs, not only at the American giants GM and Ford, but also on European manufacturers. At the start of the 1980s there was an obvious need for substantial changes, especially in the European industry (Haraldsen 1994). A considerable increase in productivity in the automotive industry was necessary, and various strategies were chosen to meet the new needs. Common for all the strategies was that they were inspired by Japanese production philosophy.

In an attempt to respond to the Japanese challenges, Ford and GM tried a "world car" strategy. The goal was to build a global car that would be sold on all the markets in the world. By their estimates there would be considerable economic gains from integrated production of the global car. However, making one car model popular in every market proved both expensive and difficult. These immediate responses were eventually replaced with more long term and well-considered changes. Hudson (2000) outlines five distinguishable approaches that can be seen as resulting from the changes:

- First of all there was an attempt to acquire knowledge on lean production, and to use this knowledge to develop adapted versions of lean production. Organisational changes were carried out in the direction of more teamwork and more extensive use of contract work, in addition to a reorganisation of the supplier networks. The reorganisation of supplier networks must also be seen in light of the reduction of in-house production. Cooke & Morgan (1994) describe the development in the German automotive industry where, during the 1970s, there was a steady increase in the amount of in-house production. Up until 1978-80 in-house production increased rapidly, succeeded by an equally rapid drop in the following years. By the start of the 1980s the European car manufacturers had between 1 000 and 2 000 suppliers per car model, compared to Toyota's 310-400 suppliers. The changes in supplier networks not only involved reduction in numbers but also in the way they were managed. Suppliers became more involved in product development[15], which required more R&D competence. Price was an important competitive factor but eventually other factors were given more significance, e.g. delivery precision and quality[16].

- Secondly, attempts were made to find a new production method not based on Ford that could handle high volumes (strategies were developed based on dynamic flexibility and mass customisation). The aim was to combine large-scale production with solutions that could ensure flexibility and ability to handle swift shifts in customer wishes and preferences. This approach required new investments in technology in order to automate work processes, a capital intensive strategy. This would work well in areas

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[15] First and second tier (reference and model)

[16] Hodson & Schamp (1995) argue it is mainly the relationship between car manufacturers and first tier suppliers that has become more long term and thus reduced the importance of price somewhat. At the same time suppliers further down the supply chain are still mainly chosen on price,

with shortages in labour supply, like Japan, but not in areas like Europe, where there was a surplus of labour.

- The third strategy designed to respond to the Japanese challenge has been based on a geographic reorganising of production locations. This strategy involves a reorganising of the automotive manufacturers' internal division of labour. Manufacturers have chosen to move the standardised part of production to more low-cost European countries, while keeping management, marketing departments, R&D and production of luxury models in their own country. This process is generally called Europeanisation and has contributed to a European division of labour in the automotive industry (Hudson & Schamp 1995).

- The fourth reaction one can see is that non-Japanese car manufacturers have entered into strategic alliances with Japanese manufacturers. The aim and reason for such cooperation has been that the non-Japanese wanted access to Japanese production and technical expertise. In return, the Japanese gained access to markets and distribution networks. Honda, for instance, gained access to the European market (EU) through an alliance with Rover. Another example is the cooperation between Volvo and Mitsubishi in the Netherlands. And in 1984, in an attempt to learn from the Japanese companies, GM entered into a joint venture with Toyota.

- The fifth strategy has been to form strategic alliances between European and/or American based companies. The intention of this strategy has been to reduce R&D costs, spread risk in product development and to share knowledge on best practice in production. One example of this development is the cooperation between Ford and VW on the development of the new Volkswagen in Portugal. Another is the cooperation between the European manufacturers Renault and Volvo (Haraldsen 1994).

Strategy four and five are characterised by increased cooperation between different companies. This describes a major part of the development in the automotive industry over the last few years. The industry today consists of six giants; GM, Ford, Daimler-Chrysler, Toyota, Renault-Nissan and VW. In addition, it is worth noting that BMW, Honda and Peugeot/Citroen still operate independently.

As we can see, the automotive industry is characterised by increased integration and cooperation among the different car manufacturers. However, this development is not only seen among the car manufacturers; the suppliers have also been affected by the changes in the automotive industry. The car-component manufacturers have not surprisingly gone through many of the same changes. As previously mentioned, one of the most significant changes in the Western automotive industry has been the changes in the supplier networks, which have obviously affected the car-component manufacturers. A reduced number of suppliers and their entry into new markets are perhaps the most visible changes the industry has gone through. There are now fewer suppliers that deliver to other geographical markets than before (Amin & Sadler 1995, Sadler 1999).

In other words, we find that many of the same processes that affected the car manufacturers have also taken place among the car-component manufacturers. This parallel restructuring has been marked by more or less the same processes. There has been a series of mergers, acquisitions, joint-ventures and shut-downs. Companies have sought to cooperate with Japanese companies to learn from their technology and production processes. In the European part of the industry there has been a tendency towards Europeanisation as production has been moved from the large centres to more remote parts of Europe where production costs are lower.

History shows that suppliers have traditionally competed for price. Typical European suppliers have had to contend with an abundance of relatively small companies that have been in fierce competition with each other. As a consequence the quality of deliveries has suffered. This is in sharp contrast to the relationship between car manufacturer and supplier in Japan, where a structure based on using a group of preferred and privileged suppliers, so-called first tier, has been developed[17]. These suppliers are at the top of a supplier hierarchy that consists of various second and third tier suppliers etc. The relationship between the car manufacturer and its first tier was based on long-term cooperation and trust, as opposed to short-term competition based

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[17] The first tier suppliers mainly deliver complete systems rather than a single component. Second and third tier supply components to the first tier that puts everything together before delivering to the car manufacturer.

on price[18] (Hudson 2000). The European system of suppliers faced considerable challenges when Japanese car manufacturers established themselves in Europe. The change processes at the suppliers accelerated at this point in time. The European suppliers that wanted to deliver to the Japanese companies in Europe were exposed to a different philosophy than the price-focused philosophy they were accustomed to[19] (Hudson 2000).

As a consequence of the competition the Japanese companies represented, the non-Japanese companies were forced to make changes to stay competitive. From 1988-1992 Ford reduced their list of suppliers by 15%, to 900. They had intentions of reducing the list further, down to 600 suppliers, and this would still be a much larger number than the Japanese companies in Europe were operating with. GM faced the competition in a somewhat different manner, by insisting on a full renegotiation of supplier contracts where the goal was to reduce prices (Hudson 2000). This response held clear parallels to the earlier strategies and represented more of an intensification of the previous strategies rather than a change.

The European car-component manufacturers have not only moved production within Europe. There is also a quite considerable process of globalisation in progress. This is often a consequence of the car manufacturers' wish to establish themselves on new continents, which gives the suppliers an opportunity to gain contracts in different parts of the world. This is, of course, provided both the car manufacturer´s and the supplier´s wish to continue the cooperation.

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[18] Despite a focus on other factors than price in these relationships, price is not insignificant in the relationship between car manufacturer and first tier, as Hudson (2000:149) points out: " It is, however, important to stress that the continuing renewal of such relationships was and is by no means unconditional but dependent upon the attainment of agreed targets for increases in labour productivity and quality".

[19] In Toyota's supplier evaluation there were four important criteria: 1. Management's attitude and ability. 2. Production facilities and investment in new technology. 3. Philosophy and systems for quality control. 4. Ability to Research & Development. Only when the companies had been evaluated and found interesting according to these criteria did price become an issue (Hudson 2000).

8.4 Summing up

The automotive industry has developed from a starting point as a national industry that evolved through what we can call a global decentralised industry to become a global integrated industry. This development has happened during a period of less than one hundred years. Today the six big automotive businesses co-operate with companies all over the world and are established more or less everywhere. But as this chapter has shown, there has also been a process of regionalisation during this development. The strategy Hudson call europeanisation serves as an example of the regionalisation process in this industry, where there has developed a spatial division of labour in the European car manufacturing industry. One characteristic feature of this is the "car manufacturing districts" that have clustered around the assembly plants of the car manufacturers.

These general development trends and strategies of the car manufacturing industry are reflected when looking at Raufoss ASA. Raufoss ASA bought a producer of commercial vehicle systems back in 1998. Through this acquisition Raufoss expanded in the European market. We can also see that the first strategy of involving the suppliers more directly in the product development has had a direct impact on Raufoss ASA. It is Raufoss ASA that has developed the technical solutions for their products, that later have been approved by the car manufacturers. Also the fifth strategy that Hudson has identified has had direct consequences for Raufoss ASA. Raufoss ASA had strategic and long term cooperation with SAAB, and when SAAB was acquired by GM, this cooperation continued. The consequence for Raufoss was that the cooperation with GM represented a much bigger market potential, and the contracts with GM were a direct consequence of this cooperation. We see that the changes in the automotive business have had consequences for the car component producers. This is the backdrop for much of Raufoss ASA's development and a direct reason for their establishment of a new production plant in Montreal.

9. The background of the case

In this chapter I will present the background for the case I have studied. This includes a presentation of some glimpses of Raufoss's history, both as a place and as a factory. Such a presentation also includes an introduction to the industrial environment at Raufoss. Then I will gradually turn the focus onto the case study of the technology and knowledge transfer to Montreal, Canada. This includes a thorough introduction to the product, suspension arm in aluminium, and the production lines. I will also present the plant in Montreal. I will end the chapter with a presentation of important actors that have been actively involved in the transfer process.

9.1 The Automotive Community in the Forest

If one considers that Raufoss ASA is located in the forests of Toten, in the municipality of Vestre Toten, one does not immediately think of a high-tech industrial community competing in one of the fiercest industries in the world - the automotive industry. However, this has been made possible because the industrial community has been allowed to develop with strong state support and commitment. Through history an industrial community has been built, broad enough to contribute with considerable innovations with a wide range of products. This has contributed to the existence of a rich and varied industrial community in the Raufoss industrial park since the restructuring during the 1980s and 1990s (Nilsen 1999).

Today there are approximately 3000 people employed within the industrial park, at five main companies: Hydro Automotive Structures, Hydro Profiler, SÄPÄ AS, Nammo AS and Raufoss ASA. Three of these companies have specialised in different parts of automotive parts manufacture. Hydro Automotive Structures manufactures bumpers in aluminium for the European automotive industry. The Swedish company SÄPÄ supplies plastic caps for bumpers on customer demand. Lastly, and as mentioned, Raufoss ASA is a supplier of aluminium suspension arms to General Motors though Raufoss Chassis Technology. In addition, the German company

Steertech manufactures aluminium steering columns. In other words, the automotive environment in the industrial park can be regarded as prominent. In addition to these automotive companies, the ammunitions company Nammo and the aluminium company Hydro Aluminium Profiler are significant contributors to the industrial park.

These companies, together with a range of smaller technology companies and various support companies, form a highly competent technology environment in the forests of Toten. None of the automotive companies are located in close proximity to their customers. The localisation of this technology community can therefore seem somewhat disadvantageous in relation to traditional localisation factors like proximity to market.

9.2 The Story of Raufoss

From farmland to matches

If we look at the area where Raufoss Industrial Park is located today, it is a quite extraordinary industrial milieu seen in accordance with Norwegian scale. Among 3000 workers earn their living in this industrial milieu in the deep forest in eastern Norway. A few hundred years ago this area was in general, farmland mainly consisting of forests, with no proper roads. In fact there were a few kilometres of forest road in the area, but in general the infrastructure was poor. Even though it has been reported that back in the 16th century there was a local smithy in the area (Nilsen 1999). This is the first industrial or craftsman's activity that is reported from this area. Later there was a match factory employing about 70 people for a while. This factory was established in 1873 but the establishment was rather optimistic, and the factory went bankruptcy after six years. But new owners started it up again and kept it going until the mid 1890s. The match factory was internationally orientated. It arranged sales tours to the Far East and was rather successful with exports to both China and India. But on the 1st of May 1895 the match factory was shut down, and its property was taken over by the state.

Towards ammunition

In the 1890s Norway was in Union with Sweden. The political situation was rather tense with a gradual Norwegian desire for total independence. In this situation it was a disadvantage that the national ammunition factory was located at Akershus Fort in Oslo (Christiania at that time). The Norwegian authorities were afraid of that in a possible Swedish invasion, the ammunition factory would fall into Swedish control at a very early stage. Oslo was too accessible in a war situation. The conclusion was that the ammunition factory had to be moved to a more inaccessible location than Oslo.

The choice fell on Raufoss which is 120 kilometres north of Oslo and sheltered by Lake Mjøsa from Swedish attacks from the east.

The decision to move the factory was not warmly welcomed by the workers who were used to living in the urban Oslo. Now they had to move to the rather rural area of Raufoss. They received quite good economic compensation and kept their income, which was a good offer in light of the lower living costs at Raufoss. Even though this was a social experiment at that time.

Mechanical and pyrotechnical skills

Even though the existing ammunition factory in Oslo had skilled personnel, it is reasonable to believe that the milieu at the match factory was an important factor in the decision process of where to locate the ammunition factory. The mechanical and pyrotechnical skills at the match factory were related to the activities in the ammunition factory and in that way the existing skilled employees were important in the start up process at the new ammunition factory. This transfer started with moving experts and leading technical personnel from Oslo to Raufoss. Together with the workers from the match factory, who already were at Raufoss, they started establishing the factory. This

was the start of both a new factory and activity at Raufoss, but at the same time it was also the start of a whole new society at Raufoss.

9.3 Raufoss; a factory and a society

In 1896 Raufoss had 132 inhabitants. When the Raufoss Ammunition factory was established, this number started to grow. During the start of the 20th century both the factory and the local community expanded. The factory became more than just a production place; it was also an important contributor to the local community. The factory built a school and contributed to a new water supply and water station, and also to the establishment of the local hospital. After a while the cinema and library were also established in cooperation between the factory and the local authorities. The factory also contributed to several sports stadiums. All this gave the factory a lot of public credit, and if we look at it in accordance with today's standards this was an important contribution. But we also have to remember that this was in a different time than we live in now. It was more or less expected that the factory should be such a contributor, and it is also worth remembering that the factory was state owned and was one of the Department of Defence's important tools. But either way, this contribution was creating tight bonds between the factory and its employees and therefore with most of the people living in this small society. The borders between the local community and the factory were rather diffuse, and it was experienced that the factory "*was everything*". Like one of the respondents in the study for my Master's thesis expressed it (Nilsen 1999:96, my translation):

"We were drinking the milk of the factory's cows, we were riding its horses, we were chopping our logs in its forest, and we were living in its houses. Of course this has left its mark on us; everything used to be the Factory!"

In my Master's thesis , in addition to the above, I present several other examples of the tight bonds between the factory and the local community. The loyalty in critical periods and the attitudes towards fluctuating employment rates and the acceptance of these fluctuations are examples of these bonds (Nilsen 1999, Dale & Nilsen 1999). This illustrates that the factory and the local community were developed in common and

were both very important features in people's lives. The history of Raufoss continued in this way throughout the 20th century, both the factory and the local community in general created Raufoss to be what it is today. The red thread during the 20th century is cooperation both internally at the factory but also cooperation with external companies. The local community and the factory are built on cooperation during the century where Norwegian social democracy is having its most important time. Both the factory and the Raufoss society were based on the production of ammunition, but during the 20th century this ammunition dependency was, as we shall see, supposed to be changed.

Towards the civilian market

Even though the factory was an ammunition factory that produced defence products for the Norwegian defence ministry, by the early 20th century, the union and the workers had already expressed a wish to the production of products for the civil market. This was based on the fact that they were dependent on state budgets decided by politicians. These budgets could vary considerably from year to year. Years with low budgets meant high unemployment. And by expanding into more private markets they hoped to avoid unemployment. But in spite of these attempts and wishes the products for civilian markets did not become of any substantial size before the 1950s. They then got an agreement with the Volvo Company of mounting their new military vehicle. This was their first engagement with what later would become the important vehicle business for Raufoss.

Aluminium the new material

In the 1920s, aluminium was already seen as an important forthcoming product that could be interesting in industrial terms at Raufoss. But it wasn't until the 1970s that they got their first contract of importance. They then signed a contract on delivery of safety bumpers to Volvo. During the 1960s they had developed a bumper in aluminium that reduced the casualties in car accidents. This bumper was able to absorb a lot of energy in a possible crash and in that way reduced the damage on the rest of the car and the passengers. The safety element was one of the important effects of this bumper. Another important feature was the fact that it was made of aluminium and thus a lightweight product. The car manufacturers were becoming increasingly aware of the negative environmental affects of driving cars, so one strategy for coping with that was

to reduce the cars' weight. The safety bumper became a success, and even more car companies were added to the list of customers during the 1970s. Even if the civilian products were increasing, it still took nearly twenty years before they were to be equal with the defence products, economically.

Aluminium suspension arms arriving at SAAB

The success of the safety bumper inspired the Raufoss engineers to further work with aluminium. They tried to identify and develop other parts of the car where their knowledge on aluminium could be useful. This resulted in the development of steering columns in aluminium that further developed to become a stand-alone business area and even an independent company some years later[20]. But it also resulted in the development of suspension arms in aluminium. The business unit that was responsible for the suspension arms won contracts with SAAB, which produces cars in the high price segment. SAAB sells a lot of cars based on its reputation for developing high technology and for the latest and best solutions available. Even though these contracts were of limited volumes, they were contracts that were of importance as all contracts in the car industry are. Such contracts gave the possibility to further development of the product in close cooperation with SAAB's engineers. This was both a challenging and important possibility for the technological milieu at Raufoss. It was one corporation among others in the car industry that gave Raufoss important credit and experience. In the years to come this close cooperation with SAAB was supposed to give substantial results for Raufoss.

A test driver's love

The cooperation that started with the Swedish SAAB back in the seventies continued during the eighties. But as mentioned in chapter 8, the car industry went through a consolidation phase in the nineties. This consolidation phase had important affects on SAAB so much so that in the nineties it was acquired by the American company, General Motors (GM). For the Raufoss this was an exiting development. Would their thirty years of cooperation with SAAB continue under this new regime, or was this the end for the Raufoss-SAAB cooperation? An end, due to Raufoss's size was not an

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[20] See page XX about Steertech Willie Elbe AB

unimaginable outcome. But the engineers at Raufoss continued to develop their suspension arms, and they tried to win new contracts. One of the challenges was to get the price low enough. The technical content of their product was more than good enough. In fact the technical solutions in their suspension arm are so good that it is said to be the GM's test drivers at Russelheim that demanded GM to go for the Raufoss solution. This was solely based on their experience of this suspension arm's superiority[21].

The result was that GM entered into a contract with Raufoss. The news of this contract was publicly announced on December 20th 2000, as mentioned in chapter 1. This contract was far more extensive than the contract Raufoss had previously with SAAB. Now the contract was based on GM's new platform Epsilon. Such a platform is one of the car industry's strategies to reduce costs. The cars are produced in a way so that as much as possible is the same on every car. So what differs are basically the look and the equipment inside the car such as the effect of the motor and seats and other furniture. This meant that the contract Raufoss achieved included several models on GM's European Epsilon platform. The volume of this contract was in other words of another proportion than the contract Raufoss had with SAAB before.

Summing up the history

The development of Raufoss as an industrial centre commenced towards the end of the 20th century. What started out as one ammunition factory in 1896 has evolved to become one of Norway's leading and largest industrial areas. The area and local community of Raufoss have evolved together with the former Raufoss ammunition factory. Over its 100-year history the activity has gone from production of ammunition for military purposes to an ever-increasing share of production for civilian purposes. When considering the activity that takes place within the Raufoss industrial area today, one finds that since the mid 1980s there have been more people employed within civilian than military production. The place of Raufoss has expanded with this industrial activity. Over the years a social environment that supports the industrial activity has evolved. This environment possesses expertise in many areas that

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[21] This story is hard to get confirmed, even though this is a Raufoss story, and it shows the pride in their technology - even if unconfirmable.

contribute to the continuous development of this industrial environment, and it was within this industrial environment that the wheel suspension in aluminium was developed. Based on the fact that the product was developed here and the necessary expertise and competencies are present at Raufoss, there is little doubt that Raufoss would be the most rational choice of localisation of production for the EPSILON platform (See chapter 1). To serve GM's European production the only requirement from GM was that the production had to be done in Europe, so Raufoss was an acceptable location.

9.4 Raufoss ASA

From the mid 1980s and up until 2004, Raufoss ASA has gone through major changes. From being a division of a state company, the company today is listed on the Norwegian stock exchange and organised as a holding company. In the autumn of 1990, the state company was partly privatised and listed on the Oslo Stock Exchange. This marked a milestone in the history of Raufoss ASA, as the state which had previously had sole proprietorship now opened it up to other owners. For Raufoss ASA this marked a change.

In 1997 Raufoss ASA sold off its bumper operations that the company had been developing since the end of the 1960s. At that time the bumper operations constituted half of the company. This considerable part of the company now became part of another state company, Norsk Hydro[22]. Around the time of the sale Raufoss also had a new Chief Executive Officer [23](CEO). From 1997-1999 a range of investments were made in the Raufoss Group as the sale of the bumper operations had provided the group with more scope for manoeuvre.

The major changes Raufoss went through during the 1980s and 1990s were characterised by changes in ownership and fission processes. Previous divisions of the state company gradually became separate public companies under the listed holding

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[22] At the time of the sale Norsk Hydro was considered a safe and good place of employment, under indirect state control. Even though Norsk Hydro was not fully state owned, it was known for treating workers well, which was considered important at Raufoss.
[23] Bjarne Gravdal retired and Nils Erik Skarsgård took over.

company, Raufoss ASA. In February 1999, this was the situation: A new CEO is hired after the previous CEO had to resign due to conflicts with unions and other vital stakeholders at Raufoss[24]. The new CEO faces the following situation: the company had recently bought a utility vehicle manufacturer, United Parts, with operations in Sweden, the Netherlands, Belgium, France and Germany. The company had spent most of its financial strength on this acquisition, so the remaining financial means were reduced. The company's industrial structure was diverse and not very focused. The activities ranged from various defence products like ammunition and missiles, to civilian products like couplings for trucks and various automotive parts in aluminium. Thus the situation facing the new CEO in 1999 was an industrial company with operations in a range of different industries and markets, and very little industrial focus. His main challenge would be mapping out the company's future focus areas.

The group management then met to determine what would be Raufoss ASA's future focus areas. An essential part of this process was to find good alternative solutions for the areas that were considered non-essential in Raufoss ASA's future strategy. At this point it still had a considerable amount of production for the defence industry, organised in the Nordic ammunition company Nammo AS. It quickly became apparent that this was not an area the company wanted to develop within the organisation. The chosen solution was for the state, the original owner of the ammunition factory, to take over Raufoss ASA's ownership in Nammo AS.

After the acquisition of United Parts in 1997, Raufoss ASA was left with a range of companies around Europe, producing various parts for the utility vehicle industry. These companies were defined to not be a part of Raufoss' future core business and were prepared for sale. The diversified nature and products made it necessary to sell the operations off in several stages to different buyers. Towards the end of September 2001 this process was more or less completed.

What remained in Raufoss ASA after the fissions and sell offs were essentially four operational companies. In the following, a brief description of the four companies is provided (per.2004).

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[24] For further analysis, see Nilsen 1999, Dale and Nilsen 2000.

Raufoss Industrial Tool AS (RIT), the group's tool factory. The company manufactures and adapts industrial tools for the various other companies in the group as well as for other customers. This is an important skill base for Raufoss ASA. Tool adjustment and maintenance are of great importance for the group companies and thus a skill defined to stay as a part of the group in the future.

Raufoss Technological and Industrial Management AS (RTIM) is a company that brings together all the group's laboratory services, training, human resource services, skills development and material technology centre. This company is under joint ownership, where Raufoss ASA is the principal shareholder with 66% and Sintef 34%. RTIM's role is to assist the other companies in the Raufoss Group as well as external customers with the above services.

Raufoss Fluid Technology AS (RFT) is a company that mainly delivers various types of couplings to the utility vehicle industry. Coupling systems involve, among other things, brake pipe couplings and coupling systems for gas feeding of vehicle fuel. The operation also contains a business area that to a large extent is based on the Isiflo coupling, an essential invention at Raufoss, and which supplies products to the water and gas market.

Raufoss Chassis Technology AS (RCT) manufactures aluminium suspension arms for the automotive industry. This activity has a 30-year history in Raufoss and is based in the environment that has worked with aluminium solutions for the automotive industry. Both front and rear wheel suspensions are manufactured at a fully automatic production line at Raufoss. The suspension arms are delivered to GM's EPSILON platforms in Europe. Together with the sister company **Raufoss Automotive Components Canada Ltd. (RACC),** this company form the main case in this dissertation. RACC carry out the same processes as RCT. A more thorough description of these two companies and their production processes will be provided later in this in chapter.

During 2004 and especially during the autumn, there had been some considerable changes in the business structure at Raufoss. Raufoss ASA has been dispersed as a company. Raufoss Fluid Technology has become a part of the Kongsberg Automotive Group. Raufoss Industrial Tools has also been taken over by an external company. And

Raufoss Chassis Technology and Raufoss Automotive Components Canada have been taken over by the Austrian company Neuman. Since these changes so far have been limited to the ownership structure and the fact that these are recent changes I have chosen not to make this a big issue in this thesis.

These automotive companies at Raufoss have gone through different phases since the beginning of the 1920s when four cars were manufactured in Raufoss. The environment has gone through major changes in the course of the last 30 years. This development has been characterised by continually increasing market share and continuous product innovation. Simultaneously, the automotive industry has throughout history been an industry that has often gone through various changes in its choice of localisation (see chapter 8).

9.5 From Europe to North America

After signing the contract on the Epsilon platform for the European market, Raufoss ASA and GM started to look at potential areas for developing the cooperation. When Raufoss ASA had developed new technology that was found competitive for the European market, they hoped to gain more income on their investment by also winning contracts on more or less the same models for the North American market. The good cooperation with GM continued and resulted in a new contract, now for the American market and their American platform. This contract was of the same extension as the European contract both in length and in economic terms. The product's length was set to be seven years and should give a yearly revenue of 350-400 million NOK. This meant that Raufoss was now both a contract partner and a development partner for GM in Europe as well as in North America. These contracts were of a much higher volume than they had been used to from previous contracts. Huge challenges were ahead in both continents. But Raufoss ASA had of course made plans for how to cope with these challenges.

A totally automated production line

The production line that Raufoss ASA had for the SAAB contract was quite old. This line demanded a high degree of manual power, and the automation degree was low. A high proportion of the cost on this line was labour; the investment in capital was thus rather sparse. This line had to be replaced. The Company had developed plans for the establishment of a new, wholly automated line. Norwegian blue-collar workers are, from an international perspective, far too expensive and to be competitive in the international car industry Raufoss ASA had to reduce the cost of the workforce. They had to increase the yield per employee dramatically in relation to what has been the standard in Norwegian industry[25]. To reach this goal the new plant had to be automated in a totally different way than had been seen before in the Norwegian metal industry.

By increasing the degree of automation of the production line, the need for relatively well skilled and paid workers was dramatically reduced. The production process is highly complicated, and the products have to go through several stages of different processes to receive the desired characteristics. The production line consists of two basic different processes; one for the front suspension arm and another for the rear suspension arm. In addition, for both the front and the rear arm there are several sub-processes. I will now give an introduction to the two production lines.

The Front Line:

The front suspension arm is mainly a product of forging. The front line is a highly complicated process. For the frontline these processes include heating, forging, bending, cooling, machining and mounting. At first the aluminium is cut into defined bolts. These bolts are then transported through an oven and heated up to a certain temperature degree. Then the concrete forming process of the product starts. First the bolts are pressed into a defined form, and then they go into an intermediate heating oven to ensure the right temperature once more. Then the bolt is forged and bent into the right angle in a two-step process, and then the edge of the bolt is cut. Now the bolt has been turned into something similar of the final suspension arm. But it still has a long way to go. The next step is the machining. In the machining there are drilled holes

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[25]On average a Norwegian industrial worker is responsible for a yield of approximately 1 million NOK. Raufoss in their new plant had an ambition of reaching approximately 6-7 million per employee.

in the suspension arm and burr edges are polished very sharply and precisely. When the machining is done, the aluminium has gone through all the processes it needs to receive the desired characteristics. What remains now is the assembly line. At the assembly line several bushings and a ball joint are assembled onto the suspension arm. There is also oil added to some of the moveable parts; this is a very complex process. The amount of oil has to be very exact; in fact it needs to be to the exact defined gram. When all these different parts are assembled to the suspension arm, the production process has come to an end. The suspension arm is now packed into boxes defined by General Motors. Then they are ready for transportation to GM.

Figure 9.1: Front Suspension arm.

The Rear Line:

The rear line processes include: heating, bending, cooling machining and mounting. At first glance this might look very similar to the description of the front line, but the rear suspension arm is produced through a completely different process. While the front arm goes through a forging process, the rear arm is going through several stages of stretching and bending. Here the process starts with an aluminium quarter hollow.

These are bought and delivered as quarter hollows with specific characteristics. At first the aluminium is heated in an oven for several hours to reach an exact temperature and to get the desired aluminium structure. Aluminium is a material that has 'memory' according to the specialists, and according to this the heating process is important for how the material will function in the future. When the material is taken out of the oven, it is "cooled" down in a water tank with a temperature a few hundred degrees below the temperature in the oven. When the aluminium is cooled down, it goes through a three step process. In this process it is at first stretched and bent. Then it is cut into two and a few holes are pressed into the aluminium piece. After this process it goes through a short machining process compared with the front line. Then it goes through the assembly line and is packed into boxes and ready for transportation.

Figure 9.2 Rear Suspension arm.

All these processes are at different levels and stages. They both start with a piece of aluminium and end up with the piece of aluminium transformed into a suspension arm, ready to be mounted onto a car. One important aspect is that the production lines, in principle, can produce the products without human contact. As I have presented the two different production lines, I also now present the differences between the Norwegian and the Canadian production lines.

Differences of the production lines in Norway and Canada

In principle both the front line and the rear line in Montreal are copies of the front and rear line at Raufoss, even though there are some differences. One difference is that the physical surroundings are different so then the different machinery and processes are arranged in different places inside the factory. But this doesn't mean that there are any sequential differences. In addition to the difference in placement that gives a different first impression when you arrive at the two factories, there is also a quite substantial difference in the amount of automation. At the Raufoss plant the amount of automation is quite substantial. In principle the aluminium stays untouched by humans from the moment it arrives at the production line until it is packed in the boxes ready for shipment. The assembly line at Raufoss is, in other words, fully automated. This is not the case in Montreal. Concerning the front arm, the process is fully automated when it comes to the forging and machining process. The assembly line in Montreal is done manually. The situation is more or less the same when it comes to the rear line. In Montreal this process is fully automated except for the last and final assembling and also the fill-in at the start of the line, which also is done manually. In addition there is another difference between the two production lines and that is their energy source. The Raufoss plant gets its energy from electricity, while the Montreal plant is based on gas. The reason for this is cost, gas is a more cost effective alternative in Montreal than electricity.

Establishing the plants

When the contracts were signed, Raufoss ASA had to get the process going quickly. They had 30 year's experience of more or less manual production of suspension arms. The challenge now was to transform this experience into a brand new production line and also a new way of producing suspension arms in aluminium for private vehicles. This was a quite comprehensive challenge.

The contract with GM's European platform had start of production before the North American contract; initially this was set to January 2002. The delivery to the European platform should be served by a plant located at Raufoss and the location decision was already made. The location decision was important for the management at Raufoss. The

technology and the whole concept of this production method were developed at Raufoss. Raufoss was the one place in the world with most knowledge on this technology. The logistical challenges of serving the European market from Raufoss were practicable and Raufoss ASA had a lot of experience concerning this issue. The planning and work with this plant were started when the contracts were signed. They had a very experienced staff of operators from the manual line, and they had also an experienced administrative and technical engineering staff. The challenges were now to put all this knowledge and experience into the new production line and get it working. This was a substantial operation because the ways of working were now supposed to be done in a totally different way. Processes that earlier had been manual were now put together in series of automated processes.

In parallel to the preparations going on at Raufoss for the start of production for the Norwegian plant, the management had, to focus on the North-American project as well. This meant that they now started the work of putting together a well-experienced team to lead the way in the further process. The top management hired personnel who earlier had participated in previous establishments with Raufoss. In 1987 Raufoss had established factories in Gent in Belgium and Uddevalla in Sweden. And much of the same staff had also worked together with Norsk Hydro when they transferred technology from Raufoss to Michigan (US) in 1995. In this way they created a team that knew each other and had been engaged in processes like these together before. They pointed out a strategy for how to carry out this establishment and how to reach their obligation concerning the contracts with GM.

The American alternatives

Concerning the contract for the American market, Raufoss had to establish a production plant on the North-American continent. As already mentioned, this was included in the contracts terms. This meant that there were three country alternatives, Mexico, USA and Canada. These three countries are all included in the North American Free Trade Agreement (NAFTA). The delivery address for GM would be in the USA. In general this meant that even if they should decide to establish the plant in either Mexico or Canada, it would not be negatively affected by any international trade regulations. Mexico could have been an alternative regarding their low costs and the proximity to

the USA. It could also have been an alternative to locate the factory inside the USA. Central areas in the USA are well known in the automotive history and have long traditions in car manufacturing. In the next chapter these different alternatives will be elaborated on further. The decision fell on Canada and Montreal, the capital of Quebec, which is the French speaking part of Canada. More specifically, the decision fell on Boisbriand that is located 30 kilometres north-west of Montreal. Montreal is close to the American border and is a highly modern western city. Greater Montreal has approximately 3.4 millions inhabitants (Lonely planet 2001).

The plant

While searching for the right location in the Montreal area they found it reasonable to search in the outskirts of Montreal city. Both the logistics and the general availability are much easier when you go some ten minutes by car outside of the central areas. Boisbriand is an area with high industrial activity, and the plant's location is close to one of GM's huge plants. This GM plant was not a plant that RACC was supposed to deliver suspension arms to. It was producing the Chevrolet Camaro model, but was shut down during autumn 2002. In the area there were other well known high tech plants in addition to General Motors, like Bombardier for example. When searching for alternative sites, they first found a greenfield establishment in Boisbriand. When they considered this alternative they realised that the ground consisted of clay. This is a poor solution for heavy industrial activity, including heavy presses going up and down. So they searched for a new alternative and found a location that was fit for the purpose. This was not a greenfield establishment, but it included the physical resources necessary for the purpose and has relatively new office buildings.

Figure 8.3 The plant in Montreal Canada.

A Canadian Partner

In the search for good location alternatives in the American market, Raufoss came in contact with several different regional promoting organisations. For the Montreal area they came in contact with Investissement Quebeq (IQ) and The Société générale de financement du Québec (SGF). IQ is a government owned company that promotes the Quebec region to foreign companies. SGF is an investment company which enters investment projects as a local partner for foreign companies. In the establishment of the Canadian organisation, SGF wanted to take an active part and become a substantial co-owner in cooperation with Raufoss ASA. SGF wanted to control 49% of the shares in the new company. However, it was important for Raufoss ASA to be in charge and have full control of this process. They owned the technology and knew what such a process demanded. From their perspective an industrial partner could be valuable for the company in the long run so this resulted in an agreement where SGF got 20% of the shares in the Canadian company; Raufoss Automotive Components Canada Ltd. (RACC).

9.6 Presentation of the actors active in the transfer process

The story of this transfer process is complicated. It is complicated in a variety of ways, both chronological, such as what happened when, and chorological, in terms of what happened where. Before going further I would like to present some of the actors that have been prominent in the described process. This is to avoid any misunderstandings concerning who is who and who is responsible for what. The management on different levels has been changed several times during this process, and so I find it necessary to try to give an overview of those who have been involved in one way or another. Where those presented have been involved at several stages. The intention of this presentation is to clarify who has done what and at what time.

Top Management 1:

Top Management 1 was the group of people in Raufoss ASA who initiated this project on suspension arms. In 1997 the top management were hired and had no previous relationship to Raufoss, either as a place or as a company. I regard this Top Management 1 as the group of management who were in charge including the CEO and those he relied on. They started an acquisition strategy and had the ambition of gaining growth through gaining size. This was a much-criticised strategy and after a dispute with the unions, the Top Management 1 had to resign in February 1999, after just two years in office (Nilsen 1999, Nilsen & Dale 1999).

Top Management 2:

These are the replacements for Top Management 1 after the resignations in February 1999. At first this was a temporary solution, but after a while it became permanent. This group had long relations to both Raufoss the place, and the company. This change was warmly welcomed by the community (see Nilsen 1999 for further discussions). The Top Management 2 were in office until spring 2003 when they was replaced. Top Management 2 then became the Global Organisation 2, see below.

137

Top Management 3:

Top Management 3 were hired to find a financial solution for Raufoss ASA and to deal with the ownership questions. In 2003 it became clear that Raufoss was in serious financial trouble and had to find a new ownership structure. This process was going on in the summer of 2003, and the crisis was at it most critical point when GM had to intervene and guarantee Raufoss economic engagements the next 6 months. In July 2004 the crisis came to an end when the Austrian concern, Neuman, took control of Raufoss Technology, as already mentioned. They are now part of the Neuman Group and is continuing its business areas there.

Global Organisation 1(GO 1):

The first global organisation was more or less the operative management for Top Management 2 concerning automotive issues like RCT. This Global Organisation 1 was active and among the main contributors in the planning of this technology transfer and the establishment in Montreal. Global organisation 1 was responsible for both the plant at Raufoss and the upcoming plant in Montreal, so they had a coordinating responsibility for both the plants. In addition to this they also hired the first of the Canadian employees and the Canadian management. The Global Organisation 1 was closed or shut down in the early autumn of 2002. The intention of ending the Global Organisation 1 was partly economical and partly so that the plants themselves should coordinate the activities that were intended to be common for the two plants.

Global Organisation 2(GO2):

The Global Organisation 2 was established during the spring 2003. This organisation was supposed to be support for the administrative and technical activities at both the Norwegian and the Canadian plants. Global sourcing and logistics are among some of the issues that this global organisation works with. It also had intentions of function as a coordinating link between the two plants. Both plants report to the Global Organisation 2. The Global Organisation 2 reported to Top Management 3.

Plant Management Norway 1(PLMN 1):

The first plant management at Raufoss was a mixture of the project team that had the responsibility for the establishment of the factory and the incoming permanent management for the plant. The Plant Management Norway 1 was in office from the hand-over of the project in 2001 until summer 2002. PLMN 1 reported to GO 1.
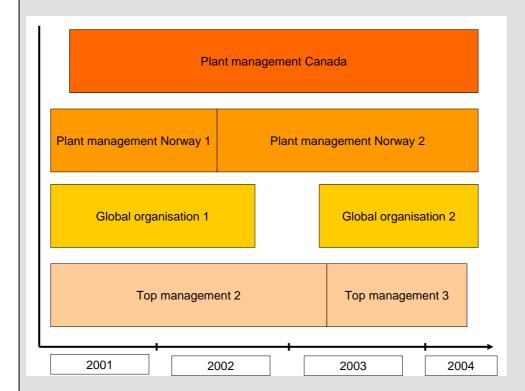
Plant Management Norway 2:

Plant Management Norway 2 was engaged in the summer 2002 and is still in place. PLMN 2 reported to TM 2 until TM 2 resigned in spring 2003 and became GO 2. After spring 2003 PLMN 2 has been reporting to GO 2.

Plant Management Canada:

The Plant Management Canada was hired in during spring 2001. The plant

management has been the same during this period, even though there have been some minor changes in the management group. This management group includes some of the senior engineers and also include the managers for Human Resources and Finance

Operators Norway:

The Norwegian operators of the new production line at Raufoss are mostly an experienced group. A lot of them had previous experience from the manual production line that produced suspension arms for SAAB. At the most there have been approximately 100 employed at the new Raufoss production line. The original plans were for about 60 employees. Most of those who did not come from the SAAB production line are recruited from other companies in the Raufoss Industrial Park.

Operators Canada:

The Canadian operators were hired in the period between winter and autumn 2002. Several of them have experience from the automotive industry, some have experience from other mechanical industries and others from food industries. Those who were hired first have now advanced into foremen. This group of six employees has been established in relation to the establishment of the factory. It has been a time consuming process to get this organisation in place, and at the same time the organisation has expanded step by step over a very short period.

Project organisation:

The project organisation is the innovative group of Raufoss engineers that have developed the new technology and modelled and developed the new production line. This group is split between product and process. The development of the product has been carried out by one part of the group and the development of the process by another, but mostly this is done in common between a group of innovative engineers. As I have argued before (Nilsen 1999), this innovative milieu of engineers can been seen as representatives of what I, inspired by Cooke's (1994:93) notion, have argued to be a "Proud engineer" tradition at Raufoss.

Ex-Pat Team:

The Ex-Pat Team is the group of Norwegian representatives in Montreal that are responsible for the technological issues and establishment of the factory. This group of engineers is formally a support to the Canadian plant management. Their mission has been to support the Canadians in the best way possible. At the same time they are the ones with the most advanced technological knowledge and experience at the plant. This group consist of four experienced engineers

with separate specialisation areas.

The technical actors:
In this transfer process there are also several important technical actors in addition to the actors I have outlined above. The most important technical actors in this process are of course the production lines presented earlier in this chapter. One of the important and main issues for actor network theory in my perspective, is to equalise the technological artefacts and the human actors. By using technical actors I will try to contribute to a more equalised perspective in this analysis. On the technological artefacts and actors on the human actors we maintain this distinction. I will like to use the term 'actors' for both and rather distinguish where it needs to be distinguished, namely that humans are reflective actors.

9.7 Summing up

In this chapter I have tried to present some important aspects of the history of Raufoss and argued that the history of the Raufoss local community and the factory should be seen in relation to each other. Then I have presented the background for the development of suspension arms in aluminium. I have presented the story of how the test drivers at Russelheim played a vital role when GM decided which solution they should choose for their new Epsilon platform.

In the section from Europe to North America I have presented the product and the production processes. Presenting the production process has included an introduction to the front line and the rear line and the differences between these two production processes. This section ends with a short introduction of the American alternatives and the plant in Montreal.

I have chosen to end this chapter with a presentation of what I have recognised to be important actors in this transfer process. This is done to try to clear up in a complicated landscape of actors in a process that has been going on for several years.

Section 6

Analysis and

Conclusions

10 The transfer of knowledge and technology

The main objective of this chapter is to explain how the process of technology and knowledge transfer from Raufoss to Montreal has been carried out. I will present the different steps in this process in chronological order.

This implies that I will start with *the phase of preparation and planning* and try to understand how this has been carried out and what have been the challenges and the consequences of the choices made. The next phase I will focus on is what I have called the *transfer phase*. I will come back to the definition of this phase later in the chapter. However, I will mention here that this transfer can also be seen as a minor process including the time from when the decision is made until the equipment is in place in the new plant. This particular section is much more concrete about this physical transfer than the whole transfer process.

Towards start of production is the third phase I will analyse in this chapter. This phase covers the period from when the equipment arrives at the plant towards the time of start of production. This period represents a critical phase of the process where the pressure on the organisations is increasing. The date when General Motors are expecting delivery is getting closer and closer. The organisational temperature is increasing as they are going into a period of comprehensive testing.

10.1 The phase of Preparation and Planning

When Raufoss ASA developed their new production line for suspension arms, they had been searching for a way to increase the volume in order to increase their yield and earnings on the invested money. It is hard to be exact on the amount invested in this technology during the years, but it is a considerable sum. When Raufoss ASA had captured the European contract with GM in 2000 , it was a natural step to start looking at the North American market. Establishing a production line in North-America was a natural development. This could happen in several different ways. They could either outsource the production to someone else, they could take over another company in the

business, or they could establish themselves in this market on the North-American continent. They chose the last alternative and started to look for attractive places for production of suspension arms in aluminium. In this section I will mainly concentrate on the considerations done in relation to the choice of location. Then I will briefly discuss some economical and analytical perspectives.

Search for attractive places

In the search for attractive locations there were, as already mentioned in chapter 9.3, only three realistic alternatives. These were Mexico, The Detroit area in the USA and Canada, represented by the Province of Quebec.

Mexico

Mexico was one alternative because of the low cost. This alternative was rejected rather quickly because of internal analysis at Raufoss, but also on recommendation from GM. GM saw the Mexican alternative as an impossible idea. GM had already found that establishing a high technology plant in such a low cost country was a very demanding process, both concerning human resources and technology wise, and therefore also financially. The knowledge level was seen as too low, and so was the industrial experience in the region. The cost level in Mexico was tempting, but it could not counter the other factors mentioned. Even if Mexico was an interesting possibility in economic terms, it was rather quickly refused as a serious alternative. An additional argument is that in the automotive industry a hint from a car manufacturer like GM is taken very seriously, you must deliver good and strong argumentation to challenge their opinion.

The Detroit area, USA

On the Raufoss staff there were, as mentioned, several people with experience from North America, concerning the earlier process of technology transfer from Raufoss. Establishing a new plant in Holland, Michigan had imparted knowledge that was important in the ongoing process. By working in Michigan they had experienced central areas of the American car manufacturing industry. This implied experience with

working in an American environment including the formal legal system but also the more informal cultural aspects of American business society.

Based on this I will claim that Raufoss had first hand knowledge of American society in the area of current interest. This gave them a solid foundation for considering this area as a potential production facility. But their experience from Holland, Michigan was rather poor. Several of the people involved expressed negative experience with working with an American organisation. First and foremost American individualism was pointed out as a negative feature. In their eyes it was hard to trust Americans because it was more important for the Americans to brag and give a positive impression in meetings, than it was to fulfil what they had promised and perform in accordance with what was expected from them. Personnel from Raufoss found this to be highly problematic. It was seen to be in opposition to the values that were important for those from Raufoss. In their development of technology and their general approach to technology, predictability and seriousness are among the core values. These core values were in my opinion regarded as threatened by the American way of bragging and the continuous struggle to give a good impression rather than focus on producing good technological results. These factors were important in Raufoss's decision not to establish the plant in the Detroit area. But the relatively high cost and wages in this area were also contributing factors for this decision.

Montreal, Canada

When it comes to Montreal, the Norwegians were welcomed and came in contact with the already mentioned The Société Générale de Financement du Québec (SGF) and Investissement Quebeq (IQ). Here they were taken good care of and helped in their search for a location for their high tech aluminium production. They visited for example, technical-schools and potential companies for cooperation. During their stays in the Montreal area they also got the impression that the people were very similar to Norwegians and this was also seen in relation to the climatic and topographic conditions (I will return to this issue in the next chapter). Because of this they felt some kind of familiarity with what they were presented with. In addition the wages in the area are more competitive than the Detroit alternative. This point in my opinion seems to have been of importance. But the decision was not only made on this issue. All the

factors mentioned must be understood as the foundation for the decision, but the competitive costs and the professional handling by SGF and IQ must also be viewed as very important.

When the decision to establish the plant in Montreal was taken, it was then time to find the right site to locate the plant. As mentioned earlier (see chapter 9) there was also a history, about the ground consisting of clay, in front of the final decision of establishing the plant at the special site in Boisbriand. But in addition to that, it is worth mentioning that the physical infrastructure around the plant in Boisbriand is rather good. It is close to Highway 15, a central communication route in Montreal and also a few hundred metres from a railway line (although currently Raufoss do not use the railway). It is an industrial area as already mentioned, close to the, now closed, GM plant. The Montreal region is ranked 2nd concerning the density of jobs in aerospace in North America. It is ranked 4th concerning the density of high tech jobs, 8th concerning density of high tech companies and 14th concerning the population density (Investissement Quebeq). In other words, from a global perspective, Montreal is a region of high quality when it comes to the density of what is seemed to be of vital importance in a western high tech industrial perspective.

The economic focus

In a process like this, it seems to be a more or less a natural reaction by managers and decision makers to start with the cheapest country or region when they start thinking of an alternative location for their business. This was my impression at Raufoss as well. When they started to argue for their Canadian decision they very soon assure you that they had also thought of Mexico because of its low costs, but that it had to be rejected because of uncertainty related to more quality related issues. The interesting point is that in their construction of the world, the world related to business consists of various spots with different prices. To navigate in this business landscape you always start looking at the cost level and orientate yourselves from that. This does not mean that they do not find qualitative issues important, but it is not the first thing that comes into their mind concerning these issues. This way of perceiving the world reminds me of Hartshorne (1939) and his fascinating mosaic of places (see chapter 3).

Technological preparations

At this stage, around 2000, the factory in Norway was under construction. The work was organised as a project. The experienced project team was responsible for the planning of the production line and purchasing the equipment necessary. The design and engineering of the production line was partly outsourced. What Raufoss ASA had done was to construct a suspension arm in aluminium. Based on this they had a vision of how to get this suspension arm into production. But like someone in Raufoss Automotive Components Canada (RACC) put it:

"The vision was there and the vision was clear, but it was only a vision though"

By this he was pointing at one important aspect of the project of putting the suspension arm into production. There were plans of how to do this, but it was only a plan and not based on concrete experience. When they started to implement the plans, they had a lot of surprises as you always do in such an industrialisation processes. In such a situation it is important to be able to undertake problem solving with the relevant personnel or expert groups. Even though the planning is done in a linear way and it seems that is has to be so, the practical work is done in an interactive way like Pinch and Bijker (1987) argue (see chapter 6). So being able to have interactive problem solving with the different social groups, in this case different engineering milieus, seems to be one of the most important skills in the implementation phase.

Indtech and APT

A lot of the up-front engineering[26] was outsourced to a local engineering company at Raufoss called Indtech and also to the international firm APT (Automation, Presses & Tooling) . These two companies were responsible for a lot of the up-front engineering of the front and the rear line. APT was mostly working with the technical solutions for the production line, while Indtech was mainly working with the total design of the production line on an aggregate level. In this sense it can be seen as a technology transfer process from these two companies to Raufoss ASA in the first place. I think it

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[26] By up-front engineering I refer to the engineering and planning of the technical issues that are done in advance of the implementation.

is an interesting point, but I won't outline it more than necessary in this thesis. My objective is the transfer of technology from Raufoss to Montreal.

The up-front engineering

Like the statement above concerning the vision of this process, several of those involved were surprised of the status of the up-front engineering. Someone at RACC put it this way:

"What has surprised me the most is how much of the engineering that was left to the launch. We launched the equipment and then we set up the parameters, the temperature and the time etc. and we did a lot of testing in example on temperature at 530'C instead of 525'C and that surprised me. It should have been adjusted to 525'C; you do not play with that. We had bought the oven because it is 525'C. And we get the equipment to run we do not do process parameters set up. That surprised me. I was not used to that. This should have been developed before. I have seen it done at a plant close to this and it has been done before, and it requires a much bigger team than this. "

This statement is an indication of the frustration that became prominent when the launch was getting closer. But it is also, as it explicitly says, a critique of the lack of up front engineering or at least what those involved from RACC experienced it to be. It is also an indication of some disappointment among RACC concerning the expectations they had of the project. To be honest, the Canadian organisation had high expectations of the Norwegians bringing their cutting edge technology to Montreal. They more or less expected them to have everything set or have at least well founded solutions for the technical challenges ahead. When such a problem as the oven example above showed up, it lead to frustration and at a certain degree of disappointment in RACC. The Canadians became insecure because they were relying on the Norwegian Ex-pat Team and when they did not know what to do or did something wrong, the Canadians became scared and frustrated. The reason for their frustration will be elaborated on further in chapter 10. Right now I will limit this analytically by stating that the Canadian had high expectations and devoted themselves very much to this job.

10.2 The Phase of Transfer

When the location spot was decided, Raufoss ASA started the work of establishing a new plant. As we have seen, the plant was being located in a highly modern area with the best premises for industrial activity. When these factors were in place the next issue for Raufoss ASA was to ensure they benefited from this solid foundation for industrial activity, namely by hiring talented employees to reach the company's goals.

The emergence of Raufoss Automotive Component Canada (RACC)

In the search for qualified personnel Raufoss bought services from a local consultancy firm. This company was assisting Raufoss in most of the practical issues and gave advice on how to proceed in the further search for new employees. In many ways this consultancy firm can be viewed as "translators" for Raufoss ASA in the new context in Montreal. Literally spoken, they translated the local conditions to the Norwegians in a social and cultural way. The company presented what they wanted, and together they developed a strategy for how to do this.

These consultants contributed with local knowledge of both the legislation and of the local workforce. When they found a group of potential candidates, Raufoss ASA carried out the interviews necessary to evaluate the candidates. During spring 2001 four people were hired, this group included the Plant Manager and two engineers. When these three were hired, they flew to Norway and had several stays at Raufoss. This Canadian management team started to hire operators and other technical personnel. At first they hired five operators that were planned to become key operators on the shop floor. These operators were immediately sent to Norway for a six month period to learn and work with the Norwegian organisation that was estimated to be one year ahead of the Canadian plant. At this stage there were eight people hired in Montreal. They were now in a phase of starting to build the Canadian organisation.

As mentioned, the Société Générale de Financement du Québec (SGF) and the consultants Raufoss had used in this early process had been to some extent functioning as "translators" for Raufoss. At the point of hiring their own Canadian employees, they were also hiring their own translators. By this I mean that those that were hired and

then sent to Raufoss became well known within the Norwegian organisation, and in this way they became important translators as well. In this context the new organisation Raufoss Automotive Components Canada (RACC), was becoming the main focus for Raufoss ASA. In the previous phases of the process the company had orientated themselves towards the SGF and the consultants to get information that could help them in their efforts to understand the Montreal area.

Hiring process

In the process of hiring new personnel, Raufoss ASA hired people to the organisation at the same time as they hired the manager. This seems to me like an odd situation. One person was in fact hired before the manager. Through this engagement process, this person was given authority by the Raufoss management. He was hired by the owners of the company, and not by the manager. This seemed to lay the ground for a legitimate conflict between the manager and his organisation. Canadian organisations tend to be more hierarchical than the situation is at Raufoss, and position seems to be more important than the contribution or what the person is really doing. As one of the Norwegians in Montreal expressed it;

"Here in Montreal your position is very important, when you move from the shop floor and into a position in the office section, then you become a hot shot or a high stepper. It seems like you are becoming someone by working in the offices. In fact it seems like it becomes more difficult for them to communicate with the shop floor afterwards."

One way to analyse this is to claim that Raufoss ASA gave authority to another person than the top manager. This was done within a system where position and authority is much more prominent than in Norway. Here the company was creating a highly dangerous situation. This was a situation that almost asked for him to challenge the top manager. But why did the very experienced and qualified management at Raufoss make this mistake? First of all maybe they trusted their consultants too much and their ability to translate the requirements Raufoss ASA had and the profiles of the applications they had received concerning the jobs available. This is one option. Another possibility is that they were not aware of the political tension in Canadian organisations and the authority that could be interpreted in a situation where a person was hired before the

manager. It is worth mentioning that this person stressed the fact that he was the first hired to me several times. It was clear that this was something that was important for him and that he tried to use it politically in the RACC organisation. Another explanation might be that they were aware of the hierarchical structure in Canadian organisations and even the implications and the importance of positions in such a structure. But even if they were aware of this, it is not the same as understanding all the possible consequences this would have. Another way to put this is that they understood the spoken organisational structure and consequences, but they did not understand the meaning this organisational form had. Expressed in a model, inspired by Hannerz (1992), this can be put like this:
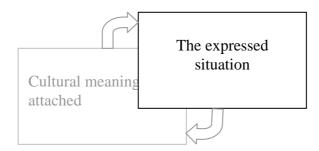

Figure 10.1. The difference of what is expressed and the meaning it expresses.

This means that the expressed situation within a Canadian organisational structure seems to be more hierarchical than in a Norwegian organisation. This is something that the Norwegians can recognise; they have some understanding of what hierarchy is about, so they nod acknowledgeable. But even if they know the word hierarchy, it is not the same as them knowing the Canadian meaning of this term. This means that the Canadian interpretation of hierarchy might be something different from the Raufoss or Norwegian interpretation of the word.

In this particular situation I find hierarchy in the Canadian way to have a meaning of great individual possibilities. Hierarchy is in this way seen as a tool for the individuals to achieve something for themselves and their career. This is, as I see it, quite far from the Norwegian way of looking at a hierarchy or any organisational form. For Norwegians this is to a much higher degree seen as a tool for achieving something in common with others. The collective way of looking at things as Norwegians have a

tendency to do, is something quite different from North American individualism. In my opinion this is within the core of the challenge in this situation.

This leads me to the conclusion that if the Norwegian management in cooperation with their consultants together had used time and tried to interpret and search for potential differences, it might have improved the situation. If this had been done they might have uncover differences between their understandings of what they, in this situation, understood by hierarchy. This could have helped to avoid this situation. If they had gone the whole way from what was being expressed and also tried to interpret what meanings this implied for the Canadians and the Norwegians, it would have eased the situation. But this means that they had to include the interpretation of the cultural meaning implied in the expressed notions, and thereby construct an understanding of what this meant and eventual consequences of this. This means that the model has to be extended to include these important assets:
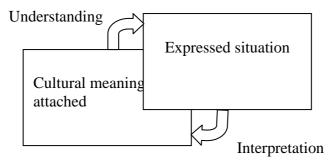
Figure 10.2 Interpretation and understanding as important features for the construction of meaning.

Travelling Canadians

When the Canadians were engaged, one of the conditions they agreed upon was extensive travel to Norway. This was a clear strategy from the Raufoss management. If the Canadians should be able to handle their own factory based on technology developed at Raufoss, they had to stay at Raufoss to see how they operated the technology and thereby achieve experience of the technology before it was put in place at the plant in Montreal. Therefore several of the Canadians got to know each other at Raufoss. As already mentioned, the five key operators spent six months at Raufoss working with the Norwegian organisation. This gave them a lot of time to get to know

the Norwegians, Raufoss society and the Raufoss industrial area. Although it varied a lot whether they spent much time trying to get to know Norway as a country, or whether they concentrated more on the job and spent the weekends close to the plant where they stayed. Some of them used the days off to travel extensively around in Norway and Scandinavia. But all of them got lot of experience. They got to know a lot of the operators in Norway, and not least, they got to know some of the specialists in the Raufoss Industrial Area that were more or less the brains behind the development of this product and the production lines. This increased their self-esteem and also gave them a lot of authority when they got back to Montreal to establish their own plant.

In addition to the operators, the Canadian Management also stayed at Raufoss for much of the time the operators were there. This was a very intensive period for the Canadians. They did not have their own office in Canada and they travelled a lot to Norway and stayed there, away from their families, in an ever-changing environment where they were supposed to learn something new all the time. So while the operators worked among the Norwegian operators and learned how to operate the production line, the management worked together with the Global Management 1 and the Plant Management Norway 1. They focused on the more organisational, economic and management issues that needed to be learned and coordinated. This was for example, discussions of how dependent the Canadian organisation should be and who was to take decisions about issues that affected both plants. It was clear that the Top Management 2 had the final word if anything came to be problematic, but in accordance with Norwegian business life culture in general, involvement and negotiations are among the core values.

Start up in Norway

At the same time as they were building up an organisation in Canada, the Norwegian organisation was close to the point of start of production. This was a stressful situation for the Norwegian organisation and the temperature was increasing. The important technical resources were working very hard at the plant at Raufoss to get the production lines to function properly. This was a highly complicated process that demanded a lot of resources. For the Canadians to be part of this process was very good experience for them, even though at times it was also difficult. The Norwegian focus was mainly on

their own launch, and therefore at times it could be problematic for the Canadians to get the attention and focus that they wanted. But in general it can be summed up as a period that was very important for the Canadians. Both the Canadian Management and the operators got to see the launch that they were supposed to carry out 12 months later.

Preparing for production activities

During the time the Canadians were in Norway, they were preparing themselves for the challenges ahead, and step by step they were also trying to establish the organisation that were going to carry out this launch. Some of the operators were, as mentioned, hired, and gradually this was to be increased. In addition to recruitment, they had to coordinate the suppliers that were going to have a crucial role in Montreal as they had at Raufoss. One important aspect in the effort to establish more or less the same production line in Montreal, was to use more or less the same suppliers and machinery. So after installing the equipment at Raufoss, the main suppliers went to Montreal to install the same equipment over there. This meant that the Canadians to some extent had already developed a relationship to the suppliers they had met in Raufoss before they started to work together in Montreal.

Start up activities

In August 2002 the organisation was together all at once for the first time, at the plant in Boisbriand, including the Ex-pat Team. This marked the start of the establishment of the plant. In this start up period a colleague and I developed some introduction seminars in cooperation with the Global Organisation 1 and the Canadian management (see chapter 9). During the winter and spring of 2002 we had developed a course together in what was named coordination management.

As mentioned in chapter 9.2, in August we spent two days with the entire RACC organisation including the Ex-pat Team and the Global Organisation 1 management (see chapter 9). Our main objective was to contribute to the establishment of RACC and to set some common objectives for the organisation. It was therefore important to get the organisation to talk to each other outside of the stressful situation at the plant, so this was arranged at SGF's premises in downtown Montreal. We spoke on how we can view the world as being socially constructed and which implications there might be on

such a transfer of technology, from Norway to Canada. The main issue for us during these days was to create an arena for trust so that the participants could have some important open minded discussions of important issues at the plant. The first day was a general introduction to those of us who had arranged the course and the other participants. We gave a few lectures during these two days, but mainly our intention was to start a reflection processes of how those involved could contribute to a successful transfer. Establishing the organisation as a group was one of the main issues.

The most important result of these two seminars was, in my perspective, that the organisation started to talk together and the organisation more or less started to establish themselves as a group. So in that way we succeeded. During this process they identified some threats to the organisation and the process in general. The main threat they agreed to take action on was the language issue. The first time I visted the plant there was a mixture of Norwegian, French (or more precisely Québécois) and English. The organisation found this problematic and agreed on that the language at the plant was suppose to be English so everyone could feel included.

10.3 Towards start of Production

During autumn 2002 most of the equipment was in place at the Montreal plant. This marked the start of a new and critical phase of the establishment. Now all the equipment was going to be mounted together and tested in different ways to ensure the RACC organisation, the Raufoss management and GM that the organisation was ready to start production and that the suspension arms would be produced in time and with the required quality. But the test of the equipment included also testing the personnel and the organisation. This was a demanding test period for RACC where the pressure was raised dramatically. At the same time it was also a demanding and critical learning period for RACC.

In the automotive industry there are several quality systems that are jointly developed by the big automotive organisations. One of the systems is QS 9000. QS 9000 is now being replaced by another system called TS 16949. But what these systems have in common is that they prescribe a way of how to implement a new production system.

There are set milestones that the organisation has to fulfil in the effort to become a qualified contractor. Another reason for this system is so that the automotive corporation can monitor the subcontractor's performance in the very early stages. I will present three of the most important milestones, namely; Production Part Approval Process (PPAP), Run @ Rate (R@R) and Start of Production (SoP).

Production Part Approval Process (PPAP)

PPAP is documentation which every supplier using the QS 9000 quality system must show to their customer. This is done to document that they are able to produce the product they have agree upon. The test documents that the processes they have described are functioning and that through these processes they can produce the product to the desired quality. In principle what is required is that you use the equipment to produce one product as you have specified. If the product you have produced is verified to be in accordance with the specifications, you have passed the test. This is the first step for both Raufoss Chasis Technology (RCT) and Raufoss Automotive Components Canada (RACC) in the process of assuring GM that they were capable of delivering their product in accordance with the specifications and that they are a trustworthy partner.

Run @ Rate (R@R)

To do a R@R is to measure that the equipment that you have tested earlier through the PPAP is able to keep the speed it promises in the documentation you have given the contractor. While PPAP is documenting that the equipment you are using is capable of producing the parts you have agreed upon, a R@R is documentation that you can produce these parts at the speed or rate that you have described and promised your contract partner. So while PPAP is more of a quality check, the R@R is more like a quantitative check. These two tests are important milestones for every supplier in the automotive industry. When you pass them, you have showed that your equipment is capable of producing both the estimated quality and quantity.

Start of Production (SoP)

The next important milestone when you have passed both the PPAP and R @ R is Start of Production (SoP). This means the point when you are going to deliver the product to the automotive assembly line. When looking at the practical side of it, the production starts before this date, and then you produce stock to be sure that you can deliver the product, even if something unforeseen happens. So at the date of SoP you are contracted to start your delivery, even though you have already had a period where you have ramped up your production.

Increased pressure and a few tactical blunders

The Ex-pat Team was in charge of all the testing of equipment at the plant. But all the testing was done with the whole operational staff at place. This meant that this period of hard testing and continuous search for defects and faults were done with staff present who were inexperienced in this kind of processes. This was a stressful situation with very high psychological pressure on the staff. For example they spent days searching for the reason for the production line was not functioning, without finding the cause. At the same time they knew that the day for the final test was getting closer and closer. This 'stressed' the inexperienced Canadians a lot. One of the Canadians expressed it this way:

"We were not ready for this, we were too inexperienced, it was really hard times."

The winter of 2002/2003 was a tough winter for the inexperienced Canadians. Both PPAP and R@R were done during this period. They lived with the uncertainty of whether the plant, that they had put so much effort into, would pass the tests they worked so hard to reach. The Ex-pat Team and the more experienced Canadians, who had gone through such processes before, were much calmer and worked determinedly towards the objectives. But even though the more experienced personnel were calmer, this situation was a tough test for RACC, both individually and as a group. Both the Ex-pat Team and the Canadian management regarded the experiences from this to be on the furthest edge of what an organisation is able to handle. They now both regard the decision of letting the operators take part in this process to be wrong. To underline the

pressure they experienced, here is a quotation from one of the Ex-pat Team members indicating the extent of this pressure:

"During that period I several times had to take walks with some of the employees, we walked around the factory in the snow, and they were on the edge of a totally breakdown, when you experience grown up men crying because they do not think they will be able to reach the goals for the plant, it has gone too far. The operators should not have been there in the first place, it stressed them too much, and we had to canalise energy towards taking care of them in a situation were we needed concentration on problem solving"

Individuals at the edge of breakdown were one situation that increased the stress levels and had an impact on the organisation. Another and just as important situation was the increased conflict potential that occurs when the pressure rises in such a way as the situation was here. And the conflict that was aroused was mainly between Canadians but also between Canadians and the Ex-pat Team. In frustration, conflicts between the Canadians emerged, but mainly the frustration was directed to the management and the Ex-pat Team.

"When you launch at the plant you do not need an army, you need 3-4 key people and you launch the plant, you do not need much support, and the support will cost you more."

What is expressed here is that the Ex-pat Team discovered that to have the Canadians present on the shop floor during these hard testing periods was to be very stressful for both the Ex-pat Team and the Canadians. Their experience was that this would have been much less painful if the Ex-pat Team had done this by themselves, without having to take care of and involve the Canadians at the same time. This experience is from my perspective highly relevant and important, but the regret of letting the operators take part in this processes is not without implications. The learning potential in these situations is huge, and in my opinion excluding the operators from this could also have long-term consequences. Through participating in the launch the operators learned a lot, at the same time they became very frustrated. During this period they achieved first hand knowledge of the plant's machinery and equipment.

10.4 Summing up

In this first analytical chapter I have combined being analytical at the same time as I have described some important features of the process of transfer of knowledge and technology. I have spilt the transfer process into three different sub-phases; the phase of preparation and planning, the phase of transfer and finally the phase towards start of production.

The phase of preparation and planning is mostly considering the search for attractive places to locate the production lines. Here I have presented the different alternatives; Mexico, the Detroit area in USA and Montreal in Canada. I end this discussion by relating the dominance of economic focus in such processes to Hartshorne's concept of place as a fascinating mosaic. Then I have turned the focus onto the technical preparations. Here I focus on the outsourcing of the up-front engineering and some of the frustration evident in RACC because of what they saw as a lack of preparation.

In the phase of transfer I turn the focus onto the way the Canadian organisation was established. An important aspect of this is the hiring process. In this relation I analyse some of the first glimpses of cultural differences. Inspired by Hannerz (1992), I come up with a model that I find very important to be aware of in a process like this, where the first impression might be that there are no cultural differences. This model emphasises the importance of interpreting and understanding the cultural meaning attached to what is expressed, when what is expressed is for example the same spoken words. The meaning behind these expressions might differ, and this is the main focus of this model. I end this section with a presentation of some startup activities as an introduction to the next section.

The last section in this chapter is dedicated to the phase towards start of production. Here I present some important industrial milestones for RACC. These are the Production Part Approval Process (PPAP), Run @ Rate (R@R) and Start of Production (SoP). Based on the experience from these processes I discuss the pressure the organisation experienced.

Whilst the present chapter has been both a description of the technology transfer process *and* an analysis of this process, the next three analytical chapters will answer the first three research questions that were presented in chapter 1. These were further elaborated through the theoretical chapters in the section three: transformation processes.

11. Culture

The main purpose with this chapter is to analyse in what way the historical trajectories at different places, understood as cultural or institutional aspects, are affecting the process of technology transfer? I will discuss how culture and institutions has affected the process of technology and knowledge transfer. I will start with some reflections and considerations Raufoss made at the beginning of the project, concerning the cultural issues. I will then analyse the consequences of these considerations. Further I will present some basic cultural differences between the Norwegians and the Canadians, and how these differences have affected the cooperation especially at the plant in Montreal. At the end of this chapter I will analyse how language as well as body language has been important issues in the process of technology and knowledge transfer.

11.1 A potential challenge

Raufoss ASA's decision to locate their plant in the Montreal region was founded on a range of different considerations. One of the issues that were being discussed up front was cultural issues. The experienced staff at Raufoss had realised that cultural differences often could be an obstacle in processes like this. At the same time, in discussions with me, they were not very precise as to what culture was. They used the notion more or less as a container for whatever that might be different between two organisations and societies. Anyway it was an issue for them, and they were aware that this could be a potential problem in some way.

The cultural considerations

In the localisation process Raufoss considered several different alternatives as described in chapter 9 and 10, but as we know, they ended up choosing Boisbriand just outside Montreal. When we discussed the reasons for this location, the discussion was quite soon spinning around the cultural issue. What

was rather interesting about their arguments was their tendency to mix the natural surroundings and the human behaviour. The argumentation turned out to be of a quite nature deterministic character. One of the people involved in this process put the arguments of why Montreal was seen as a good alternative this way :

" I do not think that Montreal is such a stupid idea. They seem to be very much like us Norwegians. They got mountains and fjords, and the climate is pretty much the same, just a little bit more cold in the winter time, but they even got cross country ski tracks, so they seem pretty much like us. I do not think we are so different from each other culturally"

I could not believe what I heard. This was probably the most environmental deterministic statement I ever had heard in a serious discussion. The connection between nature and climatic conditions on the one hand and the cultural on the other that is prominent in this quotation was at first surprising for me. In the history of the discipline of geography, and in my view, such a nature deterministic logic was rejected over 100 years ago. I chose to see this quotation as an expression of an expectation of the similarities of Norwegians and Canadians. In addition, this quotation also represents a construction of place that is interesting concerning the expectations people from Raufoss constructed and carried with them in their meeting with Montreal. By looking at the physical surroundings this person in a way reduces the complexity of the place Montreal to be similar to what he knows best, his homeland.

At first glance there are definitely a lot of similarities. The way I see it is that people at Raufoss, including the person quoted above, had a need for an explanation of these similarities, and they found it in nature. So I interpret this statement as an attempt to understand why these similarities seem so evident. Through this construction of Montreal as a place, they make it understandable and familiar. This is also a way to make it into something that they can talk about. In this perspective, it can be seen as a start of getting to know Montreal, by reducing this place to something familiar, thoughts that can be shared with others. By talking of Montreal in this manner internally, they made it into

something that they felt that they could handle. Montreal became to something familiar through their constructions. In a very early stage of the transfer process when more or less everything was uncertain and chaotic, it was of course important to try to make the challenges possible to handle. In this way the physical similarities became the confirmation of the similarities between Norway and Canada. In fact, they are not just seen as a confirmation, but they become the evidence of that what they see and experience in the interaction with Canadians, is true. This is confirmed and constructed into evidence by nature and the physical surroundings they experience when they visit Montreal. And they did not just relate it to nature but also to the activities the Canadians carried out in nature. Like cross-country ski tracks as mentioned in the quotation above. This anticipation of the cultural similarities could be analysed in relation to Hannerz's (1992) contribution elaborated in chapter 4. In Hannerz's three-dimensional model he points at three important aspects of viewing culture, that is: 1.Ideas and modes of thought, 2. Forms of externalisation and 3.The social distribution of these phenomena in a population. What Raufoss did here in their analyses was to forget or not recognise the importance of the ideas and modes of thought, in their attempt to understand the culture in the Montreal area. On the basis of what they saw, the forms of externalisation, they anticipated that the ideas and modes of thought behind these activities, in example cross country skiing and way of behaving, were the same as in Norway. And secondly, they anticipated a generalisation of the social distribution of this as well. Such a generalisation based on a few visits and being in contact with a limited segment of mostly English speaking people, is a too narrow foundation for concluding that the Canadians are more or less the same as the Norwegians.

The consequences of these considerations

Because of the experiences they'd had before, Raufoss ASA was aware of the potential challenges connected to cultural differences. So when they experienced Norwegians and Canadians to be very similar, and then had this interpretation confirmed by the physical surroundings, they felt reassured concerning the cultural challenges. In their understanding, the cultural differences would be at a minimum. The situation was, in their perspective, that

they were supposed to establish a plant in a western society and country located in a natural environment that reminds them of Norway. Both Canada and Quebec have social democratic features, in opposition to the more market liberal USA. This issue was put forward during several gatherings I participated in at the Canadian Embassy in Oslo during the winter and early spring of 2002. During these sessions the similarities between Norway and Canada were repeatedly underlined, for example that we very often vote the same way in the United Nations. This was seen as an evidence of a common value foundation in these two countries at either side of the Atlantic Ocean.

The impression from the sessions at the embassy contributed to an understanding of two countries with a very common view of the world and with a common belief system, and very few, if any, cultural obstacles. In my point of view, this is a very pragmatic treatment of reality. But, to sell the country for foreign investment and tourists is more or less the job of an embassy. Those who receive this information have to be highly critical in my point of view. At these gatherings there were also representatives of Raufoss ASA present. The reason for their presence was both to learn about Canada and to present their project in Montreal at a very early level of their experience with the Canadians. The experience the company had with the Canadians at this point was rather scarce and limited to a certain group mainly consisting of high-level officials.

At one of these gatherings a representative from another prominent Norwegian firm with wide experience from Canadian industry, spoke about this experience from Canada. This representative, who at this time was the Senior Vice President of this company and was born in Canada, focused mainly on one issue; Canada and Norway seem to be very similar, but there are cultural differences, and it is extremely important to be aware of these differences. I noted this statement, but my impression at the end of the day and in the gathering after the lectures was that it was the similarities that had been focused on, the differences could be there, but they were possible to overcome.

To sum up, Raufoss at an early stage of the process found Canada and Norway to be very similar. There were given warnings that there were differences to be

aware of, like there very often is in such situations. But the main impression was that the cultural differences were more or less absent, so it was not necessary to direct many resources in that direction.

Cultural implications

Whatever was expected at an early stage, in the end it seems to differ from what was experienced during this process. It is often difficult to foresee what is coming and what kind of knowledge it is important to express for the participants in such a situation. This become clear for me after a meeting I participated in April 2002. At this meeting was the Norwegians who were most involved in the process present. This was more or less a kick off meeting for the technology transfer. I was invited for two reasons, partly as a preparation for the seminars that were going to be held in Montreal (see chapter 10.2) and partly as a PhD Student. Here I addressed several issues that they might be aware of, among these I made a point out of Gertler's (1997) finding that Canadians have a quite different approach to industrial problem solutions and behaviour than what is common in Germany and, according to my knowledge, at Raufoss as well. This was noted by the participants, but at the same time I felt that this message did not reach them, a feeling in direction of; "okay, that might be right and interesting, but we do not think that will be a problem for us". During this meeting and afterwards I was, on my own, starting to question the findings of Gertler and their importance and relevance for this situation. I think that this was a relevant question to ask myself at that time. It is important to evaluate the theoretical issues you carry with you in a situation like this. To ask this question was in my opinion right, but to doubt the findings of Gertler's relevance turned out to be wrong, as I will show in the next section.

11.2 Some basic cultural differences

One of the issues that have turned out pretty clearly during my work with this project is that more or less everybody experienced a latent conflict or tension between those involved in the transfer process. The reason why I call it latent is

that on the surface the situation seems stable and without confrontation. But just beneath the surface it smouldered. My impression though, of differences between representatives from two countries that are supposed to be quite similar is stunning. This is also experienced by one of the Norwegians involved :

"Before we arrived we talked about how similar we were, and that turned out to be right, we are very similar. But the small differences that is present gets very big. This is such basic attitudes that do not get evident in the daily work or that you really do not care so much about them. But when it starts to get hot they also become evident!!"

As it is pointed out in this quote there are some differences that became visible when the pressure rises. This means that these differences are difficult to get a grip on in daily life or in ordinary situations. They had to be set under some kind of pressure to become visible. These differences are in my opinion of a very fundamental character. Like one Norwegian told me:

"What has surprised me the most is ……That I discovered how incredible important it becomes what your mother and father have been teaching you during your growth. And all what this little things effect what you do in your daily activity."

Here it is pointed at a substantial factor in human interaction, namely what has been given to the individual by their surrounding and in this example by the parents who are often seen as the closest ones. In the situation this was said there was no doubt that this person was pointing at how important it is what Norwegian parents tell their children, and how important it is what Canadian parents tell their children. He is pointing at national differences that arise and are reproduced by impulses given during childhood. The person quoted above is a skilled and an experienced engineer, having in my opinion an engineer-based view of life. And that was partly also the reason why this quotation was the one that surprised me the most during this study. The surprise was not that somebody would, at some stage, express themselves in such a way, but that this particular engineer would put it this way. This is also giving an indication of the

important learning processes that have been evident in the transfer process, learning processes that go beyond the technical specifications, and I will come back to this in the next chapter.

Another way to analyse this quotation is to understand it to be a confirmation of the effects of social construction. This person is realising the effects of being a product of different social constructions and how this is visualised when you meet people with different backgrounds. He anticipates his social construction to be a product of what has been given to him by his mother or father. I do not want to interpret his statement literally, because the way I analyse it is that he points at something that is rooted deep inside you from the very early days of your life. He uses the metaphor mother and father to describe the construction he has been a part of from his early years. This is a description of how something inscribed into a person at the early years of life, affects his interaction with others today. The effect of these inscriptions from early years was a quite common issue during my stay in Montreal in June 2003. The reason for this is to find in the challenges they had been through during the launch this winter.

Different problem solution attitudes

In April 2002, when the first Canadians had been at Raufoss for a while, I spent some time there. I found it interesting to get a glimpse of how the first meetings between the Canadians and Norwegians turned out. One of the Norwegian's reactions came like this:

"The Canadians seem to be ok. They are eager and want to learn, they want to understand this technology and get into depth of it. But they can turn too eager, when the line stops they want to fetch the sledgehammer and more or less attack the line at once without analysing the situation. That is a little dangerous, we can't act that way"

Those who have developed this technology have realised that it is a very immature technology that goes through phases of troubleshooting, where the

only way to handle this is to be systematic in the problem solution activity. In short terms they want to know why the line stops before they get it started again. This is a very important issue for the milieu at Raufoss that has clear features of being very influenced by developmental values. It is in general a development and innovative milieu rather than a production milieu (see chapter 9). This is at least very evident in what I earlier have labelled "the technology culture" at Raufoss (Nilsen 1999, Dale & Nilsen 2000). One of the features characterising the technology culture is a close cooperation between the development department and the production line. This was expressed to me in this way:

"Yes it is important with close cooperation between the researcher and the operator. If we look at the new plant now we have Mr.XX in example that is dr. engineer in metallurgy. He is one of the persons who has knowledge and competence on this issue and has thought about these issues for a while and have a clear opinion of how things are functioning. And then you got team leader Ms. YY in example at the forging line. When she is going to make some adjustments on the temperature or something like that she has to contact Mr. XX and they have to coordinate this all the time. It has to be a short distance between theory and practice."

This gives an indication of the tight cooperation between the development department and the operators at the Raufoss plant. At the same time it says something about the positions the engineers and the development department have in this industrial milieu. The development department and its engineers have an informal dominant role. Therefore the production line accepts and is used to analyse the situation before starting up the line, and often this is done in cooperation with the development department. This acceptance and way of doing it can be labelled to be an *analytical approach* to problem solving. This can be seen as a cognitive institution mentioned in chapter 4. This way of working, in accordance with the analytical approach, has become "the way we do it". At the same time it can be seen as a cognitive institution with normative aspects. To work this way is important for the milieu at Raufoss, and this way of

working is infused with value. It is not just "the way we do it", but also the way it is expected to be done.

This situation has remained through the whole process of establishing the plant in Montreal. The Canadians are eager to get the production line going, while the Norwegians prior to analyse the situation at first. An explanation to this can be found in Gertler's argumentation. Gertler (1997) suggests that there is another institutional structure of the Canadian Capital versus European Capital. I like to add here that from my perspective, we can most likely talk about North-American Capital versus European Capital. The institutional explanation that Gertler suggests is that the North-American Capital is far more short term than the European. The capital demands a higher earning per invested dollar, and a consequence of this is that the production line has to be running. When the production line is not running, the earnings decrease, and this is not acceptable for the Capital.

Gertler's argumentation is illustrated by the fact that the Canadian workers are eager to keep the production line running because the Capital demands so. The result is a *production-oriented* attitude, where the important issue is to keep the line going. This has some consequences as Gertler points out, for example for the maintenance area, where equipment is not maintained in a satisfactory way, and in Gertler's example, the German way. This institutional attitude explains the action and behaviour in the production. It leads to the construction of a production culture where to get the production line going and keep it going became the core values.

This is, as I see it, also the case in my story. The operators are very eager to get the production line going and keep it going. In this relation it can be argued that there are two different institutions that meet and are in conflict in this situation, the Norwegian based institution of analytical approach and the Canadian based institution that is production oriented. I find Gertler's reasoning and conclusion in this case to be relevant to a large degree and in accordance with what I have been seeing in my study. But I think that there can also be other explanations, in relation to Gertler's, that should be put forward. The situation at the plant in

Boisbriand was rather tense because of this different way of behaviour. Although the picture is more complex and nuanced than the explanation given above, I will go into more depth of this issue to get a more holistic understanding of the situation. But first I will elaborate more on the differences between the Norwegian focus on quality and the Canadians production oriented attitude.

Quality versus production orientation

While quality is the main focus at Raufoss, the Canadians have a different perspective. As already said they are more production orientated. One of my informants expressed this about situations that occurred when the production line was stopped:

"You know we Canadians get frustrated, not because of the equipment or the way the Norwegians act, but we just want to run the machines and operate the lines, you know that is why we are here…"

The frustration that it is referred to here is related to what happened when the production line was out of function. In those situations the Canadians felt useless and became frustrated. This caused a lot of tension and stress at the plant in Boisbriand in particular. The Canadians production orientated attitude has already been mentioned, and trying to explain this and their eagerness to keep the production line going, one of them put it this way:

"…..if you are responsible you want to work harder, …it does not look like you are working, you are not earning your money. And now I can earn my paycheck and that is important. So that is what I see it that way with the guys, they want to earn."

Another one put it in a much more to the point way:

" We just want to earn our paycheck"

This is fairly in opposite to the technology culture of Raufoss that is more concerned about whether the production facilities are functioning perfectly or what can be improved. The representatives for the technology culture at Raufoss are very quality orientated, in a way that reminds me of the expression used by Cooke and Morgan (1994:97) about the German car manufacturing industry; "proud engineer tradition"[27]. The product quality is the first priority whatever the situation is. Quality is prior to cost, and that is a clear feature of strong engineer dominance. This was put this way in a meeting:

"...the quality is above all importance, if we let go on quality we lose, Raufoss as a brand is quality"

For the Canadians it is very important to do the job they are set to do. In fact, the Canadians feel obliged to do this job, and therefore they get frustrated when they are prohibited from doing what they are paid for. In relation to this, it is important to mention the work-systems in Canada that are quite different from the Norwegian. In Canada you can quit your job on Friday afternoon and start with a competitive firm across the street the following Monday morning at seven o'clock. This is also a privilege of the employer. You can be fired just as quickly as well. In Norway the system takes much more care of the employees, and there is most likely three-month quarantine before entering a new job. In addition, you are ensured pay for three months from the day you are given notice.

The quality focus that Raufoss ASA emphasis can be seen as a cognitive institution that has been developed through their long experience with the automotive industry. Through this experience they have learned that the lack of quality has consequences, this has infused this cognitive institution with value and has given it a normative character as well. Concerning the Canadian institution of production orientation it is clearly that this institution has normative aspects. This is due to what they feel is expected of them. The origin of this institution is hard to point at, but maybe it has turned out to be the way

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[27] Raufoss can maybe be seen as more German than German industry; one story at Raufoss says that German customers are often impressed by the order at the plant at Raufoss (Nilsen 1999).

we do it, or it may be a result of the regulations of the labour market. If so, it is what I would address as a regulative institution.

Individualism versus Collectivism

Underlying the differences in attitudes already mentioned there are some other fundamental differences. This difference is also hard to identify at first glance during the daily activity. I find much of the difference to be related to what can be called the North-American individualism in opposition to the Norwegian collectivism. The North-American individualism can be identified through the American dream, characterised by the individual rights and that everyone, in the end, is dependent upon themselves. The Norwegian collectivism, characterised by solving problems in common, is based on social democratic ideals especially developed during the post-war period. When it comes to differences between the Norwegians and the Canadians, they seem to be very much rooted in this distinction. This is a fundamental distinction that affects a lot of the actions that are carried out in the transfer process. And it is like the informant mentioned above said:

"these are such basic attitudes ".

When building a plant from scratch to Start of Production (SoP) within a period of a year, these different ways of behaving and acting become quite important. If we think in a sequential way, that the Norwegians are going to establish a new plant in Montreal and the Canadians are supposed to learn how to operate this plant, these differences do not seem very problematic. What makes them problematic is when we see the interactive picture of these actions, where the Norwegians and the Canadians have to work closely together within the same offices and shop floor, and under a time pressure that becomes substantial. Then the situation becomes more complex than what it seems like when all these elements are artificially separated from each other in a sequential way.

My argument about the American individualism versus the Norwegian collectivism, as important factors in this, has to be elaborated further. How did

these factors come into play in this process of technology transfer? The most evident situation occurs in problem solving, when Norwegians from the Ex-Pat Team for example should discuss a problem with Canadians. As one of the Ex-Pat Team put it:

"It is impossible to discuss an issue with the Canadians, with the aim of coming to a solution through that discussion. The problem is that when I try to elaborate the problem and discuss different solutions with, for example, three Canadians, all three of them are sitting there thinking to themselves that they know the answer, but in the discussion they say" oh now this was a very difficult issue, I am not really sure if we can manage to solve this". But at the same time they are thinking on their own; "Okay, now I know the solution, when the meeting is over I shall go out and fix this issue, that will make me a hero." So to be able to have good discussions here is more or less impossible."

Another informant underlines this experience by this expression:

"It is not possible to have enough good discussions here. It seems for me more like theatre."

The Norwegians experience the Canadians to only be concerned about how to put themselves in a good light and how to promote themselves and their knowledge and skills. This is in many ways completely different from what the Norwegians are used to, and it also differs from what they see as proper behaviour. This produces frustration, as expressed in the next quotation:

"Over here it is like that everyone who discovers a problem, is supposed to fix it themselves, and afterwards they will tell the rest of the organisation that we had a major incident, as you surely have heard of, but I have fixed it. It was a very big job, I had a hard time, but it went well"

The Norwegian Ex-Pat Team interpret these events as a confirmation of the individualism present in North America. This interpretation of the Canadian behaviour ends up in a negative way, because of the fundamental differences in

how to behave in a proper way. This can be seen as a conflict based on different normative institutions, where the values of the Norwegian collectivism meet the values of the Canadian individualism. The self-bragging attitude is in strong opposition to the Norwegians' values and what the Norwegians experience themselves to do, namely to contribute to the best of the whole group and not to promote themselves or their own interests. This is important for them because they are sent on a mission for not only their company, but also it can also be seen as a mission for the whole Raufoss society. Everyone in the Raufoss society knows about the plant they are establishing in Montreal, and most of them know at least some of those who are the Raufoss representatives in Canada. This is of course a burden the Ex-Pat Team is aware of, and it is also a mission they have put their honour into. They know that they are dependent on the different knowledge the members of the Ex-Pat Team are in possession of, and therefore this strengthens the team spirit of the Ex-Pat Team.

The strong internal unity in the Ex-Pat Team put those that are outside this team, and are divergent from this, in a critical light. This contributes to show the differences more clearly. The individualistic focus of the Canadians becomes very visual for the Norwegians. The honour they have put to their mission is escalating their frustration of this individuality. I think this is an important point in this story. The cooperation between the Canadians and the Norwegians has coming under an enormous pressure that has surely affected the situation. This means that the situations that had occurred during this hard period of PPAP (Production Part Approval Process) and R@R (Run at Rate), has been a very special situation that have challenged the organisation in a very special way. How representative this situation will be for everyday life is hard to say at this point. The way I see it however, it is likely that with such a reaction pattern, conflicts are likely to arise when the organisation is going through hard and challenging periods.

11.3 Language, an issue

During interviews and work I did with the participants at Raufoss at an early stage, there was a relaxed attitude towards the language issue. It was realised that Montreal and thus Boisbriand was in French Canada and that French was the first language. However, they also had found that English was fairly well spoken. This was put this way:

"….yes, but even if French is the first language, I believe that they also speak English fairy well…."

This was said at a point of the operation where Raufoss had hired the staff and the key-operators. And their experience was that these people spoke English, even if their first language was French. All those hired at that time in my point of view speak English excellently, much better than the Norwegians did. But this was a group consisting of only 10 people. They had overlooked the point that not everyone in Montreal speaks English perfectly, and not everybody even speaks English. Montreal is the biggest city in Quebec, and with its 3.6 million inhabitants, it has approximately 50% of Quebec's population. Inner Montreal has approximately 1 million inhabitants, and about half of them speak both French and English, 400,000 speak only French and 100,000 only English (Lonely Planet 2001). This underlines the point that the language is not a straightforward issue where you can anticipate that everybody will understand English. But if we extrapolate these numbers from inner Montreal to greater Montreal, we find that 1,440,000 (40%) speak only French and 360,000 (10%) speak only English. From these numbers we can also anticipate that 1,800,000 are bilingual. If we add those 360,000 that speak only English we find that 2,160,000 people in the greater Montreal speak English. That is a very high number, probably not so far away from the number that speaks English in Norway.

From these figures it was hardly any reason to make the language issue into a problem in advance of the process. But with knowledge of Quebec and its reputation as French Canada and the nationalists' fight for independence, it should maybe been a reason to pay attention to the language issue. During my stay in Montreal in June 2003, I found that a lot of those hired at that time were rather poor in both understanding and expressing themselves in English. Fairly early in the process the Canadians expressed to me that it was only a matter of time before there would be people hired who were rather poor English speakers. This was still not an issue for the Norwegians, and the impression I was left with was that this was an internal Canadian issue. The Canadian Management was seen as those responsible to communicate with those who did not speak English.

During the seminar we arranged in August 2002, one of the main conclusions the participants got was an agreement of English as the only language to be spoken at the plant (see chapter 10.2). This was because they had experienced uncomfortable events and situations related to language issues. One of the Norwegians that had been in Montreal for two weeks before this seminar, expressed this frustration at the other participants at the seminar like this:

"I am not very happy with the situation right now, to be honest; my stomach hurts, we have a long way to go. It is necessary that we communicate in this process. If we do not we will fail. It is hard for me to understand French and I am sure that it is difficult for you to understand when we talk Norwegian."

There were also Canadians addressing frustration related to language issues at that time. This situation was not only because of the French, it was also in relation to Norwegian. The effect of the decision of English as the only language was on short term a better atmosphere at the plant and a more inclusive experience for those involved. I was in close contact with the participants after this seminar, and the feedback was clear on this issue. For an organisation that was at a starting point in its development, a common language was of high importance to gain trust among those involved. One of the more

basic needs concerning building trust among people must be that everybody are capable of understanding what the others are trying to communicate to them.

During the winter 2002/2003 the organisation was, as shown in chapter 10 put under enormous pressure during the launch. They also had to hire people who were more or less only French speaking, because it was more or less impossible to get only English speaking operators. The feedback from this period shows that language continued to be an issue at the plant, and as the temperature increased, the reactions on how communication was made also became more focused. This resulted in a change in the language politics at the plant. The agreement on having all meetings in English more or less came to an end during the winter, based on among others the following experience:

"Well if we do a meeting with the Canadians and you assisted, we can do one in English and then 15 minutes in English and 15 minutes in French, with all the employees, we do that sometimes. When we do it 15 minutes in English, it will last 15 minutes. When we switch to French, it last half an hour. We got lots of questions. We get everybody much more at ease. We can communicate a lot more right with the people."

This was one of several occasions that contributed to a change in the language politics at the plant. But the most important happening in this regard was the following incident, that underlined the drama and power in this issue:

"At one point we got a warning, that the boys were about to call the protection of the French language office. We have that here, it is an official government office. Because they were tired of seeing English everywhere. And it is a Quebec law that your are not allowed to be in English, you have to be in French."

This was a dramatic situation. RACC was launching the plant, and there was a lot of testing going on. The pressure and expectations on the organisation was high. A quarrel with the French language office was not what they needed at this time. The Canadian Plant Management gathered the operators in groups and tried to work out a solution to this situation. The morale of the operators was

down, and organisation wise the situation was tense. The Canadian Plant Management was concerned of what signal such a situation would send to the Norwegians, both the Raufoss ASA as the owners and the Ex-Pat Team as colleagues. Reconstructing the dialogue with the operators, one of the Canadian Plant Management put it this way:

"And they just said that they have no problem with the Norwegians and that we do this in English, they said that is fine, even the documents, just make sure when you can that you translate in both English and French, the common memos and in meeting you could do it in English and French. They said: some of us speak a bit of English but we do not really understand what you are all saying. So that was the problem. As we were getting more and more employees, the employees are not catching everything we say in English. So any way that's what happened. They did not complain, no."

So, in the end there was no complaining to the French Language Office. But in a rather dramatic way both the Canadian Plant Management and the Norwegians had been aware of that there was a potential language conflict. This potential conflict could in the next stage have other consequences that could have a dramatic outcome. When the operators did not understand what was being said, it could have severe consequences on both the learning process and not least, the security in the plant. A situation where a certain and increasing proportion of the staff do not understand the language that is communicated is one thing, a situation where the management is not aware of it is something far worse.

Language is in Hannerz' model a form of expression. The French language represents an expression of the French Canadians' historical relation to France. It is also a way of distinguishing themselves from the rest of the English speaking North- America. Their fight for independence is also an example of this. The relation to France and their history as French Canadians is of high value for them. Several of those working at RACC had studied in France. In this way the language is an expression of this relationship and can be seen as a normative institution that is valuable for them and is also regulated by law.

Body Language

The challenges concerning the oral language have, as shown above, been a central issue throughout this process of technology transfer. But the communication between people goes beyond the spoken words. One addressed it this way:

"When you work you read body language, you do not only read the words"

We communicate a lot just by our presence and the way we move, the way we look at others or the way we talk, if we talk hard or slowly. This is important in understanding how we understand others as well. What do we read from a person that seems to be in control, and how do we interpret this person to be in control? This is making the language issue far more complex than just the oral words. The way we act might be depending on how you are as a person or whether you are raised to be emotional or calm. Several of the people at the plant in Boisbriand were very concerned about this issue. When talking about culture, one of the Canadians expressed himself this way:

"This is about the way the Canadians are and act compared to the Norwegians. You know we are Latin-blooded, the Quebecois, French Canadians are Latin Blooded, they are emotional, they are short. If they are not in control, then arms and legs[28] . They want to be in control. The Norwegians are different, they are calmer and more like what I would like to call like a poker face. Even if you are not in control you may not show it. It seems important to look in control, that does not necessary mean that you are, but you physical do not show it."

Here this Canadian is pointing to something crucial, namely how the Norwegians and the Canadians act and differences in their unspoken behaviour. The Canadians' impatient behaviour is experienced to be strange for the Norwegians, and at the same time the Norwegians interpret this behaviour to be sending stronger signals than what is in fact the case. By this I mean that an

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[28] "Then arms and legs" is more or less jargon for chaos or chaotic circumstances. This is most likely to be a Raufoss made jargon, which means something is out of control and are not into the systematic frames it should be. Maybe this is also normal jargon in industries in general but I think that it is only at Raufoss I have heard this used. The Canadians seem to have adapted this.

emotional outbreak by one of the Canadians is not to be understood to be as dramatic as it seems. In the opposite way the Norwegians do not have everything in control all the time even if they look calm and in control, and have, as the Canadians put it, poker faces. One of the Canadian managers was also concerned about this issue:

"A percentage of my job is trying to keep the Canadians calm. Because the reaction of the Norwegians being calmer and not knowing, give the impression that they are not moving, that they are slow in reacting, because they are not moving their arms and legs. To the Canadians it is stressful because "If we have a problem, we have to solve it, are we not going to solve it, or what is going on?" So it affects the moral, it effects how the people work together. In stressful times a part of my job has unfortunately been to try no.no.no.no (calm the Canadians down) by giving them the feedback that they are not getting."

The interpretations these two groups have made of each other during this process have been based on both what has been said, but also on what has been done and how they have acted. This has contributed to increase the tension in stressful times, but it is hard to say that this is the main reason for what has happened. It is more relevant to view the body language as a factor that contributes to increase the tension that is already there. The body language is therefore not to be seen as a triggering factor. I would rather describe it as a contributing factor. When the situation is uncertain and it is problems with the equipment, and you do not get the machinery to function the way it is supposed to, then you start to look around, and what you see are people acting the opposite way from what you expect. This most certainly will contribute to increase the frustration already in place, however it is not the triggering factor.

The way we express ourselves is most certainly dependent on our social background, and may also depend on personality. What is interesting in this relation is that it represents different ways of exposing the emotional status. This may lead to confusion when the emotional status (modes of thought) is expressed different (forms of expressions) in different social contexts. In this

process of technology transfer this has lead to frustration and had direct impact on the process.

11.4 Summing up the cultural issues at play

From a starting point where it was anticipated that the cultural challenges should be at a minimum, it has been realised that the cultural implications have certainly played a role in the process of getting the plant in Boisbriand to be at a satisfactory level. The process of getting to know each other's reaction-set and way of acting in interaction with the others has been an important and completely necessary process for the plant and the actors to go through. The Norwegians and the French Canadians, "The Quebecois", are presumably very similar, but as I have outlined here, there are some important differences to be aware of. The main cultural trap to fall in is to believe that there are no differences whatsoever. The differences are clear and they have consequences.

The differences in attitudes towards problem solution are, as argued, of importance and have clear consequences for both the morale and the way the production is done at the shop floor. The Canadians' eagerness to solve problems right away, versus the Norwegians' analytical attitude has turned out to be one of the main differences. And it should be added that this difference has led to several situations where it has become very visible. The same is also the case for the difference in orientation, where the more traditional engineering environment at Raufoss represents a more quality-concerned perspective, and the Canadians are more eager to have the production line going all the time. Both these challenges can be traced back to Gertler's argumentation of the more short-term capital in Canada. And as I have showed they can also be characterised as cognitive institutions with normative aspects.

Individualism versus collectivism is, as I have argued, another issue that has been important in this process. This is experienced by those involved, to be differences in "such basic attitudes", which have effects on the cooperation in a wide term. Discussions are effected by these differences, the Norwegians

complain about the problems they have in trying to establish good problem solving discussions. But it is important to remember that this is a two-sided sword. The Norwegians express their dissatisfaction about this situation and at the same time the Canadians are frustrated with a situation where they meet resistance in their way of handling challenges. And their frustration is just as important as the Norwegians' reactions. But there is also a possibility that the pressure the Canadian experience of increasing the cooperation might also increase the diversity in the way of reacting. This must be seen in relation to the way they react in the first place. This is the reaction pattern they are familiar with and when the pressure increases it is a possibility that they return to this way of reacting.

In addition to this, language has without doubt been an issue, both the spoken and the unspoken word. This has been dealt with in different ways, from banning Norwegian and French to a more flexible adjustment where the importance of informing the employees became the main point. During this process, the differences in expressing themselves have been put on the agenda in a lot of forums. The way I see it, this has been important because these discussions have helped create understanding for each other's challenges concerning both language but also other cultural issues, and last, but not least, it has helped them in expressing their common challenges.

The way the Norwegians and the Canadians have been trying to analyse and adapt to each other can be seen as a process of creolisation. But my study has stopped before this has become very evident. Despite that I see indications of a creolisation process also at the stage where I studied this carefully. The analyses the Canadians and the Norwegians have done of each other during this period is a way of relating and adapting to each other where the objective is to work out solutions that can take their cooperation further. When adapting and relating to each other they are creating an environment where they are trying to understand each other's behaviour and behave in a way that makes sense for the other ones. This is in my perspective an essential factor in what can be called a creolisation.

12. Learning

In this chapter I will analyse how learning is perceived in this process of technology and knowledge transfer. Through this analysis I will also examine how this was carried out in practical work. I will show how the perspective of learning slightly changed through this process from a one dimensional to a reciprocal perspective. The dilemma in prioritising between the socio-cultural learning and the technical learning will be elaborated, and so will also the consequences of the priorities made. In the end of the chapter I will discuss the role of place in relation to the learning processes of the actors involved.

12.1 From a one dimensional to a reciprocal perspective

" At this time we first of all have to get the project organisation at the GME[29], a little more in the background in Europe, but still enable them to get the needed experience from GME and then put them on at the GMNA[30]..... We have to do that now with a little more push than before..... and also to get the project management over there integrated in the local management in some way or another, this to ensure some ownership and to get the best learning as possible... This will be a project with European competence and at the same time we have to try to getting the Canadians to accept that it is their project at some extent as well... to make good learning and to reach them in the start and to see how much competence we need over there for the start up.... Yes we more or less do a search process in parallel with the build up of the plant."

The interview that this quote is taken from took place at Raufoss in October 2001 and was given by a high-ranking manager and highly central person in the transfer process. The impression I got from this interview was that they have realised that to get the Canadians to know the equipment was to some extent

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[29] GME refers to Raufoss ASA's contract with General Motors Europe.
[30] GMNA refers to Raufoss ASA's contract with General Motors North America

important, but as expressed in the quotation, the project was supposed to be mainly driven by competent Norwegians. But learning would anyway be an important issue in one way or another. The focus was at this time quite one dimensional, like the following quotation could be an example of:

"It is important to get the Canadians to understand the more fundamental sides of this and what it demands, and the competence behind this, not only what is obvious at the first glance but try to get them to understand the mechanism behind."

What I refer to as one dimensional in this, is the focus on who it is that has to understand something and who is expected to learn something. It is a predetermined cast in this situation. Norwegians have the competence, and the Canadians have competence, but not the right competence. They are going to learn the right competence from the Norwegians. This is more or less the "scene" before the show starts up.

I do not try to argue here that the Norwegians had a superior view of themselves and a condescending view of the Canadians, because that was not the case. But the focus for the Norwegians was to establish the plant in Boisbriand and provide the skills and knowledge necessary to build up and operate this plant at Start of Production (SoP). Their perspective on which skills and which knowledge this process requires was rather one dimensional or at least vague. When talking of knowledge and learning, their point of reference is more or less consistent on the technology that they have developed and are going to start production with. Even when I, during interviews, ask them to tell me what technology is, most of them give me an outline based on that it is more or less everything. It is at least more than the technical artefacts; it is knowledge, skills and competence. It is also values and attitudes. So in their perspective technology is a very wide concept ranging over a wide spectre of factors. This is when they are directly asked to define technology. When they are seen working in their daily life and observed in relation with others, this perspective is, the way I see it, questioned. What I see and experience is that even if they know

that this is a transfer of so much more than technical artefacts, it is hard to reflect that in action.

When it comes to what is being focused on concerning learning, we are on a concrete technical level. Knowledge and competence are notions directly tied to the technical artefacts and are in that sense easy to handle. But when it comes to values and attitudes, it is much harder to grasp and handle in a constructive way. These notions are diffuse and abstract and therefore difficult to make operational. So to sum up my point in this section, to me the Norwegians seemed too one-dimensional when it comes to the skills and knowledge necessary to build up and operate the plant. In this section this will be elaborated upon further. In addition I will show that there is also a gap between what is defined as technology by those involved, and how it is handled to be in their daily work.

An essential part of the process of technology transfer has been learning. In this chapter I will analyse learning on different levels in this process. This involves the learning that has taken place at Raufoss and how it is transferred to Montreal and RACC. The learning process at RACC will therefore be very important in this chapter. The way I see it, learning is a process going on between people either directly or through the inscriptions (see chapter 6) of the machines.

A development project
As already mentioned several times, the technology that was to be transferred had roots about thirty years ago at the Raufoss Industrial Park. The skills and knowledge available at Raufoss were in a high degree of a historical and tacit character. Despite this, the projects, both at GME and GMNA must partly be seen as development projects. They are both industrialisation projects, but at the same time they are also development projects. My argument in this relation is that there is continuous development going in the production lines. There is always room for improvement, but just as important; there are always some adjustments going on based on incidents that occur.

This has some implications for both what to expect from the projects and how to carry them through. If you plan a project that you have developed at the drawing board and have calculated with a tight plan and schedule, there will not be room for much development. In such a project incidents will be regarded as disruptions and noise. Incidents like this happen all the time in both the Norwegian and Canadian factories. From that perspective I claim that the establishment of the factories both in Norway and in Canada have to be viewed as development projects, even if this is most likely not in accordance with the economical perspectives that the decision was founded upon. By declaring the projects for development projects means that they must be seen as learning projects. Developing includes testing and searching for new solutions. This search for new solutions contributes to creation of new knowledge, and it makes it an essential point in the learning process. When new knowledge is achieved, the project is progressing, and those involved are learning.

The visualisation project

As a preparation of the learning programme for the Canadians and the Canadian operators in particular, a digital programme was developed that visualised the production line. This was done in cooperation between the Global Management 1 and a Canadian student. The student undertook the job on the initiative of the Global Management 1. The purpose was to give those not familiar with the technology and the production process, a preparatory glimpse of what this was about, both in advance of their first visit to the plant but also in advance of their first visit to Norway. Thus they could start to anticipate what was expected of them, and what their job would be like when everything came in place. The visualisation was very good and had a pedagogical layout. It gave a good view of the production lines and showed the different machines pressing the product into its right shape and so on. I believe this to be an excellent tool for its purpose.

The technical trap

However, there is a "but" to be mentioned here. Is this a sufficient visualisation for transferring technology? Yes, if we reduce technology to only be about the technical artefacts and how to operate these artefacts, it should be a sufficient and in my opinion excellent visualisation. But as I have tried to argue and as I felt agreement on with those involved in the process, technology must be seen in a broader perspective. So this visualisation programme was superior describing the technical issues and the technical aspects of the process, but at the same time it obscures the situation by its reduction. This programme leads the attention towards the technical issues; we fall into the technical trap. And it is so obvious that we did not even think about it. When I say we, I include myself, because when this was shown to me, I was stunned and overwhelmingly impressed. Now I realise that the trap closed behind me. The technical issues and the learning of the production line became the dominant issues.

The way I experience it; it was never their intention to reduce technology to just technical artefacts and how to operate them. They ended up this way because of the logic of the technical artefacts. It is easy to absorb the logic of the concrete technology when it is visualised. The socio-cultural issues are much harder to absorb and get a grip on. The abstraction level is much higher when it comes to socio-cultural issues, and they are often also much harder to visualise in an easy and available way. Another important point in this relation is that it is the technical issues these engineers and operators are trained to handle. This is what their education is based upon.

Raufoss ASA was very conscious about the tacit aspects of the knowledge they were suppose to transfer to Montreal. The visualisation project had the best intentions and was seen as a tool to ease the process of socialisation; from tacit knowledge to tacit knowledge (Nonaka and Takeuchi 1995). But as stated the effect was not as intended. The focus became on the technical and visual aspects, and not at what they were intended to be about, namely the more abstract knowledge that was related to this visual presentation. In my

perspective, what caused the technical trap to occur is a lack of ability to question their own practise. This is what I understand as Argyris and Schön's (1996) double loop learning. They did not question their own practise, or in Argyris and Schön's terms (1996:21): *" the theory in use"*. If they had been more capable of questioning their own practice they may have been able to avoid the technical trap.

12.2 Two processes seen as one

I will argue for splitting the learning process in two main directions, the one following the socio-cultural part and the other one following the technology. These two processes cannot be understood in the same way. It is important to recognise that both these processes are of vital importance for getting the plant operational. However, they are two different learning processes that have to be handled in different ways. In my opinion these learning process should be split already in the planning of the establishment of the plant. And during the transfer process they should have been handled separately, but at the same time they should have been seen in relation to each other. This means that coordinating the two learning process would be of vital importance.

At some point there has to be equilibrium between these two learning processes. It is impossible to understand the technology from Raufoss without understanding the people and some of the social aspects at Raufoss. And in the same way you cannot understand the Ex-Pat Team in place in Montreal without understanding the technology, which is the reason why they are there. This means that the main objective for Raufoss ASA, namely to have an operative plant in Boisbriand at the date of Start of Production, is dependent on two main aspects; learning each other's social system, and in common learning the technology and construct the new plant. This can be expressed as in a Figure 12.1.
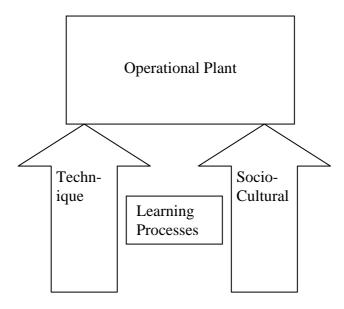
Figure 12.1.The two most important learning processes the operational plant is resting upon are learning the technique and learning the Socio-cultural aspects.

In Wengers (1998) terms this can be understood as participation and reification (see chapter 5). Through participation they had to relate to each other. They had to relate to people from different social practises, that means learning from each other's social systems. Secondly they had, in common, to relate to and learn the technical systems, which in Wenger's terms is reification. This means to relate to the abstractions the technical system represents and to objectify the abstractions through the technical machinery.

Learning the technique

The technology developed at Raufoss is the foundation of the whole transfer process. To learn the production processes which this technology is based upon and all the associated technical issues is therefore obviously and very logically of importance. This means to learn how the machines operate, at which temperature, pressure and so on. Learning the metallurgical issues behind the characteristics of the product will also be included in this. This includes a lot of engineering knowledge like formulas, electricity, pressure, temperature and metallurgy. The engineering knowledge required for these two production lines

is enormous and based on the uniqueness of the product. There is also unique knowledge required to produce this product.

For learning this knowledge several actions took place. One of the actions was the visualisation project, whose mission was to give the operators an impression of what this was about. All the operators have gone through this visualisation of the production process. Also the rest of the technical staff at RACC has gone through the visualisation program.

In addition to this, the RCT has hired in expert personnel from RTIM (Raufoss Technology and Industrial Management) in different steps of the production process. The experts have then taught the Canadians about the production process and especially about aluminium and how aluminium is different from, for example, steel. This is important knowledge when working with aluminium, because it has extremely different characteristics from steel, which often is the reference point for average engineers. These classes were arranged mainly in Norway and were mostly concerning metallurgical issues and such issues related to the production process. As an organised activity this was ensuring some basic levels of knowledge about the most important aspects of what was going to be the core technology of the upcoming plant in Boisbriand. It was of course important to give classes on these issues, even though this was rather basic and not of any impressing extent.

Despite the classes given in the basic core technology, most of the learning about technical issues has been done on the shop-floor. As one of my respondents expressed it:

"Okay I can give you an example how we train a new operator, we can have a structured training program, with some theoretical, some at the floor very structured, very efficient. That is not what we did. We did it the other way; when you put an operator with another or beside another who know the job, and you hope that they are going to talk about the work and learn through it. And they will do, and some times they do not realise that they are learning. It takes three

*times more time to learn what you could have done if you were efficient......We
did it the hard way, the expensive way."*

Based on this, the conclusion is that the learning of the technological issues has
been done in two ways. One has been to arrange classes for the operators with
hired experts from RTIM as the main lecturers. The other part concerning
technical learning, has been done through "learning by doing" (Schön 1985)
under informal supervision of more experienced operators. These experienced
operators have been operators at Raufoss, and this learning has first and
foremost been carried out during the Canadian's stay at Raufoss, but also under
supervision of the Ex-Pat Team in Boisbriand. When I was talking to the
operators, they were not very concerned about the classes that were arranged,
they did hardly seemed to remember and it had certainly not been a very big
issue for them. What I draw out of this is, what also the quotation above
indicates, that the main learning has been done through "learning by doing" on
the shop floor. It has not been very structured and as the quotation indicates, it
has been the hard and expensive way, but the operators have learned.

There is one point about this way of learning that I find important to comment
on. When putting two operators beside each other and more or less telling them
to learn, the result of this learning process might be dependent on the people
they are and the chemistry between them. What I saw and observed with the
five operators that went to Norway for about six months, is a variance in what
relations they have made with the Norwegian operators and what they have
learned during their stay. Some are more eager to get in touch with new people,
and some are not, maybe they are a bit shyer or that there are other personal
matters. However, the result from such a learning process is more or less
difficult to measure, or at least it is difficult to foresee the result of your
investment.

This observation indicates a need for a more structured learning program. My
argument for the need for this is that the way learning was carried out at the
plant in Montreal, including the preparations where some classes in the core
technology were held, was neither sufficient nor effective enough. The

operators were hardly able to reconfigure the classes they had attended in Norway. This indicates two important issues. Firstly, there was a time delay between the time these classes were held and the time the operators started to work at the plant in Boisbriand. Secondly, there was not a systematic approach to the learning situation as for instances Nonaka & Takeouchi's (1997) knowledge spiral indicates (see chapter 5). A more systematic approach would have utilised an improvement potential in relation to create an effective learning of tacit knowledge through learning by doing (see chapter 5). They tried to implement learning by doing, as the quotation above indicated, but the operators was not equipped with a tool or a program of how to learn or how to interact with each other. Such a program could be raised to ensure the quality of the learning and to reduce the dependency of personal chemistry and relationship. I will soon get back to my thoughts of such a program, but first I will go through the learning of socio-cultural issues, or the way I experience it to be in the world of technicians: "learning the rest…."

Learning the rest……

As already indicated, learning the technical related knowledge does not seem to be enough to fulfil the process of technology transfer. The non-technical related knowledge is surely also of importance concerning this process. In my terms this involves learning behaviour and learning about the background of the people you work with. Socio-cultural issues are of course a central element in this. What this is pointing at is an understanding of the social situation where the technique either is developed or shall function. And it seems to be important to have good knowledge of the socio-cultural conditions at both places. One argument is that you cannot move the technology out of its social context without any consequences. This is underlining the importance of a learning process that does not include only the technical issues, but also the social aspects. To learn a social system and its values, norms and different aspects is demanding, and most likely it is not done in the same way as technology is learned. Some basic knowledge of the background of the people you are working with will ease the interaction and the interpersonal communication, which is important in these kinds of learning processes.

One of my respondents expressed himself this way about what is important in order to get a successful technology transfer:

" I think it all comes down to get people to work together.... To establish a group that can handle the challenges it meets.....Technology I think has something to do with people, it has less to do with the technical artefacts..... it is all about putting together people that can cooperate, the most sure way to bankruptcy is when people starts to quarrel, it is surely the fastest"

This points at an important and problematic issue when talking about learning the socio-cultural situation and setting; namely how to put together a group that you can be sure do not want to quarrel. That requires a lot of knowledge and insight into both the background of the people and their characteristics. It also points at the difficulties concerning being able to communicate at a high abstraction level and the lack of evident solutions concerning cultural understanding. There are probably one thousand possible reasons to start a quarrel, and therefore it is also more or less impossible to eliminate all these possibilities. But with knowledge of the background of the participants and an experienced project management you might be capable of eliminating the most obvious problems that might arise. This is knowledge of socio-cultural factors that are abstract and hardly available, and it might also be said to be available in a different way than how technical knowledge is. Therefore it is also harder to get a grip on in a technological perspective. If the Canadians and the Norwegians could have had knowledge of each others ways of reacting as analysed in chapter 11, at an earlier stage, it would have eased the learning process a lot.

Learning the socio-cultural setting must be seen as a process of constructing meaning (see chapter 4). The construction of meaning that is taking place at RACC is a two- fold process. First of all the Norwegian Ex-pat Team is trying to construct meaning in the Canadian organisation together with the Canadians, and also vice versa; the Canadian's are constructing meaning out of what they experience from the Norwegians. In sum this is a very complex situation where

both Norwegians and Canadians are trying to get a grip on what the others are like and how to relate to them. This is a time consuming process involving a lot of interpretation (Berger and Luckmann 1966), translation and negotiation (Latour 1987). Both the Norwegians and the Canadians have to interpret what the others are saying and expressing. During this process they translate and interpret both what is being said orally and also what is being expressed in other ways, for example by body language (see chapter 11). By interpreting I mean that they are transforming information they get from others into their own understanding, and by translation I mean expressing this interpretation to others. These processes of continuous interpretation and translation is also a situation of negotiations, where the meaning is constructed in common with others.

The time consuming aspect of this process is interesting concerning how such a learning process can be structured to be as effective as possible. In chapter 14 I will examine possible alternatives for the two learning processes described. But first I will give some reflections on learning in a wider perspective concerning the two places involved in this process, namely Raufoss and Montreal.

12.3 Learning places through learning actors

In the theory chapters I have given an outline of how place is an important dimension and an extension for organisations in the global economy. I also argue that people as actors carry or are embodied by places, and at the same time they effect and contribute to the continuously construction of places. This means that when people move in the global economy, they move as representatives for places, and they contribute to the ongoing construction of places that they drop into. This is important for the following arguments, namely that the learning taking place in a technology transfer project has to be seen not only as two different learning processes, but also as learning processes that contribute to the continuously construction and reconstruction of places.

As mentioned in the introduction of this chapter, in early phases of the planning of the transfer project the attitude at Raufoss was that they should teach the

Canadians about their technology, and the Canadians should carry out the production based on instructions from the Norwegians. There existed a conception of a one-dimensional learning process where the Canadians were those learning and the Norwegians had a supervisory role. This attitude is completely understandable seen in the light that this was a parallel industrialisation process, where they were setting up the plant in Norway just a year ahead of the Canadian plant. To feel that these objectives were able to overcome, they had, in my perspective, to reduce the challenges "to keep floating". But even if this was an understandable and explicable reaction, it was not right to think that way. By thinking in terms like this, they closed several development directions for the project at a too early stage. In the same way that we have path-dependency as a notion when we talk of technology, I will claim that we also can talk of path-dependency at some extent in this project as well. By closing the possibility of a reciprocal learning process at an early stage, the minds in the organisation were set to this view, and it is then reasonable to believe that this also affected the interaction between the Norwegians and the Canadians at an early stage.

During the project there was a gradual change towards a more reciprocal approach. This was very much because of the Norwegians working closely with the Canadians and finding them to be knowledgeable and experienced operators and engineers. Gradually actors from Raufoss found that there were things to learn from the Canadians that slowly turned the cooperation into a better track. The way I see it, the situation concerning learning between Norwegians and Canadians is improving, but it is not and will most likely not be an equal relationship in the near future. The knowledge and the technology is most likely too embedded and rooted at Raufoss to achieve equality. But there are several other areas where Raufoss ASA can and has learned a lot from the Canadians. Business wise and regarding cost orientation are some of the areas where Raufoss ASA has learned and experienced a more or less different world from what they have been used to. This was evident for me when working with the global sourcing project, where the Canadian's economical approach had some differences from what can be claimed to be the Raufoss way of thinking. It is no magic solution that the Canadians are suggesting, but more a result of looking at

the world from Canada and a Canadian perspective. For instance they know the American continent better than the Norwegians in Raufoss and they also have a more extended network of the American continent. Therefore they are able to do things in a different way. Suggesting other business solutions is also a part of and a result of this. The experiences Raufoss ASA has had during their transfer project have, in this perspective, made them more open for learning from other actors. That is important learning and an important experience for a company that is entering the global arena. The reciprocity in the learning mentioned here can be characterised as what Nonaka and Takeuchi (1997) calls combination; from explicit to explicit. The Norwegians have experienced that the explicit knowledge that the Canadians posses, for instance about the American continent, has been fruitful to combine with the Norwegians' market knowledge. This combination of Raufoss market knowledge and the Canadians knowledge of North-America has created new knowledge on how to utilise these opportunities.

According to my introduction to this chapter, the individual actors are important concerning learning in this project. That includes also learning between places. Those learning on behalf of the places are the individuals. During this transfer there has been substantial travel between Norway and Canada, both the Norwegians and the Canadians have been travelling a lot. This exchange of people across the Atlantic has mainly had one purpose; learning. When the SGF joined Raufoss as a partner in this project they had a goal on behalf of the Quebec province and Montreal as a place, namely to attract knowledge to the region and thereby to increase the knowledge present. Someone learning something increases knowledge. The plant has now entered production and is going quite well. This can be seen as a conclusion of that learning has been taking place. The knowledge level has without doubt been rising at the plant in Boisbriand through what the individuals employed at the plant have learned by interacting with the Norwegian Ex-pat Team for example. And the other way around when, for instance, the purchasing department at Raufoss learned that it is possible to reduce the transportation time for deliveries from Ohio to Raufoss by almost six weeks by knowing the transportation system and having the right contacts and experience of the American continent. This makes Raufoss and

Montreal two better industrial places. Even if this knowledge only rests upon individuals, the knowledge that is important, and contributes to something new, will be spread when those individuals who have learned it, talk to others about their experiences. In this way the individual learning across places is important and contributes to the construction and reconstruction of the knowledge base at each place.

Technology and the Socio-cultural: Differences in how to learn?

What I have been suggesting above is that it may be useful to view learning of technology and learning social behaviour as two different learning processes. At the same time I believe this to be a dangerous path to follow based on my argumentation that the technology and the social aspects are closely linked together (see 12.2). As I already have mentioned concerning learning in technology transfer, it is necessary to have a wider focus than technology-wise.

When this project started, Raufoss was very conscious of who should be in charge of the process and why. They (the Norwegians) should of course be in charge of the process because they had the knowledge and skills required for their technology. They saw themselves as the leaders of the process based on their knowledge and skills concerning this technology. In the Top Management 1, one underlined the importance of Raufoss in a leading role by saying:

"We are going to hold the control of this process and we are going to hold hard as damn"

In their construction of this process they, as technicians, saw the importance of teaching the Canadians the technology as priority number one. Learning about the people and behaviour and so on was at best included in this or most likely came as a second priority. As mentioned in chapter 9, both the front and the rear lines are fully automated at Raufoss[31]. For the Raufoss people the product is not

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[31] As also mentioned the production line at RACC is not so automated as the one at Raufoss but it was of course the production line at Raufoss that was the reference point for the Raufoss engineers.

touched by human hand from the point the aluminium is delivered on the production line until the finished product is at the end of the line. It is the machinery that does the job. Then it is of course easy to draw the conclusion that in this process, what is important is to know the machinery. It is the machinery that makes the product, the natural conclusion when it comes to learning is then obvious. Learning is about learning the machinery. The technical trap closes again.

One essential issue is how can and should these two learning processes be carried out. For me this has been a recurrent question throughout my study. Is there a good way to suggest how it can be carried out in a generic and fruitful way? Before I carry on with this outline of how to do it, I'd like to address again that my main argument of separating the learning into the two processes technical and the socio-cultural, is that I find it incredibly important to focus on the socio-cultural learning. The best solution would be to integrate them, but as I have shown, the technical trap snaps shut before you know it.

The problem of entrance cost concerning learning

At first glance learning technology and learning the socio-cultural seem to be two very different learning processes where technology is a representative for the nature science and its concrete knowledge. This is seen as a type of knowledge that is measurable, and where you can estimate outcome based on the inputs you give. On the other hand as already argued, the socio-cultural aspects are more abstract and less available. You cannot measure and estimate this in the same way as you can estimate the capacity of a heating oven. In this way it is easy to conclude that the knowledge structure of the technology and the socio-cultural factors are so different that the learning system also must be quite divergent from each other. In my perspective this is doubtful. There are some differences in the knowledge structure, but in the overall picture the knowledge structure is quite similar. The difference is related to what I will call the entrance cost of the knowledge. By the entrance cost of the knowledge I mean how much it requires of those that are going to learn something, to learn the knowledge at stake. For a person that is trained in an engineering way and

tradition it is most likely easier for him to acquire new knowledge that is related to his background. And in the other way around for a, for example, social anthropologist, it is relatively easy to learn about new cultural systems, because he already knows a lot about culture. The entrance cost is for him relatively low.

The logic of this reasoning is that there are relatively high entrance costs for an engineer to acquire knowledge that he is unfamiliar with, for instance socio-cultural knowledge. The entrance to socio-cultural knowledge has to be made in some different way. This represents some of the core challenges in the technology transfer project. Those working in the organisations involved are trained for the technical work and not for the transfer (or learning) of this into another cultural setting at another continent. On the other side, a social anthropologist or perhaps a geographer will have problems with understanding the complexity of the technology and that would also represent a problem. In chapter 14 I will come back with a proposal about how the learning could have been carried out in this transfer of technology.

12.4 Summing up the learning aspects

The learning carried out in this transfer project has of course been of both explicit and tacit knowledge. Due to the substantial time some of the Canadians spent at Raufoss they were able to learn a lot about the Raufoss society and Raufoss ASA, including the technological aspects of both the society and the organisation. But as stated in this chapter, the "learning by doing" together with a skilled colleague, was done the "hard and expensive way", which I have stated to be dependent on personal chemistry between those involved. Anyway this way of working can be viewed as a way of learning tacit knowledge both according to Nonaka and Takeuchi (1995) and Wenger (1998). There were also arranged classes to learn the explicit knowledge necessary to operate the equipment. This was as stated just partly experienced as important among the operators.

This analysis shows that the learning process at first was perceived in a one dimensional way, where Raufoss ASA was seen to have the knowledge that the Canadians was suppose to learn. This however gradually changed, especially among the Ex-pat team that experienced the Canadians to be competent and having a lot of knowledge to contribute with to the Raufoss organisation.

Even if their conceptualisation of technology, what was at stake learning wise, was in accordance to the theoretical conception I have put forward, consisting of both knowledge, skills and attitudes, this was not followed up in the practical work. When it came to the practical work the technical trap snap shut too commonly. When they had to prioritise between the abstract aspects of social-cultural relations and the concrete technical issues, the technical issues got priority. When that is said, the plant performed well, but the learning process could have been more efficient and have resulted in less frustration if it had been carried out differently.

13. Enrolling the human actors and the technical actants

In this chapter I will demonstrate that the process of technology transfer also is a process very much related to reconstruction of an actor network. I will analyse how this reconstruction has taken place and what effect it has had on the process of technology transfer. This will mean I will analyse how the reconstruction of the actor network is done in praxis and what implication it has brought into the process. Central in this analysis is to elaborate whether the enrolment of actors and actants is regarded as equally important in this technology transfer. And whether they are treated differently or not, I will elaborate on why is it so? I have chosen to first analyse the organisational enrolment and then how the technical actants are enrolled into this actor network.

13.1 The organisational enrolment

Starting enrolling a network in Montreal

At a conference in Germany in 2000, a representative from Raufoss ASA was talking to one of their suppliers. During this conversation some of the challenges facing Raufoss were mentioned, in particular the new contract with GM, and the forthcoming establishment in North America that was necessary to fulfil their contract. The representative for the supplier mentioned Quebec as a potential region and Montreal as a potential area for such an establishment. Both Investment Quebec (IQ) and SGF (The Société Générale de Financement du Québec) (see chapter 9) were mentioned as professional organisations that could be helpful to contact in this regard.

This is said to be the introduction for Raufoss ASA to the potential of Quebec and the Montreal area. One of the core actors of their industrial network was the one that tipped them off about the potential in Canada. Raufoss ASA, which at

this time was on the search for a location for a plant in North America, contacted SGF and Investment Quebec, and this was in fact the start of enrolling their network in North America.

The enrolment of a network at a new location that the company did not have much knowledge about was an important process. The entrance of a new region meant a critical learning period, where they had to take a lot of decisions based on information of and from a region that they were not familiar with. This meant a lot of interpretation (Berger and Luckmann 19966) and translation of meaning and negotiation (Latour 1987) concerning what were seen as important factors for their purpose.

When Raufoss ASA entered a completely new region, they needed support from somebody who could help them through the jungle of information. In this perspective the SGF and Investment Quebec were important contributors in the process of bringing relevant information to the table. This also involved a role as a filter and a translator for Raufoss ASA. The information Raufoss ASA received was already digested and transformed by these Canadian organisations.

Strategic considerations

One other important decision Raufoss ASA had to take at an early stage was which role SGF should get as a partner. One Norwegian reflected upon this issue in this way:

"SGF would like to have 49% of the shares in RACC, but we did not want to have that kind of investor involved at such a level. The reason was that we viewed them as a financial investor and was afraid of them being too bureaucratic. We did not want them to be in control of more than 20% of the shares. This was because we wanted to have an opening for a more industrial partner on the more long term perspective and still being able to have full control in the company."

What he is referring to here is that in the long run Raufoss ASA wanted to control over 51% of the shares, and in this regard they have to take some strategical considerations for how to involve, and to what degree, they should involve SGF as a partner in RACC.

Another important role for these place marketing organisations was that they organised viewing trips in the area for the representatives of Raufoss ASA when they visited the region to get to know it better. This was of importance for the company, as this way they got in contact with a range of different and interesting firms that they saw as potential partners at a later stage. These trips also included visits to local technical schools to get a glimpse of the level of the technical training in the area.

Place marketing or industrial development

The role of SGF and Investment Quebec is in my view, two fold; They are supposed to ensure good industrial solutions for foreign industry that chooses Quebec as the region to establish their factory in, this includes good financial support or co-investment, and they also have a role as salesmen for this region, where their task is to attract businesses and capital to the area. This is not unproblematic. Are they trustworthy? Do they in heart act as salesmen for their home region, or are they able to act as impartial advisors? I think these are important questions when industrial actors operate in the global space and meet new places with other actors and another socio-cultural setting than what they are used to.

What I have seen from these regional investment organisations and of their presentation material, is that they present the headlines and key figures at a rather aggregate level. What I find more important and interesting is what they do NOT tell. What is behind the headlines, and what is behind these key figures? To get a grip on this you have to go into a deeper discussion and take a more analytical position. In a situation where it is required that you take decisions at such a pace that you keep up with your plans; there is not much room for very deep analytical discussions and analyses. The headlines and key

figures therefore are likely to have an important effect on the choices the industrial establisher finally ends up with. My perspective on this is that regional marketing firms such as IQ and SGF should be handled as what they are, namely important partners, but also actors acting on behalf of their region. In this perspective it can be claimed that they are important actors to incorporate in the network, but at the same time it is important to be aware of their double role.

The second step enrolling the first experts

When Raufoss ASA had come to a decision of location, the next step was to get in touch with local experts on hiring processes that could support them in the initial stages of building the new Canadian organisation. Through their contacts they chose a consulting firm that supported them in their search for those who should become the Canadian management group. In the first selection process of those that were to go on to become important members of the Canadian organisation, Raufoss had to rely on the external consultants. This did not mean that the consultants hired the employees, because that was taken care of by the Global Organisation 1. The role of the consultants was to arrange the recruitment process and advise Raufoss ASA where to search for employees. This role is important in such an early stage in the process of establishing a new plant. To get good advice at this stage is crucial for the further development. But another aspect that is important when you have a tight schedule is that the relationship with such experts is sufficiently successful so that you do not need to change consultants during the process. To establish new relations is time consuming, and it is important to avoid such change if possible.

The internal enrolment

As mentioned in chapter 10, the management group was hired first. To be correct, one process engineer was hired first, then the plant manager and then another process engineer. The further hiring was characterised by operators with different backgrounds; at first five operators that were seen as the core crew. In the coming months they would become the most important actors in the technology transfer from the Canadian side, in addition to the management.

An accountant was also hired at this stage along with a receptionist that also had some accountancy experience and education. What was prioritised in this early stage of the establishment was to ensure technical and operational competence, and also financial competence to have control with the economic situation of the project. This was both a logical and reasonable way of handling the hiring. The organisation was growing in accordance with the challenges and the tasks at hand in a generic way.

The Human Resource Management

When the organisation had grown considerably, to approximately about 25-30 members, a person responsible for human resources was hired. This Human Resources Manager became responsible for the personnel and the way they were handled. She was a very skilled person with good experience and a way of working very closely to the personnel. The hiring of the HR Manager had a very positive effect.

The operators at RACC could choose between two different unions. They ultimately chose to enter the union that was regarded as the toughest one. This was done before the HR Manager was hired. One of the respondents put it this way when he tried to describe the importance of the HR Manager and the effect she had on the organisation:

"To bring in the HR person earlier, that would have helped us not to get unionised."

This is just one of several statements that underline the importance of getting the HR management into a structured and controlled system. Based on the knowledge of the pressure this Canadian organisation had been working under, I find it neither strange nor surprising that the existing employees were satisfied to have a person on board that wanted to listen and had them as the main objective of the working day. Based on this, it was not a surprise to hear some informants say that this hiring was done too late. The period before the HR Manager was hired was characterised by a focus on technical issues, and human

resources were more or less neglected. One of the Canadian managers expressed it like this:

"*Many of our people are engineers so if the machine makes a funny sound they are there; "something is wrong here" you know their ears are wide open on equipment. If the morale is down or something like that, no one even notices it. They just walk right by. We should have detected that we were going towards a union. And we did not, not enough. Even when we put XX as supervisor, we took a decision on that, and once we announced it, the operators told me that they thought we had made the worst decision ever. I said how can you say that, he has drive and …?... They said you will find out yourselves. And they were right. But how could we take such a decision together and none of us had that type of feedback from the floor? But we knew which machine was having a problem and which bolt was loose, but we all were equipment oriented. And now as XX (The HR Manager) has come in we know a lot more about what is going on the floor because she is involved. Right now I know who on the floor are for the union and who is not.*"

The relatively late hiring of the HR Manager has, according to this quotation, had a negative effect on what was going on in the organisation before the hiring. When the organisation got a professional in to take care of the human resources, the situation improved. The general approach in the organisation is that this should have been done much earlier. This is an interesting reflection made in an organisation that has been under severe pressure over a period of time. My view is supports their own reflection in this way.

Another interesting aspect of not hiring the HR Manager at an earlier stage, is that this was not in accordance with their own definition of technology. Their definition included both knowledge and attitudes and skills and not only the technical issues. Their definition was in accordance with the theoretical approach I have argued in this dissertation (see chapter 6), but by focusing on just technical personnel in the early phases they were not able to follow up this definition in their practical work. In practice knowledge, skills and attitudes have been neglected at a certain degree.

What went wrong?

When they had a well articulated definition of technology and a view that took care of what is seen as important aspects of working with technology, an important question arises; why were they not able to see this in the first place? I think there are at least two aspects to be emphasised in this relation.

Too focused on technology

First of all I think it is important to remember the time pressure both the Canadian and the Norwegian organisation were working under. Acting and to keep moving were crucial under the whole process. Whatever they were doing, they knew that the date for start of production was July 2003, and by then the equipment had to be in place and the plant had to be able to run at the promised rates. Under these circumstances there was a kind of logic in starting hiring those who should be responsible for installing the equipment and getting it to run first. This meant that the technical management and operators were hired first. Furthermore, it is also logical to wait with the hiring of your HR Manager until they have someone to manage.

So far this was a rather obvious way of doing it. But this is also a kind of a "technical trap", where the concrete and obvious gets priority, and what is not that obvious and concrete is set aside. Managing the people that are going to operate the equipment was one such non-concrete activity. Even if this is an obvious situation where, what I call the "technical trap", has occurred, it does not mean that hiring the HR Manager should have been done at the same time as the rest of the management, even though some argued for such a solution when they looked back at the development. If they had looked up from their machinery and their installing equipment some months earlier, it would have improved the situation a lot. I think that hiring the HR Manager at the same time as the organisation moved into the plant, and then starting to hire new operators, would have been a more efficient solution.

The outsourced Human Resource Management

Another aspect that could have played a role in this situation is found at the parent organisation in Norway. In cooperation with Northern Europe's largest private research institution, SINTEF[32], Raufoss ASA had launched a project where the HR management was outsourced to experts at the research institution. This was a very interesting project, and the intention was to improve the HR management by using the best expertise available for this purpose. In many ways this outsourcing was a innovative project. The intention was to upgrade the importance of HR Management. This upgrading was done by using experts on this subject and thereby increasing the quality of the processes taking place in the organisation. I have not evaluated this project, so I cannot say if the results internally were in accordance with the intentions, but in relation to the technology transfer, this project made a rather odd appearance. Commenting on this issue one Canadian manager presented his thoughts this way:

"We hired for the GME plant[33] external consultants in human resources from SINTEF. That sending a message for me, when I saw it was like …ok this is not top priority, we are outsourcing this or we want to use this as a variable cost. This is how I am thinking about it, so we are not developing core competence at managing our resources and that should maybe have been the first person to hire before the plant manager (laughter.…) especially in technology transfer."

This person is pointing out a very important element of such an outsourcing. Outsourcing is what you do with something that you won't develop yourself and something that others can do better than you. And this was also partly the reason for the outsourcing; somebody, in this situation SINTEF, was capable of doing this better than Raufoss. But the result was that it was interpreted as a signal of degrading HR management as a core competence in the company. Seeing HR management as a variable cost is a powerful signal to send both to external and internal human resources. The signal this sends is rather different than the intentions. The way I see it and the way I interpret those who were

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[32] The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology (SINTEF)

[33] The plant in Norway.

involved in this, are that their intentions were for the best, but the effects were sadly the opposite.

The local suppliers

Another factor that Raufoss ASA has been very focused on is the need to enrol local suppliers in North America. This had high priority at a very early stage of the process. This is an issue where the company has high competence. Getting a supplier approved is based on the supplier being capable of delivering the specified product at an acceptable price. The quality, as mentioned in chapter 11, is an important issue for Raufoss. To be sure they could get the qualified suppliers they wanted, the process of searching for suppliers in North America started at a very early stage. Enrolling the local suppliers is both important in terms of getting qualified deliveries at the right time, but also it could be an advantage for Raufoss in a longer term. By establishing contacts with suppliers on both sides of the Atlantic, they could at some point be able to get better prices because of higher volumes.

Enrolling local suppliers in North America also had other advantages, and this is related to having North American staff present. The purchasing department at RACC knows more or less, the North American businesses that are relevant, more so than the purchasing department at Raufoss. At least they have a better understanding of North America than they have at Raufoss. This means that they also are in position to see other solutions. With this knowledge they have been able to improve both delivery times and delivery conditions for the whole company (see chapter 12). This would not have been possible if they had decided to serve the plant from their European suppliers, which in practice would have been impossible.

13.2 Enrolling the technical actants in the Network

One of the most profound features with Actor Network Theory (ANT) is the way it includes the technology as an actor equal to humans. This in particular, is what makes ANT a relevant theoretical approach in this thesis. In accordance with the arguments of ANT, the enrolment of the technical artefacts are equally important to the enrolment of the human actors as presented above. In the following presentation I will show how the enrolment of the technological artefacts has taken place and what consequences the enrolment of technological actants has in contrast to the enrolment of the human actors.

The starting point of enrolling the technical artefacts

The starting point for the enrolment of the technical artefacts in Montreal was in fact on the other side of the Atlantic; at Raufoss. This was the first place where the Canadians saw, touched and experienced the technical artefacts that a year later would become their own. This first stay at Raufoss for the five operators and the Canadian Management lasted, as mentioned in chapter 9, for a period of up to six months. During this period the only place where the Canadians had contact with the technical equipment was at Raufoss. In Canada they hardly had an office to go to. These first stays at Raufoss for this group of Canadians were an important part of the Raufoss strategy concerning technology transfer. It was important for Raufoss to bring the Canadians over to Raufoss so they could see the technical equipment running and at the same time have the technical environment available to their process of understanding this technology.

With a little help from the Norwegians

Being present at Raufoss they had a lot of Norwegian workers available to direct questions to. In this way the Norwegians acted as resources for the Canadians in their process of getting to know the equipment. The Norwegians acted as translators for the Canadians in their attempt to understand this technology. When the Canadians were trying to understand the logic of these machines, they interpreted the inscribed meaning of the technology. To be concrete, this includes a whole range of elements from an obvious inscription,

from our cultural perspective, like the red emergency switch to a far more complex inscription like the structure of the aluminium of the finished product that you can view through a microscope. This structure can, to a trained eye, give a lot of information about its strength and other characteristics. But to an untrained eye, this information is more or less worthless. Through these interpretation processes, the Norwegians acted as translators in the effort to make these learning processes and the enrolment of the technical actants as easy as possible for the Canadians. This means that the Norwegians at Raufoss were important helpers for the Canadians in their attempt to enrol the technical artefacts. At this stage in the transfer process, incorporation of the technical actants was a process where the Norwegians and the Canadians worked tightly together. But it is important to remember that this stage in the process was rather special as well, with a situation where a few selected operators and management representatives were present at Raufoss.

Inscriptions

According to Akrich (1992), inscriptions refer to meanings linked to and attached within technical objects. Through these inscriptions, the technical objects embody meaning and a set of different relations. In other words, the innovator or constructor of the technical artefact has inscribed his or her understanding and knowledge into the artefact. This means that to understand the technical artefact the end-user has to understand the inscriptions attached to this technical object. During the Canadians' first stay at Raufoss, they got a some impression of these inscriptions and what was behind the technology they were working with. This was also an important point for Raufoss ASA and their strategy in the technology transfer, the Canadians had to understand what was behind the technology and the technical equipment. In their eyes, their technology is special and different from a lot of other technologies; this is especially related to the aluminium and its characteristics. This argument can be seen as a tacit acknowledgement of the technology's inscriptions, tacit in the sense that it was never explicitly expressed by Raufoss ASA. The way I interpret this is that they had an awareness of that there was "something" there,

but they did not have suitable concepts or terms to express it properly. In lack of a better alternative, this was expressed in ways such as :

" It is important that they also understand what is behind the technology and not only learn to operate it"

Another example is this:

" there is so much of the competence here at Raufoss that is in the walls at the plant, that is not obvious at first glance"

Both these expressions from people at Raufoss ASA can, in my perspective, be seen as pointing at something that can be understood to be inscriptions in the technology itself, as well as inscriptions in the social setting this technology is developed and operated within. By inscriptions in the social setting I am referring to Thrift's (1997) conception of "*places as passings that haunts us*". The social setting at the place Raufoss is inscribed in the technology. And the technology is inscribed in those who work there. Inscription therefore has to be understood in a dialectical way. It is not only the social activities that are inscribed in the technology, but in a social setting or a place like Raufoss, the technology becomes so essential that it also inscribes the place. This argument must not be understood in a technology deterministic way. The point is that there is a dualism in this relationship, you cannot understand the technology without understanding Raufoss, and you cannot understand Raufoss without understanding the technology. This argument can be taken to a higher level by claiming that you cannot understand the world as we know it today without understanding internet and information technology in general, and you cannot understand internet and the information technology without understanding the world.

Inscriptions; also a technical aspect

In an attempt to take the inscription discussion back to a more concrete level in the process of technology transfer, it is important to be aware of the complexity

of the technology at stake. Understanding the social meaning inscribed in the technology from Raufoss is about understanding a lot of complex relations, both social and technical. The technical relations that have to be understood are of course linked to the social aspects at stake, but at the same time they are still technical issues. An example of this can be illustrated by the following argument. Let us say that during testing of the finished product, the strength of the product is not good enough. When tested, the suspension arm breaks. The question that arises is then; why does it break? If we know it was not an external influence that caused this situation, the answer to this can be either the material is too soft or too hard. A skilled and well-experienced engineer can, in this situation, take the damaged part into the laboratory and examine it under the microscope, and by looking at the structure of the aluminium, can say a lot about the reason for this damage. The structure of the aluminium can say a lot about the history of this particular part, whether it has been heated too much or whether it has been cooled down too slowly at one stage. This information is very important in the search for what has gone wrong in the production process. Another way to put this is to claim that what this engineer is doing is interpreting inscriptions made by the machinery. Of course all adjustments on the machinery are made by humans and in this way the social aspect is of course present. But situations might also occur where the inscription is not made by humans but entirely by the machines. When the resistance of a robot arm is worn out, and it starts to create marks or scratches in the suspension arms, this will hopefully be noticed by the internal control. These marks are in the way I understand it, inscriptions made by the machinery that says; the resistance of the robot arm is worn out, it is time for maintenance. This message has of course to be interpreted by the control and understood or constructed to be meaningful in a way that makes sense.

I am aware of that a perspective like this, is to some extent, challenging my own position, that technology is socially constructed. But either way I find it relevant to question this position. Because the perspective presented has been relevant in this case and as the technology is becoming more advanced and automated, through use of ICT in the production processes. On this background I find it to be a relevant question to ask. A conclusion on this must be that our

positions in this relation should be developed in a more nuanced way to meet the challenges of the future technology. In chapter 6 I have questioned whether the empirical examples Akrich (1992) presents, are good and complex enough to be seen as relevant for today's far more complex industrial processes. I think the point shown in this section illustrates this question fairly well.

The role of the innovators

When discussing Akrich's (1992) term de-scription in chapter 6, I state, in accordance with her, that this is a process between the innovator and the end-user. This is pretty much what I am describing in this chapter as well. And in that relation I want to address a few points about the innovator. The innovator in this outline is a very complex object. In one perspective the innovator is a person at Raufoss who has been central in the process of developing this new technology or at least part of it. In another sense the innovator might be someone who has developed a machine and as such, be unknown to the people at Raufoss as well as the Canadians. The innovator can thus be both a known person and a total stranger. The role of the innovator can therefore be limited to the inscriptions that are in the machine or the technical artefact. But in the situation where the innovator is a living person at Raufoss, who is available for the Canadians, the innovator is much more than an object that has inscribed something in a technical artefact. Inscriptions can, in an abstract way, be argued to be descripted through a process of negotiation between this innovator and the end-user. The innovator's role can therefore be said to vary between the rather abstract role and a more concrete role. The innovator can be an abstract figure when the innovator is unknown. An unknown innovator communicates with the end user, as a negotiation partner in a predetermined negotiation, through the technology he has inscribed. But when the innovator is a concrete person working at Raufoss that is open for questions and taking part in a real time discussion and negotiation, then the role of the innovator is completely different. This should underline the understanding of the innovator as a multi-faceted actor and not one or *the* innovator. When we recognise the innovator to be a diversified figure, we also recognise the innovator's role to be diversified depending on which relation he has to the end-user. The innovator that is

walking around the production line at Raufoss with the Canadians has a quite different role than the inventor of a machine that is bought from Germany, for example. Either way, the inscriptions and the process of de-scription are important features in this communication between the end user and the innovator. The process of de-scription is a much easier one, when the end user works in close cooperation with the innovator. This has very much been the situation in the process of establishing the plant in Canada.

De-scriptions through negotiations

In the section above I have considered the role of the innovators, and I have also touched on the relation between the innovator and the end-user. This relation and interaction seems to be of high importance in the process of understanding and further developing the technological equipment. In chapter 6 I have outlined the translation model that Latour (1987) emphasises. The main focus for me in this connection is how ideas are transformed in the interaction between different actors, as in a process of transferring technology and knowledge, which is the case here. I put forward three important notions in this relation: interpretation, translation and negotiation. Interpretation describes the process where the individuals internalise information and adapt it to their understanding "of the world". When they externalise their understanding, they are translating this information to somebody else. The processes of interpretation and translation should in my opinion be regarded as processes of negotiation, where different individuals or different groups are trying to configure a common understanding of a situation or a challenge (see chapter 6). In relation to enrol the technical actants in the network in Canada, this is important. When the innovators, or those with extended experience of the technology from Raufoss, work together with the end-users in Canada, these conceptions describe the situation very well. The Norwegians explain how the equipment works and what the ideas are behind this technology. They try to translate their understanding of the technology to the Canadians. The Canadians interpret this information and adapt it to their previous understanding. On the basis of this interpretation they then try to translate their understanding to the Norwegians, who then interpret this information. This interaction must be

understood as a negotiation process where, in common, they are trying to understand the technological actants through a process of de-scriptions. But just as important, they are trying to understand each other's understanding of the technology. This makes this process even more complex because it includes an understanding of each other's socio-cultural background and experience. In chapter 11 I have showed that these are troublesome and complex issues to cope with. This emphasises the importance of understanding the learning processes as one which includes both the technical and the socio-cultural learning, as I have emphasised in chapter 12.

Technology transfer on basis of the translation model?

The last sections show that the way this technology transfer has been carried out, has to a large extent been similar to the translation model that I presented in chapter 6. The technology has been transferred from Raufoss to Montreal through processes between individuals, that I have discussed and found to be characterised by interpretations, translations and negotiations. These are, as I have argued, important factors in, and aspects of, the translation model. It has been an interactive process between Norwegians and Canadians, which may be seen as an example of the interactive innovation model, or at least a process characterised by interactive learning. At the same time it can also be mentioned as a critique to this that the Norwegians, as the innovators of the technology, had the opportunity to force this technology on the Canadians, as described in the critique of the diffusion model (chapter 6). Even though I don't find it possible to claim that this technology transfer has been carried out like the diffusion model argues. The process has been characterised by what Latour (1987) argues to be central aspects of the translation model.

13.3 Summing up the enrolment of the actors and the actants

In this chapter I have analysed how the different actors and actants have been enrolled into the new actor network Raufoss ASA had to establish in North

America. I have divided this into one sub-chapter with focus on the organisational enrolment and one sub-chapter with focus on the enrolment of the technical actants. Through this discussion it has become evident that these enrolment processes are related to each other. This is especially the case when analysing the enrolment of the technical actants, which through inscriptions, are tightly connected to the socio-cultural aspects. Enrolling the technical actants, including learning the technology, is also a complex socio-cultural process as described in my discussion of negotiations, translations and negotiations.

The technology has been too focused upon in the transfer process I have described. It has been right to focus technology at a very high degree, but at the same time it has to be understood that when technology is emphasised, it should be in a broad definition of the term. This means including the knowledge, skills and competence to a higher degree. The focus has in other words, been too technical, meaning that important issues have been neglected in the enrolment of the technological network. At the same time it is important to underline that the focus on the socio-cultural aspects increased after the hiring of the HR Manager, after which the situation greatly improved. This suggests that RACC as an organisation, experienced and learned through this transfer process. This shows that they were capable of adapting to the new situations that arose during the transfer process. In my opinion this indicates that they were capable of reflections in actions as Shön (1983) emphasises.

14 Place in the global economy

In chapter 1 I elaborated on the research question; to what degree is place and reciprocity important and prominent in this case of technology transfer. Place has been an important topic through this thesis and in this chapter I will highlight how place has been important in this transfer process. By focusing on place, the prominence of reciprocity also becomes evident. The prominence of reciprocity in the global economy has been one of this thesis' core questions.

Globalisation has as stated in chapter 3 been an enabler for technology transfer. At the same time technology transfer might be seen as an operational part of globalisation. By this I mean that a technology transfer as shown in this thesis where people from different places meet and experience and learn from the interaction with each other is globalisation in practice. These actions are shaping globalisation. So in this relation globalisation is both exogenous factor who makes technology transfer possible at the same time technology transfers like this is shaping and influencing what globalisation is. My main argument for this is that the decisions that are taken in such a technology transfer is affecting the way the transfer, and thus also the way globalisation, is carried out. These decisions are taken by individuals, as carriers of places, thus place is a prominent and important factor in technology transfer and shaping and influencing the globalisation processes. The importance and prominence of place will be emphasised through my main findings that is summed up in this chapter. The reciprocity in the global economy is essential part through this summing up.

Understanding place in a complementary way

Throughout this thesis I have presented different approaches to place. I have presented several in chapter 3, and in the analysis, place has been perceived in different ways. In a more or less normative way, I have developed an understanding of place based on seeing it as a social construction and as "passings that haunt us"(Thrift 1999:310). When we take the Raufoss

representatives' view of place into account, seeing place as a location or spot on the map as presented in chapter 11, this represents another and maybe a more everyday approach to place. The more comprehensive understanding of place as described above, is an understanding that is rooted in a professional understanding and discussed amongst academics. While the more everyday approach of seeing place simply as a location or "a spot on the map" represents a perspective that huge numbers of people share. In my perspective, these two understandings should be seen as complementary rather than in opposition to each other. The understanding with a basis in the academic discussions is a fruitful contribution to the common everyday understanding, at the same time seeing place as a location also implies a geographical delimitation that is meaningful for people. This shows the complementary aspects of these two approaches.

14.1 Place in a cultural perspective

As shown in chapter 11, when Raufoss considered culture as a potential challenge, they quite quickly concluded that this would not be a major issue. The reason being that they saw Norway and Canada to be quite similar. The argumentation was in many ways based on a quite physical conception of place, where they argued that Canada was very similar to Norway in terms of; similar climate, just a little bit warmer in summer and a little bit colder in winter, both countries had mountains and fjords and there were even tracks for cross-country skiing in Canada. And these considerations were then strengthened, through the interaction with the well-educated people from SGF (The Société Générale de Financement du Québec) and Invetissement Quebec that spoke English fluently, for example. So from a mixture of physical considerations of the place Montreal and Quebec and the experience with a limited number of the inhabitants of this place, they constructed an understanding of the places Raufoss (Norway) and Montreal (Canada) to be similar. But as the analysis in chapter 11 shows, these considerations proved to be a much too narrow analysis of the cultural issues at play in these two places. There were more substantial differences than expected.

The cultural differences

In the analysis in chapter 11, the differences in the attitudes concerning problem solution have been emphasised as one of the cultural differences. Where the Canadians are very eager to get the production line going, the Norwegians are more analytical in their approach to solve the problem. Based on Gertler (1997), I argue that the background for these differences can be traced to the different institutional structures between Canadian and European capital. This can be seen as an institutional heritage where the Canadian capital has been far shorter termed than European capital. This institutional heritage has lead to Canadian workers being more eager to keep the production line going. In opposition, the Norwegians are more concerned about getting the technology to function properly. This Norwegian practice can also be seen as an institutional heritage from the Raufoss society where the Raufoss's representatives have their background. The technology culture (Nilsen 1999, Dale and Nilsen 1999) has been a prominent cultural feature at Raufoss. And this I have also linked to the "*proud engineer*" tradition that Cookes (1994:93) has found prominent in German manufacturing.

The differences in problem solving can also be seen in relation to the differences in the focus on quality and production orientation. While the Norwegians are concerned about quality and spend quite a lot of time on ensuring that everything is working properly and the quality is as good as it should be, the Canadians feel frustrated because in this situation they do not get the job done as they wish to. The Canadians eagerness to earn their paycheck is one of the fundamental reasons for this eagerness. This must also be seen in relation to what I, inspired by Gertler (1997), have called an institutional heritage. I have argued that the more short term Canadian capital through history has contributed to a collective definition on what is seen as important on the shop floor, and has in this way been an important factor for the production-oriented approach of the Canadians. This orientation towards production has become a cognitive institution with normative aspects for the Canadians, and this is an institution in opposition to the institution that characterises the background of the Ex-pat team from Raufoss, namely the technology culture and the "quality above all" attitude.

Such basic attitudes

Another cultural difference that became evident through this study was the significant difference between the Norwegian collectivism and the Canadian individualism. In chapter 11 this has been referred to as *"such basic attitudes"* by those involved. One of the consequences of these basic attitudes is a totally different way of viewing the world. As referred to in chapter 11, it seems like the Canadians and the Norwegians have a totally different interpretation of what a meeting is. One way of interpreting the Canadians' understanding of a meeting might be; an arena where they could figure out the solution on their own and afterwards fix the problem, and then get credit for fixing the problem, individually. This is in complete opposition to the Norwegians' conception of a meeting, which can be interpreted as; an arena where the technology and the production line is the main focus and the objective is how the individuals can participate in finding a solution in common and in this way commonly participate in the improvement work. This illustration of the differences concerning individualism and collectivism is at some point put at the edge, but it is either way representative for the differences experienced between Norwegians and Canadians, experiences that were unexpected at first.

The cultural and institutional heritage these basic attitudes represents must be seen as important features and differences between the places Raufoss and Montreal. Those involved have referred to these differences as *"such basic attitudes"* and *"What has surprised me the most is ......that I discovered how incredible important it becomes what your mother and father have been teaching you during your growth."* This is experiences that illustrate that the actors in this process of transferring knowledge and technology are carriers and representatives of different social systems that are anchored in, and have been developed at, different places. The consequence is that they carry different social constructions and are haunt by different places. This adds a complex factor to the process of transferring the technology across the Atlantic.

Language

When studying how these cultural differences are expressed, one essential expression is language, both the orally spoken and also body language. These issues have been emphasised thoroughly in chapter 11. I have also presented language as a problematic issue, where Raufoss at the start of the transfer process did not recognise the language to be a problem. This changed, and it was decided that English should be the only spoken language at the plant. This decision was changed again when they discovered that some of the operators did not fully understand what was being communicated in English.

The language issue is a very interesting one in my view. This is because it has so many features that are important from a cultural view. At first we can view language as an expression of some more fundamental ideas and modes of thought, as shown in chapters 4 and 11. This illustrates Hannerz's (1992) conception of culture in a relevant way. A substantial proportion of the Canadians relate themselves to France and their French ancestors. This is a heritage they are very aware of and also proud of. When talking about the differences between Norwegians and Canadians, the Canadians emphasise that they are Latin blooded. This is, in my opinion, relating to both their biological background but also to a cultural heritage as well. Their conception and use of the word 'Latin blooded' must in my terms be viewed as both their biological background and what they have been socialised into. The result of their close connection to the French background and way of being is, as shown in chapter 11, expressed through language both orally and also by body language. Interesting in this perspective is to notice that the social distribution (Hannerz's third point, see chapter 4) of this phenomenon of French influence was far higher than expected by Raufoss at the initial stages of this process.

Some concluding remarks on culture and place

A conclusion that can be drawn out of this is that the Montreal area was far more influenced by the French and French history than expected. But there is also another important point to make in this connection. The Montreal area is, in addition to being under French cultural influence, also influenced in general by

North America. This is shown in the discussion on the individualism versus collectivism and also in the discussion on both different problem solving attitudes and production orientation versus quality orientation. In all these discussions the Canadians seem to be influenced by what I recognise to be a North American inspired way of thinking. This is related to the more short-term capital that I, in accordance with Gertler (1997), have addressed as Canadian capital, but on a general basis it seems reasonable to address this as North American capital. It can also be argued that the individual focus might be understood as a more general North American phenomenon. When knowledge about the "American dream" as an important myth or inspiration dominates in the USA, it is reasonable to take this into consideration as well. This turns the whole cultural discussion into an interesting topic concerning the creolization perspective that I introduced in chapter 4. In this perspective the plant and in particular, RACC becomes an arena for a creolization process. Here at least three main cultures or culturally inspired systems meet and operate towards the same goal, namely delivering suspension arms to General Motors. This arena then becomes an arena where the different cultures have to adapt to each other and learn, and in a common way define how to do things in accordance with the other cultural understandings present. The Norwegians are carriers of what can be understood as ideas and modes of thought representative for the place Raufoss, but also Norway in more general terms, and the Canadians are carriers of ideas and modes of thought representative for Montreal, which is influenced by ideas and modes of thought from its French ancestors as well as North America on a more general basis. The sum of these ideas and modes of thought are then expressed within the frames of the plant and the RACC organisation. Through interpretation, translation and negotiations the expression of these ideas and modes of thought are adapted and related to each other. The process of adapting and relating these different ideas to each other should be understood as a creolization process where new ideas and modes of thought are established on the basis of the different expressions expressed in this context.

14.2 Place in the perspective of enrolling the network

In the analysis presented in chapter 13, I have shown that establishing a new network for the production plant in Montreal has been an operation with many facets. The process has ranged from the first accidental contact with the supplier that advised Raufoss ASA of Montreal, to the more complex processes of hiring and training competent personnel for operating the advanced technology on the shop floor. In this spectrum of various tasks, understanding place is a central issue. In the following I will argue for a perspective taking place into these considerations and addressing the understanding of place as a central element in comprehending the establishment of production sites at new spots in the global economy.

Knowing the local markets

Raufoss ASA's decision of entering a partnership and cooperation with SGF and Invetissement Quebec was based on the experience that a local partner could provide them with important local knowledge. This local knowledge was both of general and more specific character. On a general basis this was knowledge of the local legal/law system, and more specifically about knowledge of local firms to cooperate with and local suppliers. In addition to these Canadian governmental organisations, Raufoss ASA also hired a local consultancy firm to support them in their hiring of employees. The knowledge they provided was about where to search for different competences, for example, via which newspaper to search for an operator and via which newspaper to search for an engineer. This knowledge of the local workforce market eased the workload for Raufoss ASA, and most certainly provided Raufoss ASA with the successful hiring of the first experts in their establishment of the RACC organisation.

Strategic considerations

A perspective that was evident from the start of the transfer of the technology and knowledge from Raufoss to Montreal was that The Top Management 2 believed that the process had to be under the control of Raufoss ASA. This

meant that personnel with thorough knowledge of the technology should be in control of the process, in other words, that people with their basis in the Raufoss society and industrial area should be in control. One result of this was their strategic considerations referred to in chapter 13, about how large a share the Canadian partners should be allowed to have in RACC. This can also be related to the analysis carried out in chapter 12 where I argue that Raufoss ASA at first had a one- dimensional perspective on learning, as well as the strategic considerations mentioned here.

In the relation between the representatives from Raufoss and the representatives from Montreal, in this case the SGF and Investissement Quebec, there was an interesting situation concerning what should have the main focus. These representatives of Montreal can, as mentioned in chapter 13, be seen as organisations that have their main activity in place marketing. This is in opposition to the representatives of Raufoss who see their main activity as industrial development. So when Raufoss ASA stressed that they should be in control of the transfer process, the argument is that they will ensure the industrial development in the project. This is of course important in the initial phases of the project, and especially before the final localisation decision is taken. To succeed in an industrial development project such as this, it seems important to have full focus on the industrial needs. This means that Raufoss ASA's decision of having full control must be regarded as important. At the same time I find it important to distinguish between having full control in relation to the partners on an aggregate level, and having full control concerning the employees at the RACC organisation. In relation to the RACC organisation, the processes have in a higher degree, been characterised by involvement and cooperation, which in my opinion have been essential for achieving the results they have. So, on a more operative level the strategic considerations have been more characterised by integration and involvement, despite efforts at an early stage on signalising that the technology was developed at Raufoss and that the Canadians had to remember this and adapt to the technology. In practice this became more influenced by what can be characterised as interactive and reciprocal learning. I will in the following reflect further on how the relationship between the parent organisation and the RACC organisation has worked out.

Establishing RACC and the cooperation with Raufoss ASA

As stated above, the enrolment of the first local employees was done in cooperation with local companies. But as I have concluded in the analysis in chapter 13, establishing the Canadian organisation was not done without problems of course. After a while language became problematic and the first engineer that was hired had to resign. But in general the RACC organisation became an organisation that delivered the results that the customer, GM and the owner, Raufoss were very pleased with.[34]

Additionally, the cooperation between RACC and Raufoss ASA is an interesting issue. At first the Global Organisation 1 had a function as a coordinating link between these two organisations. But in early fall of 2002 and until they reorganised this organisational structure again, as shown in chapter 9, Global Organisation 1 was shut down. The responsibility for coordinating the activities between these two sister organisations was now delegated to the plant Management at RACC and RCT. The result was that the coordinating activities were more or less neglected. In such a start-up phase, as both these two organisations were at that time, with a complex technology and a tight schedule for deliveries, the plant management's focus is drawn towards the daily challenges and the concrete objectives, such as getting machine X to function properly. The technical trap snaps shut again. The more strategic and coordinating activities lose their focus and are therefore less prioritised. This is of course also a result of the long distance between the organisations both physically and in time. There are only a couple of hours during the working day that the plant management have common working hours and as they are very busy, it might be hard to be coordinated. As a result of this situation, a new reorganisation was carried out during the spring of 2003. Now a new global organisation was established as Raufoss ASA saw the need for a coordinating link between these two organisations and places. The Global Organisation 2 had the function as a pipeline between Raufoss and Montreal. This was an important

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[34] During the PAPP and R@R testing, RACC performed very well, they were one of the two suppliers for GM that scored full score during these tests. These tests were done with representatives from GM present.

decision for the further development of both the plant in Montreal and the cooperation between RACC and Raufoss ASA.

Enrolling the actor network, what about place?

There is need for an increased focus on the enrolment of the socio-cultural factors. The enrolment of the SGF and IQ as Canadian partners was important in this regard, but this should have been carried out with a more explicit and analytical focus on the socio-cultural issues. From my perspective there is a lack of systematical approach to these issues. A more systematic approach would have increased the value of the time spent and the resources used on this cooperation. The result of a non-systematic approach is that the picture you get of the place is fragmented and not grounded in a professional way.

To expect that two sister organisations will cooperate on their own is at least naive. You need to organise the activities in a way that encourages those involved to cooperate. As shown in this thesis, it has been a demanding task to get the individuals from these two different places to cooperate with each other without too much friction. Therefore it seems important that somebody has an explicit responsibility to push this cooperation forward. In that way a link needs to be built between these two organisations and places, that ensures the interaction necessary for the learning and interaction process is sufficient. What seems to happen if you do not have a stakeholder in this process, is that everyday activity takes too much attention, which leads to poor focus on longer term learning activities. The technical trap snaps shut again, and the importance of getting to know the individuals that are carriers of another place is likely to be neglected.

14.3 Places in the reciprocal learning process

What is expected in one place is not automatically what is expected in the other place. This is due to life-long learning that differs between places and is related to how and where you were brought up during your childhood and upbringing.

As stated in chapter 12 the learning carried out in this transfer project was of both explicit and tacit knowledge. The tacit dimensions have mostly been carried out by working together with the experts from Raufoss ASA. This has been done both in Canada and in Norway. The learning carried through at Raufoss, during the time the Canadians spent there, seems to be of high importance, because this delivered the Canadians the opportunity to utilise the whole network of resources at Raufoss in their learning process. It was important that the Canadians spent this learning process at Raufoss. This is also where the classes was arranged, that was devoted to the explicit knowledge and learning. When Raufoss Automotive Components Canada (RACC) was established and the Ex pat team was in place in Canada the learning processes of course continued there.

During this technology transfer project the perception of learning has changed from a one dimensional process to a reciprocal understanding of learning. This became evident for those involved when they experienced that they learned from each other and together with each other. This was in opposition to what their focus had been at first. The focus was then technologically oriented and the knowledge of this technology was in Raufoss ASA's possession. Gradually their perspectives regarding learning changed as they experienced their different cultural background and experienced the need for understanding each others ways of thinking and behaving. This helped turning the perspective on learning from a one dimensional technical issue to a reciprocal issue with focus on the socio-cultural elements and understanding each others background in example place.

What is rewarded is important for what is focused in the learning process and how the learning process is organised. Individual actions seem to be more rewarded by the Canadians than the Norwegians appreciated. This was creating a rather tense situation based on fundamental differences in the understanding of what is meaningful activity and action. The confusion of what was being expressed and the reasons why the "others" acted so differently created a lot of frustration. In this situation the concrete technical challenges were put forward

and the socio-cultural issues not prioritised as much as they should. The result was that they were not able to create good enough learning processes for both the technical and the socio-cultural training. In the following I will present a proposal on how this could have been carried out.

What could be done differently?

Based on the experiences from the way learning was perceived and the learning process that lead to a change in this perception I have ended up with a proposal to what could have been done in a different way to help the learning process become more efficient in a technology transfer like this.

The technical training

The technical training should be organised in a way where the experts give lectures at a very early starting point. These classes should only be for the Canadian operators, so the teaching can be adapted to the same level for everyone. This would most likely make it more motivatory as well. This should happen before the operators have visited the shop floor, but after they have been through the visualisation project. The visualisation project would then function as a teaser but also it will help the absorption of all the new information given to them by the lecturers. The lectures must be strictly organised and structurally presented. Their aim is to give the operators as much formal and explicit knowledge as possible, and as be effective as possible. This is supposed to give them a basic understanding of what this technology is about. It should deliver notions and concepts related to what they would later experience on the shop floor. This preparation, combined with the visualisation programme, would make the operators more prepared and increase their capability to qualitatively absorb the information they would get from the moment they enter the shop floor. With sufficient background and basic knowledge about the production process and the characteristics of aluminium, they would be ready to start learning by doing. After gaining experience on the shop floor for a few weeks, they would be ready for more theoretical input in classes. This should then continue during their six months training in Norway. Once a month classes should be arranged to ensure the theoretical understanding of the operators.

However, it must be said a solution like this would most likely meet some resistance from the operators, because they are very hands-on and practical by nature. Theoretical approaches should be kept to a minimum in their view. But in this situation, my opinion is that this is so important for the success of the process that the management has to ensure the fulfilment of this interaction between theoretical and practical teaching.

The interaction between the technical and the practical is important because so much of this technical knowledge is tightly related to the social characteristics of Raufoss. This is indeed tacit knowledge that is not highly available, and a learning by doing process where they are working with experienced operators and the technology is necessary. The theoretical input has its main purpose to increase the quality of the practical lessons, and also to create an arena for common reflections of how these technical solutions differ from the experiences they have from previous work.

The socio-cultural learning process

Like the technical learning process, the socio-cultural learning has to be divided into theoretical and practical training. But there are some important differences in the organisation of the teaching. The classes have to consist of the Canadians and the Norwegian Ex-pat Team, and also the Norwegians who would be working most closely with the Canadians from their base in Norway. The argument for this international composition is that the socio-cultural understanding has to be learnt and constructed in common and together with those colleagues the workers are supposed to understand and construct meaning with. In an early phase of this process consultant experts should be hired to give an overview of the Norwegian and Canadian culture and business culture implications that have been experienced earlier. This is to prepare the participants for what might come.

By organising the socio-cultural training this way, all those involved would have started at a higher and more common knowledge level when they began to interact with each other on the shop floor. This would have helped them

understand each other's reaction pattern much better and greatly eased the frustration. The implementation of the technical equipment would then have been a much smother process.

14.4 Concluding remarks

The essence of this thesis has been the process where people from different places meet and the reciprocity this situation is an arena for. The mutual exchange of knowledge, skills and ways of thinking over a whole range of factors stretching from pure technical calculations to a more or less common cultural experience are vital elements of the technology transfer process. This is of course related to the changes the world economy has experienced for at least the last thirty years. The knowledge of the recent changes in the global economy, and also the relation to history that Giddens (1990) argues for in his definition of modernity, is essential for the understanding of place I try to argue for in this thesis. The main argument for this approach is that this kind of technology transfer is more or less the operational result of these societal changes. At the same time this is one of the great challenges the global companies are facing, a challenge that is about how to utilise the possibilities that the global economy represent. My experience from working with global Norwegian based businesses is that there is substantial potential for improvement according to this understanding. The focus on technical and to-the-point-oriented cases and everyday tasks is often too prominent without enough room for constructing a broader common understanding that the technical challenges and understanding must rest upon. At the same time it must be mentioned that from my perspective, there is a positive change in the right direction going on. On the basis of working industrial and business oriented since I started my studies in 1997, I feel that I can dare to point at such a change of direction. The reason why this is important is to contribute to businesses growth, of course. But far more importantly, I think that increased knowledge on these issues can contribute to ease the work for a number of people around the world that are struggling with such challenges in their everyday work. Without the knowledge of what is going on, in the interaction between

individuals as carriers of place in projects such as this, such challenges remind me of fighting with moveable shadows, creating a lot of frustration and stress. Increased knowledge of these issues will ease the job much more effectively for those working in the operational consequences of an intensified global economy.

Both business and academia have a long way to go before this knowledge is sufficient to support these processes fully. There are a lot of collaboration skills and ways of thinking to be learned in both academia and business. This thesis is an attempt to create new knowledge on this subject with a scientific approach. Even though the literature within this field is growing, I think there is a need for further investigation on these issues to create sufficient knowledge about this on broader terms. I think this is especially important on the operational consequences of globalisation. To do so, academics and industry have to work closely together to be able to work out relevant cases and knowledge on these issues.

Conclusion

In this thesis I have delivered arguments for the importance of place and the prominence of reciprocity in the global economy. I have showed that the cultural and institutional heritage at different places involved in such a technology transfer is considerable affecting the process at several levels. The learning processes underline the reciprocity of this process. At first learning was assumed to be what can be called a one-dimensional character, but as those involved got more experience during the project, this changed gradually towards what can be characterised as reciprocal or interactive learning. I have found that those involved perceived technology in a broad way and included knowledge, skills and attitudes when they defined it. But when enrolling the network at the plant in Montreal, they were not able to follow-up their intentions. They fell into the technical trap and focused too much on the technical actants. This could be explained through recognising that they are trained to handle technical equipment and not the socio-cultural issues. A more holistic approach and

background to these challenges is therefore preferable, to meet the reciprocal challenges that the global economy requires.

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