Harri Hakala

ARE PROFESSIONS STILL NEEDED IN INDUSTRIAL RESEARCH AND DEVELOPMENT WORK?

University of Tampere
International School of Social Sciences
Department of Sociology and Social Psychology
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ABSTRACT

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This thesis is an ethnographic study that aims at understanding the role of professions in the contemporary work life as it appears in the Research and Development (R&D) departments of industrial companies in Finland. The focus is on companies that operate globally and sell material products, and in addition maybe also services. The material used in the research consists of 29 interviews, field notes based on 2 years of part time work in an R&D department, seminar presentations related to professions under research as well as written material, like trade magazines and web-pages.

The first part of the thesis describes the R&D department as a workplace and explains the theoretical orientation of the thesis. It is based on a moderate constructionist view on social phenomena. The theoretical frame used in this thesis is simply the notion of community and communality and the nature of their changes. 'Real' communities where the whole system of meanings is shared are distinguished from 'imagined' communities that create communality as based on only partially shared system of meanings. In imagined communities, the system of meanings is often a product of mediated interaction instead of face-to-face discussions. Good examples are printed media and the Internet.

The second part of the research compares three professions that are common in the R&D – environment, namely engineers, economists and industrial designers. The goal is to find the most common features in each of the professions relevant for the research, general enough to allow the ignorance of differences on an individual or even a faculty level, but still so distinct that they can be used for distinguishing between professions. A suitable level of analysis was found by

concentrating on professions that are represented by trade unions and universities. The logic behind this is the idea that socialization in certain professions takes place during education and it is maintained by trade unions. Therefore, those institutions are a good source for finding the characteristics of each profession.

The third part of the research analyses daily work in R&D – departments and the roles professions play in them today. The first finding is that there are three types of organizations in R&D that all give professionalism a different role. A *specialist organization* sees professionalism as the key element in defining the community. In such an organization, people with a similar professional education work together, often in common laboratories or other facilities that create the physical environment. In a *project organization*, work is organized around a certain task and the work group consists of all professions needed for completing the task. The profession is the reason for belonging to the group and has a distinguishing role regardless of the fact that the group itself is multiprofessional. In a *transprofessional organization*, the boundaries of the professions are blurred and not deliberately maintained. The group is oriented towards creative results and flexibility, with regards to professional or cultural boundaries, is appreciated.

The conclusion of this thesis is that specialist organizations are useful when aiming at superior efficiency or cutting edge scientific results. When R&D comes close to customers, time schedules become more important and project work offers better tools for developing commercial products in a controlled fashion. In that sense, the ability to work in projects is an add-on to professional skills. When aiming at radical innovations and shaping the market instead of just adapting to it, the transprofessional approach is required. Transprofessional skills can also be seen as an add-on to other professional skills, including ability to work in projects.

As a recommendation for the skill base in the early phases of R&D, three competence teams are recommended. The first would concentrate on understanding the world and requirements of the customers and users, the second would aim at understanding the technology and strengths of the company and the third group would be aware of market issues, like market size, cost structures, price levels and so forth.

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1. INTRODUCTION

1.1 Companies have turned transnational

”At least in our company we work more and more in teams and there must be freedom in the teams. So that you can work from home or anywhere, if only you respect other team members and dead-lines…” This quote from my data describes the recent changes in many workplaces well. My home base has been an R&D department of a middle-sized global company. There I have witnessed continuous change in work practises and organizations, as most of us have. Although the changes are local, the reasons for them are more general. The process of globalization is often mentioned in this context.

Globalization has been changing the world everywhere for the last thirty years. This development accelerated after the collapse of the communist block some fifteen years ago. Since then, it has resulted in a continuously expanding movement of capital, goods and people across borders. Large companies have stretched their operations around the globe and when doing so, they have applied new transnational strategies. One of the aspects in such transnational strategies is that the products of the companies must be localized. The localization of products stems from the fact that companies have recognized varying needs and tastes of their customers, who always are located in some territory and cultural context. A good example is Nokia in Finland. Cell phones used in villages of developing countries require entirely different features than phones used in the western business life. Nokia, therefore, has a large selection of variants of its products for different users. Another example is Coca Cola that has a large number of mixtures for different parts of the world. This is the difference from ‘global companies’ that aim only at economy of scale through one-size-fits-all-products. Another important aspect in transnational strategies in mature markets is that products are deliberately made to be more and more 'emotional'. That means that they do not only fulfill some material needs, but also contain a lot of symbolic value and advertising of one’s life style. Of course, differentiation by using an attractive appearance is not a new phenomenon, but what is new is that companies must manage several local tastes at the same time and under global management. Also new is that companies are not happy with only adjusting their products to local tastes but they try to control them, also in other areas than in the fashion business.

Lowering trade barriers and developing IC (Information and Communication) technologies have enabled free placement of company operations. Division of work is aimed at achieving minimum total costs. Therefore, work is divided into parts that can be done in the most appropriate place in the world. Relevant issues are costs of manufacturing and logistics as well as proximity of the market. Quite often, manufacturing which includes a lot of assembly work takes place in Asia where cost of labor is lower than in the West. Packing of goods for consumers on the other hand can take place in Eastern Europe because it is near to the European market. Call centers for customer service could be located in India or Algeria who have developed infrastructure for especially that kind of service. Consequent developments in Western labor markets have been continuous restructuring of old organizations, moving into network-based management of small companies, expanding networks from private companies to public actors such as universities and the like. These changes have an impact on all employee groups in companies and it can be expected that as the work environments change, also the roles and tasks of individual workers change. In this, it is especially important to pay attention to interaction and mutual understanding across traditional occupational borders.

Traditionally, industrial research and development (R&D) has been centralized, because it has been easier to run development projects and exchange information when the whole project group has been in the same location. However, it is not possible to only perform customer and user research centrally if the market is global, because native researchers are needed to carry out interviews and observation. On the other hand, knowledge that is related to manufacturing should be close to the factories. It has also been important to be able to establish partnerships and joint research projects with both public research institutes and specialized companies that have knowledge about a certain narrow area. Therefore, applying a transnational strategy has become mandatory and new structures are needed. It has become necessary to create networks across national, cultural, organizational and occupational borders, because even large companies cannot master all the necessary skills alone. Working in such networks requires the employees' willingness to travel and even to move from country to country. On the other hand, there is still a need to have more concentrated locations where people can live and work together with the possibilities to change jobs and have further education. It is also important that people meet each other and get novel ideas from the interaction. This has resulted in clustered areas, Centers of Excellence, where several small and large companies, universities and other public research

organizations can work in cooperation. A familiar example of such a center is Silicon Valley in the USA. Many governments have tried to duplicate its success in their own countries. In Finland, it has become especially important to aim at competence in R&D as the economy is increasingly dependent on export of high-tech products. Finland's traditional export industry has been focused on investment goods or wood products. Nokia's success was the first global scale conquest in high-volume consumer products where emotional design is important. Therefore, it is a challenge for Finnish companies to learn how to utilize symbolic values in their products. This requires the cooperation of several disciplines.

At company level, organizations have usually changed from being functional or competence-oriented to project or process organization. When teams or departments earlier contained only engineers, industrial designers or market analysts, teams now are organized around certain tasks like development projects. The most obvious changes in work practices have been more flexible borders of professions, utilization of virtual teams, flexible working hours, corporate-level partnering, inviting open innovation, frequent changes in organization structures, the tendency to subcontract parts of the work that was previously done within the same company and the like. All of these have increased interactions across traditional borders. The most important occupational groups involved in the R&D of the export industry are engineers, economists and industrial designers. Traditionally, engineers and economists have had many common issues in factories. Recently, also industrial designers have been included in the core group. Design has been supported in public policy, with public funds having been especially granted for utilizing industrial design in Finland. A good example is the founding of the IDBM-program (International Design Business Management) in 1995. In that program, University of Arts and Industrial Design, Helsinki University of Technology and Helsinki School of Economy and Business Administration provide multidisciplinary study programs. Many companies have also systematically hired foreigners in their R&D to import new skills. This multioccupational and multicultural cooperation is still quite new in Finland and requires more learning and research in order to succeed in global markets.

1.2 Earlier research

When looking into the research done earlier in the field of professions, the general remark is that a lot of literature is available on professions and only a few examples are presented in the following paragraphs.

There is a lot of research done on the work practices of engineers as a profession. Ravi Seethamraju (2004) presents a general and historical outlook on the roles of engineers in society, starting from the notion that the word 'engineering' is about 2000 years old. Karl-Erik Michelsen (1999) presents a similar historical overview on Finnish engineering, though not dating back to ancient times. In addition, engineering work in high-tech industry has been analyzed by Gideon Kunda (1992). He presents a lot of features of an engineering culture from a sociological perspective. An interesting ethnographic example is Thomas Porcello's (2004) analysis of discursive practices of sound recording engineers. In this article, the socialization of a certain specific group has been analyzed, as well as the impact of recent changes in industry and technology. However, this study is not interdisciplinary, it compares generational differences within the profession, rather than interdisciplinary implications.

For her part, Alison Bain (2005) has studied the identity of artists. Although this study is not clearly relevant for industrial design, it does illustrate the complicated relation between industrial designers and artists, because it is difficult to deny that visual literacy is in the core of both professions' core competences. In turn, Anna Valtonen (2005a) has found six roles of the Finnish industrial designer during the last six decades. She has concentrated on the Finnish environment. While Valtonen has published a lot of articles on the identity of industrial designers, she has not excessively compared it with other professions. In her recent doctorate thesis (2007) she also comments on engineers' and architect's relation to industrial designers. As a whole, Valtonen's thesis explores the same landscape as mine, although from a different perspective and with emphasis on different issues.

With regard to economists, a historical overview on the education of Finnish economists can be found in Karl-Erik Michelsen's (2001) work. Although it presents the history of economists mainly from an educational perspective, it also offers an insight on the life of the profession in

the workplaces. Earlier, Asaf Darr (2000) carried out an ethnographic study on sales and R&D-engineers that sheds light on the social frameworks that these two groups used in creating distinctions between them. Although the research does not separate workers based on their occupational background, it does clearly show many of the aspects that are relevant in the economical side of R&D-work by using an interpretive research approach.

Multidisciplinary work has especially been studied in public services, like in health care and education. Joanna Latimer has done an interesting analysis (2004) on such work in hospitals. It is relevant especially from the methodological point of view because it uses discourse analysis, frame analysis and use of cultural materials. It illustrates the totality of social practices and utilization of material objects in shaping the relations in a workplace. Multiprofessionality, interprofessionality and transprofessionality have been discussed also in the context of the education development (Powell – Pickard 2005).

Several comparative studies have been done about income level and the perceived prestige of professions. However, not many include industrial designers as an occupation, perhaps because it is a rather new, small and not well known group. Nevertheless, Whitfield and Smith have done such a survey (2004) and according to them, designers were located in the intermediate group of all professions. Their research is interesting because it separates industrial designers, furniture designers, graphic designers, fashion designers and artists. The most interesting result from the perspective of this thesis is that these professions were strongly clustered, excluding the artist. This may indicate that design professions are not distinguished from each other but they are separated from artists. Unfortunately, there were no engineers or economists among the occupations researched. Another comparative study has been done by Kim Weeden (2002). He studied the effect of occupational closures in general terms but only at an aggregate level, including no education-specific data in his research.

Kati Knopp (2004) and Eija Leiviskä (2001) have researched cooperation of the students of the same three professions as will be studied in this thesis. However, they were interested in collaborative learning. Their research supports the idea of the importance of this area, but does not touch work practices in actual workplaces and they do not aim at understanding the changes in workplaces, caused by general societal developments. The work in question was done under Faculty of Behavioral Sciences and aims at improving multidisciplinary education. Both reports

are very useful for comparing findings in my research, especially since Leiviskä has used student's personal experiences and categories in a way similar to which I intend.

1.3 The scope of the current research

It seems clear that although a lot of work has been done on professions in general, most of such research is not comparative with regards to professional identities and it does not illustrate multidisciplinary practices in workplaces of industrial R&D. Furthermore, most of the comparative research done between professions concentrates on differences in salaries and social status instead of daily practices. Although there is also a certain amount of research, which would be methodologically interesting and which focuses on interdisciplinary work, the professions researched are not relevant for the Finnish technology industry as the research has been done in the health care industry and in education. The research done on relevant professions has been done from an educational perspective, not in actual workplaces. Therefore, there is a clear need for further sociological research in this very specialized, but also very important area of research and development in the Finnish export industry.

Many of the changes described above have been connected with modernity and post-modernism. Arjun Appadurai, who is one of the most prominent authors in analyzing today's modernity, claims that this modernity is practical (Appadurai 1996, p. 10). He also claims that modern identities are not necessarily based on being a member of a large group but appear in small-scale practices. Globalization does not mean that everything becomes similar, but there is a possibility of local variation. "Global facts take local form", Appadurai says (1996, p. 18). Agreeing with Appadurai, the method of this thesis is to look at how recent changes emerge in the everyday practices of industrial R&D, in the expectations of the students in these fields and in the communication of the trade associations of the selected three professions.

Today’s organizations share many features of multicultural societies in general. Among ethnic groups, there are various strategies of acculturation, such as segregation, assimilation and integration. Migrants tend to search for neighbors of their own kind. It is useful, therefore, to analyze phenomena among professions by starting from more general frameworks. Like many other authors, Appadurai (1996) has challenged the role of traditional institutions, like nation

states. When occupational groups have to work together, they are forced out of their comfort zones where they can be sure that their colleagues share their language and values, exactly like citizens of different nations or members of ethnic groups in today's world. This is a fruitful field for a sociological research. One central aspect of this research is the analysis of how certain groups in R&D have utilized the winds of change and how different strategies of these groups emerge.

In this, the main concerns are how various groups in R&D are adapting to the changes in environment in order to survive and how these changes have affected the everyday practices of technology companies. New transnational work practices have placed various professional groups in front of new requirements when new networks and communities have been established. It has become necessary to deal with diversity in workplaces and that calls for interactional abilities and adaptivity. More languages and jargons are surrounding employees in a transnational company. Is it so that there are differences between groups based on education, different abilities, so that some groups have an advantage? Do professional identities help or restrict adaptation? Does it make sense to treat professional backgrounds as marking borders at all, or is it necessary to find new indicators? What is the influence of continuously changing organizations and colleagues?

In this research, I will examine the impact of the changes in the surrounding society that have an impact on workplace practices, how comfort zones of employees have changed and what distinctions are valid for the individuals at workplaces when they define the group to which they belong. I will argue that like the roles of nation states, the roles of professions have changed, although they have not disappeared. In the end, I will speak about transprofessionalism in the same sense than transnationalism is used. The difference between transnationalism and multinationalism is that in transnationalism, roles and borders of nations are blurred and negotiable, whereas multinationalism conveys the idea of recognized and distinguished national identities. In a similar way, multiprofessional work groups consist of individuals with clear professional identities, whereas in transprofessional groups those identities are blurred and negotiable.

The discussion about transprofessional organizations in the private sector is rather new area and represents the most important contribution of my thesis. Its existence in industry is based on empirical data and importance of it is verified by own experience.

1.4 The structure of the thesis

This thesis has been divided into 6 chapters, of which this introductory chapter is the first.

The second chapter presents the landscape of the research in terms of R&D as a work place and the underlying paradigms used in this thesis. It also delineates the research interest that is a step towards the research question. The work can be called an ethnographic or cultural study that uses various kinds of data and an interpretive approach in the analysis. The second chapter also introduces the research theory that is in fact simple definition of some central concepts. This enables more accurate formulation of the research question. The concepts are communality as a continuum between 'real' and 'imagined' communities and the societal changes in postmodern time, when notion on homogenous culture has proved to be useless. Of course, these two are interrelated and the prominent authors used in this area are Arjun Appadurai, Anthony Cohen, Benedict Anderson and Richard Sennet.

The third chapter discusses professions as communities and introduces three examples that are important for the thesis; engineers, economists and designers. It is based on data from web pages of three professional associations and schools and interviews of students and teachers in those professions. As the professions are seen as communities, the chapter attempts to explore the nature of communality in these professions, to describe what kind of communities they are, to find what is shared within them and how do they distinguish from other professions. That analysis is needed in order to see the role of professions in the work places later on.

The fourth chapter concentrates on analyzing empirical material about the view of working professionals on their work practices, especially asking about recent changes, trends, problems and opportunities provided by multidisciplinary work. This chapter introduces three different kinds of communities that can be found in work places as well as their differences and similarities. These communities are distinguished by their organization principle. The first is

based on special skills and is therefore called a specialist community. The second is based on certain task and called a project organization. The third community takes care of a certain creative process and is called a transprofessional community. The role and nature of professionality varies between each community type.

The fifth chapter discusses the findings of previous chapters and attempts to answer the overriding research question. The tentative answer is that the professions are comparable to nation states, ethnic groups, families or other old institutions. They still have an important role, but their role has changed and most probably will change more in the future. The three types of found organizations also have their best application area and that will be suggested. A new way to find the right competences for teams will be introduced as well as alternative treatment of the same research area.

The sixth chapter summarizes the work by rephrasing the storyline of this research. That is, how and why professions are communities, what the developments are and what can be said about the usefulness of the concept of a profession in R&D. Of course, the analysis of professions is only valid within the environment researched, but it is likely that similar developments are going on in other segments of professional life.

2. THE LANDSCAPE OF THE RESEARCH

2.1 R&D as an organization and a work place

"Why can't you make such a simple change?" wondered a middle-aged woman, who had asked for a flowerpot of a special length. It was one of those long, box-like ones used in balconies and the woman just needed a couple of them, few centimeters longer than usual, in order to cover her whole balcony. She could not imagine that the mould for a flowerpot like this costs about 100000€ and she was surely not willing to pay that much for a flowerpot. Like her, most people buy products without knowing much about their production or design, it is enough that they just do their job. The production of goods is part of the modern rationality that ensures that 'the tram comes on time'. We do not need to know all the details of the organizations that enable the comforts of everyday life. As my thesis explores exactly product design, it is necessary to delineate this environment, for the reader to be able to understand the context.

R&D as a function has developed with industrialization and mass production. In order to have product development, a 'product' must exist. Before industrialism, manufactured items were unique, made by blacksmiths or some other craftsmen who developed the product and its manufacturing methods themselves. Mass production and factories were not a possibility until it became technically feasible to implement idea of interchangeable parts. At that stage, development of both products and manufacturing methods were separated from the productive work itself. These became the task of Research and Development (R&D) departments in factories.

The first R&D laboratory was established in 1867 by a German chemical manufacturer BASF. Another important laboratory was Thomas Edison's laboratory in the USA that was founded in 1876. Other big manufacturers like GE, Kodak and Bell Telephone followed the model of a devoted R&D laboratory and by 1945 there were about 2000 such laboratories in the USA and Europe. Their work was basically systematic improvement of manufacturing methods and application of scientific research to industrial use. The primus motor was the development of science (or the supply side, to refer to economic terms) and the laboratories worked in this field quite independently. Miller and Morris (1998, p.14) call this phase the 1st generation R&D.

The next step in R&D took place when factories became more interested in the demand side. That means that companies became more systematic when deciding the features of products in advance and thought more about customer needs. Subsequently, project based work methods were introduced, because companies did not just want to wait their inventors in the laboratories inventing something sellable. This stage took place when the scarcity of goods caused by World War II had been relieved and there was enough supply of products to fulfill the immediate needs of the consumers. Then real competition entered to the market as well. The role of the marketing function increased at the same time. Miller and Morris call that 2nd generation R&D (1998, p 14).

Later on, companies grew larger, technology became more complicated and investments required for developing new products grew as well. Therefore, managing the risks by carefully selecting the products to be developed was more important. It was understood that wrong selection of R&D projects might make the company fail and therefore, R&D was managed with project portfolios. The goal was to find a viable balance with high-risk, high reward projects and low-risk, low reward products. Business understanding and strategic planning then became important. However, R&D was still based on existing and explicit customer needs that were found by market research. This phase calls the 3rd generation R&D (Miller and Morris 1998, p.15).

The development has continued and the 4th generation R&D is currently gaining foothold. The stakes needed for R&D are continuously growing and technology is developing with increasing pace. This makes forecasting the coming and latent needs of buyers as well as screening for the emerging technologies necessary. Wrong guesses might cause major failures of companies and enforced turnarounds, like IBM's experience with PCs proves well. In R&D terms, this means more emphasis on understanding the life and needs of customers in a real context, as well as forecasting the impact of the emerging technologies. That may increase the number of possible solutions in products, make their manufacturing cheaper or change customer's requirements and wishes. At the same time, it has been understood that from time to time there is a need for major changes in the markets, in addition to continuous improvements. If you are a horseman, what do you do when the cars come? If you are selling CDs, what do you do when music can be downloaded from the Internet? If you are a traveling agency, what do you do when plane tickets can be bought online? Global branding is another phenomenon that is spreading into new fields.

It aims at selling whole life styles instead of just products. Advertising has turned to product placement and is turning cultural events into sales promotions.

What is a new development is that the changes may have such a fundamental impact on a company that a new product line may require an entirely new set of skills, including manufacturing, selling and marketing. Today, the buzzword related to R&D is innovation. Instead of R&D as a separate function or department, companies have an 'innovation management' process that aims at maintaining the whole company ready for a new business logic.

All companies have to have some way of ensuring that they always have competitive products on the market. Sometimes, the responsibility for this has been given to a department or a function called 'business development'. This is the case especially when a company delivers mainly non-material products like services. If a company does have material products, it is common to have a separate department, usually called 'Research and Development'. 'Research' usually refers to the work that is so far from the final deliverables that it is not motivated by any specific product. Research contains market studies, technical feasibility studies and so forth. 'Development' projects, on their part, aim at specified products. This is the common practice used to separate research and development in industrial companies: work is called research if there is no decision for completing certain product development projects and launching them to the market. Research, on the other hand, contains all the work that is needed for making such a decision. Sometimes, research is called the 'front end' of the R&D and the development is called the 'implementation'.

In some big companies, research and development have been separated, so that the company has a common research laboratory and development projects are done in factories, in different locations and by different people. It is also increasingly common to subcontract both research and development projects or parts of them. So, there are many forms of R&D work. In order to achieve more focus in my research, I will narrow down my field. I will concentrate on the Finnish companies operating in technology industries. This means that they have some material products but in addition they may offer also services.

A typical company in technology industries in Finland has a separate R&D department with

40…400 employees. In addition to R&D, other typical organizational units are marketing, manufacturing, after sales or service and administration that includes financial control, IT, human resources management and so forth.

Work tasks in an R&D department are usually organized in projects and the totality of projects is managed as a project portfolio. In other respects, the details of the organizations vary a lot, and this is one of the subjects of this thesis. In some companies, the R&D department is arranged according to competencies, so that there are separated teams or departments for software development, mechanical engineering and so forth. Often, the division is or has been based on physical facilities needed for certain tasks. Therefore, there are devoted laboratories where research and development is done. Engineers specialized in software need a certain set of workstations and related literature with the testing equipment. Machine building engineers work near the manufacturing equipment, lathes and drills, so that it is easy to walk in to the factory with drawings. Electronics engineers need their own premises with the possibility to test electronic circuits in a safe environment. However, this separation has lost part of its relevance with increased computer modeling and virtual prototyping. An R&D department today can be like any office with just a lot of computers. Still, in some point the design must meet the reality and physical pieces must be tested in a laboratory or in a real physical environment. When it comes to mobile phones, user tests do not require many special arrangements, but when dealing with elevators, full size buildings are needed, not to mention ship building, where real experiments are huge.

2.2 Developing the research interest

In order to understand this thesis, it is good to know the starting point of my research and the reasons of my interest. My father worked for a company that offered electric appliances and installation services. Therefore, I got familiar with that branch of technology before I learned to read. As a hobby, I designed and built miscellaneous equipment for my acquaintances. I remember my biggest challenge being a frequency counter used for tuning musical instruments, which I made at the age of seventeen. I did it for a friend of the family who repaired accordions. Today, such tools are common and cheap, but in 1970’s they were very expensive and rare. Before I started any occupational education, I had made about 300 pieces of various equipments.

They were technically simpler than the frequency counter, but they were always designed for a certain person for a certain purpose, like thermometers with a remote sensor (they were also rare in the 70's!), burglar alarm systems, audio systems and so forth. I made them for money, so that I could continue with my own hobby. So, it was only natural that I chose engineering as my profession. Clearly, I have roots in natural sciences and in their application.

Already during my early studies of engineering, I found an interesting phenomenon. Part of my fellow students were interested in engineering skills, like mathematics, theoretical electronics and physics. They were not keen on other subjects that we also had to study, like languages, economy, management and so forth. They were called 'hanttiaine', a Finnish name for 'not-so-important subjects'. Another group, however, said that in fact engineers never do mathematics like integral calculus in real life. They were prepared to be managers or foremen and considered those 'hanttiaine' – subjects to be more important than mathematics and other more profession-related issues.

After graduation, I entered work life as an engineer and started my career as an electronics designer in an R&D department of an international company. The department was full of engineers as one can imagine. The company arranged further education for its employees and an important subject was business understanding. One major issue was cost awareness, but it was also important to understand all business processes and customer's expectations. I remember wondering why it seemed to be so difficult for engineers and business people to understand each other. On the other hand, it seemed that business people had unreasonable expectations with regard to technical solutions. On the other hand many engineers seemed to be totally blind to life outside the laboratories. I got more interested in these issues when I got some more business education. I completed an MBA - degree. That taught me a new language. I learned to think in terms or ROI (Return on Investment) and the Pay Back Time. I also found that the central dimension of the R&D was Time-to-Market. Somehow, it was a relief to find this different world, but it still did not help much in practical life, because these worlds seemed to be separated and people who left the engineering world usually did not return.

When I started my engineering career in R&D, the department was arranged according to engineering disciplines, like software, mechanics and electronics. Over the years, several organization principles were used. The main reasons for changes were always achieving higher

efficiency in producing good end products and completing their design faster. Organizational silos often caused suboptimization that caused frustration among employees. In recent years, the work in R&D has faced new changes that seemed to make communication and understanding even more difficult. Those phenomena are internationally growing organizations, increased subcontracting, better customer focus and so forth. Other changes have been defunct professions (such as draughtsmen), emerging virtual teams, increased subcontracting and established flexible work practices. When I started my work as an engineer, my problems were essentially technical, mainly focused on how to make certain equipment work properly. The next challenge was to understand the cost structure and business logic of the company. After that, the market has changed so that more and more non-technical issues have a big impact on R&D. Several new professions have been introduced in R&D. I have had architects, industrial designers and even a psychologist working with me.

Somehow, I have had an intuitive understanding of the importance of these new issues, but gradually I became sure that I wanted to learn more about human nature and communities, partly to make better products, partly to be able to more confidently orientate myself in an organization. The personal mission of this thesis is learning how to deal with practical problems and challenges in work life in an international R&D-unit. I turned to social sciences to find names for the phenomena I recognized in my work environment and perhaps also to learn new theories for explaining these phenomena. Soon I started to think about what causes the communication problems. I found that many harmful boundaries aligned with the professions. Could it be that different professions create languages and thinking models so different that they are difficult to overcome? However, professional boundaries did not always stick. Was there some other principle that caused separation? As Jari Aro (1999, p. 29) suggested, there are ultimately two alternatives for motivating research; namely progress of the science or developing practices for the social world. This research is important for the latter reason, as there are many workplaces in industrial R&D and many people who face the same kinds of questions studied in this research. That is the research interest of my thesis.

Now it is time to approach the research question of my thesis. At this stage, my research question can be formed only generally and tentatively, based on the research interest. Later in this chapter, I will set up a more precise and theoretically solid framework within which, I am able to form more specific research questions for the next chapters. On a general level, my master's thesis

research aims at exploring multidisciplinary work in industrial research and development departments, in order to understand its nature and to help managing such work in an optimal manner. To be a little more specific, this research aims at answering the questions: How are the groups established in R&D? What is the role of professions in an industrial research and development department?

2.3 Locating research in the map of sciences

In the previous sections of this chapter, I have introduced the scope of my research and my overall research interest. The first step in the way to answering these questions is to elaborate the methodology and the realm of the intellectual inquiry within which, these questions are relevant and can be answered. In other words, the research must be located in the map of various scientific traditions. As I am an engineer, it would be tempting for me to rely on the traditions of natural sciences and try to find 'reasons' for the phenomena. However, natural sciences and social sciences are not similar and different paradigms must be used and are used in both areas. When outlining the approach of this thesis, I found it fruitful to rely on moderate constructionism as presented by Risto Heiskala (Heiskala 1997, 2000). He has developed a rational reconstruction of social sciences, combining many major theories in a general theory of society.

The title of Heiskala's thesis (1997) is 'Society as Semiosis'. It indicates that his main point in building his theory of society is the process of semiosis. The theory is abstract and my intention is not by any means to be dependent on all its details. Therefore, it is not necessary to go through his intellectual path in developing his theory, or to list all the theories he has used as ingredients. However, the main important implications are explained in the following paragraphs. Heiskala's way to explain all aspects of social life with the semiosis also solves one of my personal questions, namely understanding the nature of other languages but verbal. As an amateur musician, I have been interested in music as a language and the differences in music styles. A similar issue of importance in this thesis is the nature of visual thinking and 'design language'. Heiskala's theory enables understanding these as a part of a system of meanings.

The point of departure is that people's life worlds consists of semiosis, which is a process of giving meanings to observations. That means that the social world of people exists only in

meanings. The basis of this thinking is in phenomenology, an area where Alfred Schutz (2007) has done a major work. Some of the meanings are shared within a community and learned in the process of socialization. This process has been described in the work of Berger and Luckman (1994). They explain the birth of institutions and other social structures starting from the socialization process. They base their theory of society on cultural issues, which is a major view that Heiskala has also adopted. This is the essence of social constructionism. For me, this thinking helps to understand how and why concepts like brands and the 'social life of things' are relevant and affect in practice as well. Constructionism is a model of thinking and similar to the idea of material things being construed of particles like electrons and protons. It casts grounds for further thoughts.

Heiskala separates two versions of social constructionism, moderate and radical. The radical version states that everything in a culture is based on social constructions only, there are no restrictions by reality. Heiskala does not accept that but claims that in people's life worlds, there are also unconscious habits and motivations of behavior that have biological roots. Therefore, although there is a large cultural variation in societies, there are also common phenomena that have biological roots. The same is also valid for the natural environment. Signs (that are articulated meanings) cannot be entirely arbitrary, but in certain extent they reflect independent reality. This view is appealing to an engineer who is used to having the last word in experiments. (On the other hand, it would be nice to explain all the failures of technology by telling that burned transistors are just social constructs and in fact they can be understood as beautiful examples of some explosion art.)

Heiskala's book is also interesting because it speaks about action theory and rational decision making as cases. They are also relevant for my thesis, because one among the professions used as examples is economics or business. In this example, a rational action is used as the basis of many classical theories, but in practice professionals operating in this field agree with constructionism by preferring 'sentiments' over 'fundaments' in practical stock market pricing.

Because the overall approach of my thesis is based on constructionism, I aim at understanding rather than at universal laws that could be used for explaining or even predicting the behavior of people. Getting close to participants and focusing on understanding subjective experience are typical in constructive orientation. The logic of the research is to compare established

professions and trace their impact in work places. Therefore, the research is based on cases. With the constructionist approach, the researcher is an instrument that interprets the data. This is a big difference to natural sciences that relies on realistic assumptions of the world and tends to make the researcher transparent. Constructionism in turn leads to methods that are hermeneutical.

2.4 General methodology

As I said earlier, I am motivated by a rather long experience in the field of R&D. Therefore, in terms of Malinowski (1922, p. 9) I have many 'foreshadowed problems' in my mind. The challenge then is to separate these 'foreshadowed problems' from preconceived ideas. A specific method is needed for this.

The aim of this study is to understand the life of people working in a modern working environment. The approach will be that of cultural anthropology, as described by Keesing (1981, pp. 1 - 8 and 67 - 75). The central idea is that all people live in cultures consisting of some collective subjectivity and a shared social world. This notion removes hierarchy from the ’culture' when it simply refers to the life style and orientation in the world. “Cultures in this sense comprise systems of shared ideas, systems of concepts and rules and meanings that underlie and are expressed in the ways that humans live.” (Keesing 1981, p. 68). According to the selected paradigm, people are assumed to live in a socially construed world, where social life is mediated by meanings. Social actors use these meanings in order to orientate themselves. My aim is to study the relevance of certain aspects of social life, professions, as an organizing or constitutive part of people's lives. Therefore, it is especially interesting to scrutinize constitutive rules that define boundaries of socially construed categories as well as symbols and discourses that are used for carrying cultural meanings among professions. That theoretical framework is the explicit perspective that is used in analyzing the data. In the case of institutional actors, the categories are to be found from written texts, whereas in the case of interviewees it is based on recorded interactions.

It is important for the researcher to be aware of his/her perspective in relation to the researched. In this case, this is an interesting issue, because the 'foreshadowed problems' appeared when I was working in the environment similar to what I was going to research. Thus, it can be said that

I have an 'emic' perspective. It would be nice to have field notes available for the analysis from all the years I have worked in industry. Unfortunately this is not the case and I can use only the material that has been collected for this research. This material also contains some earlier written material. Of course my experience within the environment will be an important cultural and interpretational resource.

There are several positions of a researcher in relation to the research subject, also within the analysis. One possible way to address this issue is to make a distinction between an analyst, an advocate, an interpreter and a debater (Jokinen - Juhila - Suoninen 2005, pp. 201 - 218). Analysts try to keep the distance to the data as far as possible, disregarding their own interests. Advocates clearly have sympathies and a mission of improving society with their own actions. Interpreters discuss with the data and use their own experience as an important tool in the analysis. Debaters participate in some public discussion by selecting and presenting results in the currently interesting field. In this view, I see myself mostly as an interpreter.

By now, I've shed light on most of the relevant aspects that form the overall landscape of my research, its field and its general scientific commitments. Heiskala (2000, p. 208) refers to Arto Noro's division between a general theory of society and a research theory. In this section, I've used Heiskala's work as a general theory of society that contains paradigmatic commitments. However, a general theory is too abstract to be used in an empirical study. A research theory must be used as a bridge to empirical data. This theory I will elaborate in the next section, as well as other specific issues in the research design of my thesis.

2.5 The 'Change in Communality' as a theoretical frame

The previous sections were devoted to making the reader more familiar with the surroundings of my thesis, its anthropological 'field' and also the intellectual landscape in which I am going to dwell. The purpose of these remaining two sections in this chapter is to zoom nearer and go to specifics in the thesis. I'm going to elaborate a research theory that is also needed in order to analyze the empirical data. This theory is outlined in this section. It is very simple and contains essentially only definitions of central terms and concepts, setting the perspective used in the research or showing the theoretical lenses through which the data has been viewed at. For my

analysis, I need only two central concepts that I will discuss further, namely change and communality. In the last section of this chapter, I will also explain methods I used when gathering data.

I'll start by discussing 'community' and 'communality'. Community is one of the oldest concepts used in sociology and social anthropology, starting from Tönnies' distinction between Gesellschaft and Gemeinschaft in the 1800's. This concept is as widely used as 'culture'. Some author counted 161 definitions for the concept of 'culture' and more than 90 definitions for 'community' already in the 1960's (Cohen 1985, p. 7), therefore, it is necessary to explain which terms are used and how.

The starting point is Thomas Hylland Eriksen's (2001, pp 73-76) definitions of 'a social structure' and 'a social system'. The former is "the totality of social institutions and status relationships" in a society. He describes it as "a matrix of society, emptied of humans". As such, it is a purely analytical concept that can be used for comparing societies on an abstract level. In this research, 'social structure' is a useful term when explaining where the research object, the R&D department, is located in a society. For an empirical study, 'a social system' is more important. It is defined as "a set of social relations which are regularly actualized and thus reproduced as a system through interaction". One characteristic of a social system is that it involves norms enforcing certain degree of conformity through sanctions. The empirical part of this study deals with exploring the social systems of R&D. The research question could be formed in terms of Eriksen as follows: What kind of social system is in place in an R&D department? Eriksen makes a social system a useful tool in empirical research by defining the boundaries of a social system as well: they emerge where the interaction decreases dramatically (Eriksen 2001, p 77).

Another important concept in social anthropology is 'a commmunity'. Eriksen (2001, pp. 58 - 59) seems to devote this term for groups living in conditions similar to traditional villages. This means that people share most of the spheres of their lives. This is caused by the fact that they do not belong to several social systems but live in one place. This interpretation is near to Tönnies' 'Gemeinschaft'. Benedict Anderson has a similar starting point. He writes that traditional territorial communities are 'ideal types' of communities that have served the needs for socialization and for construction of the social world. "In fact, all communities larger than

primordial villages of face-to-face contact are imagined". "Ontological reality is apprehensible only through a single, privileged system of representation" (Anderson 1991, p.14). He also claims that one of the reasons for the emergence of 'imagined' communities like the 'nation' was the need to provide the continuity that was once provided by life in a village but was lost with the modern life in cities (Anderson 1991, p.11).

In the early sociologist' (like Tönnies) texts, the community was already contrasted with a society of the modern world. It was assumed that the sense of belonging and the communality lied in the structures and practices of a community that lived together as a group and that modern society in fact lacked this communality. Anthony Cohen argued that communality has not disappeared but makes up the core of all cultures, because the feeling of belonging is required for identity (Cohen 1985, p.109). However, communality is not based on territoriality but on shared symbols and meanings. "People's perception of their community as a whole is mediated by the particularities of their membership of it". (Cohen 1985, p 89). A community is interpreted as a mental entity, constructed by symbols. Cohen summarizes as follows: "Our argument has been, then, that whether or not its structural boundaries remain intact, the reality of community lies in its member's perception of the vitality of its culture. People construct the community symbolically, making it a resource and a repository of meaning, and a referent of their identity. " (Cohen 1985, p. 118) It seems that Cohen thinks people's basic identity. He thinks that people have one basic group identity that is manifested in the feeling of belonging to a community (Cohen 1985, p. 89). So, he does not analyze much the modern world's tendency to belong several social systems (in Eriksen's spirit). The reason might be his empirical basis in British rural localities (Amit 2002, p. 4.) What is interesting, though, is Cohen's recognition of change and challenged boundaries that may even cause a tendency to defend these boundaries and resist change.

What Cohen did in 1985 was redefining the notion of a community by paying attention to subjective perception and sharing of symbols, instead of concentrating on boundaries formed by shared rituals, structures, kin systems, religions or territory. Cohen defined a community as a symbolic entity, although his application of it was close to traditional face-to-face relations (Amit 2002, p. 6). Benedict Anderson (1983) took a similar step, when he introduced the concept of 'imagined' communities where the sense of belonging is important and concrete without face-to-face communication. Nation states are examples of such imagined communities. Anderson

argued that “communities are to be distinguished, not by their falsity/genuineness, but by the style in which they are imagined” (Anderson 1983, p. 6). This imagination is mediated, first by printed products, later on by electronic media and various networks that have become viable due to the Internet. The analysis of various ways of mediating common imagination is an important branch of social sciences today.

In his later work, Cohen noticed that the word ‘community’ is used in so many ways in various contexts that it has lost its analytical power in science. (Cohen 2001, p. 167). He also pays attention to the lack of homogeneity and belonging to several groups, which are characteristic to the Western life. In that sense, he aligns with Eriksen’s notion of social systems that can be described in several ways depending on the specific aspect of people’s lives. Cohen draws the conclusion that the term ‘community’ “has become a way of designating that *some*thing is shared among a group of people at the time”. It is useless to try to define any exact meaning or clear-cut category for the analytical use of a ‘community’. “But let’s not waste time and energy on semantic neurosis…”(Cohen 2001, p 169.)

It is interesting to notice that Cohen seems to be a bit tired of with the whole concept of community. This becomes clear, when he in the last sentence of his article hopes that he has now said everything he wants to say about the concept. He refers to Wittgenstein when he points out that we should make account the use of the words instead of concentrating their definition (Cohen 2001, p. 170). To me, this seems to be related to the rejection of essentialism as well as the transition from ontological theories to epistemological theories (Heiskala 2000, p.82). Perhaps, this is the reason why many anthropologists do not pay much attention to exact categories but just describe their subject by letting the usage of the terms define them. I’ll try to follow this practice by using loose descriptions of my key terms as the research theory.

On the basis of these points of departure, I am ready to explain how I will use the concept of communality in my empirical research. The first corner stone is the notion that people live in social systems that can be defined by the density of communication, as Eriksen does. These systems can be called communities. I found it useful to take the stand that communities can be located in a continuum as regards ‘communality’.

In the other end of the continuum there is an idealized, homogenous community as it appears in

traditional sociological literature; the village where all people share all essential aspects of life. Communication is largely based on face-to-face contacts so it is not mediated but lies in territoriality. All members of the community share the whole system of meanings and people belong to one social system only. Later on, I will call it a 'real community'.

In the other end of the continuum, there is Cohen's community, where all that is required is *some*thing being shared. As an example, this definition allows for discussion groups on the web to be called as communities. Communication may be mediated by electronic or printed means and therefore, the feeling of belonging emerges without relying on territoriality. The only thing presupposed is that some part of the system of meanings is shared. That shared system of meanings then forms a social system. I will call this social system as an 'imagined community', according to Anderson. Other alternative names could have been the 'symbolic community' or 'a virtual community'.

What changes come about when we move along this continuum? It makes the most sense to think that it is the number or area of shared meanings in social worlds of the members. It may be tempting to say that the changing quality is loyalty or emotional attachment. Anderson has proved, however, that imagined communities like nations may be as efficient in raising emotions as real communities. Most probably, loyalty and the binding nature of norms increase when there are more shared aspects in life and/or when they are personally important. In the other end of the continuum, people share almost everything, location, language, means of subsistence. In the other end, they may share only the home page of a discussion group.

An interesting question in the study of communities is their relation to space. (Amit 2002, p. 56, 90). Often, a place is connected to a certain group, e.g. a village for a tribe. Nowadays, many authors speak about the Global Village, where personal ties are not based on territoriality but on global networks. The degree of territoriality has an impact on the nature of the community. Nation states are imagined communities that may be established by the printed media as Anderson has proved, but do their existence require amplification by physical contacts? This is a very valid question in current work life when virtual teams are more and more common.

In addition to community and communality, 'change' is as important an aspect in sociology and social anthropology. Referring again to classics like Tönnies or Durkheim, one fundamental

aspect in their work was to explain how communities in traditional time differed from modern society. The same line has been continued by contemporary authors like Anderson, who has analyzed the impact of printing, newspapers, means of traveling and electronic media on the nature of societies and their aspects of communality. Change is a natural dimension of my thesis, too. I will analyze the changes of everyday life in R&D as a part of larger societal developments.

The next step is to connect this simple theoretical frame to my research task. The task can now be formulated as describing social systems in the R&D. The people working there obviously have something in common, so it is fair to say that they form a community. But what kind of community, are there several communities and what is their relation? The tentative idea is that communality, defined as I have just done, will provide a fruitful concept in committing the task. Then, I can also rephrase more exactly my foreshadowed thought that communication problems often seem to have something to do with professions. Perhaps professions form social systems. Is it difficult to overcome professional boundaries when working in multiprofessional groups? In order to study this further, I need to know more about professions, what kind of communities they are and have been. In the following chapter, I'll concentrate on three current examples of professions that often work together in R&D workplaces.

It is clear that professions can be seen as communities and socialization that takes place during education gives a significant amount of values, languages etc. to the individuals. Because students usually share them in place and time, professions are near to real communities during education. This professional identity is maintained by formal organizations, namely trade associations. In work life in the R&D, people must become a part of a different group, a different community. They enter into another social system where their membership in the old social system is challenged or changed. The task in this thesis is to describe this change in a certain work environment, in the R&D. The first part of task is to find out what is typical of the selected three professions during the socialization phase and in trade associations who try to maintain this professionalization. Bechet's list (Bechet 2001, p. 210) gives a good starting point. That will be done in the next chapter. The second part is to look at what kind of community the R&D is in real life and what the common issues that can be shared despite differences in professional education are. In other words, what makes the community in R&D? Is it still the orientation towards professions or is it something else?

Related work has been done by many authors, like Ylijoki (1998) and Bechet (2001), when they have researched academic subcultures. They have used a metaphor of a tribe when describing differences between various academic disciplines. The metaphor is based on the assumption that a tribe is a social system in Eriksen's sense and then a community as well. In a sense, it could be assumed that professions are like tribes. Tony Bechet published his first study in 1989. He interviewed 221 persons in 12 academic disciplines. Later on, he published a revised version of the study (Bechet 2001), in which his findings were updated to current status. What makes Bechet's work useful in my thesis is his notion that "being a member of a disciplinary community involves a sense of identity and personal commitment, a way of being in the world, a matter of taking 'a cultural frame that defines a great part on one's life" (Bechet 2001, p 47).

After these theoretical considerations, the research question and task can be finally formulated: What kind of community is R&D and how it is related to professions as communities? I'm going to use Ylijoki's and Bechet's way to describe professional groups by using a tribe as a metaphor, because it gives the possibility to illustrate many aspects of communality in professions and in R&D-communities. Another important aspect is change in terms of how work in R&D has changed and how these changes are linked with other societal changes, described by Anderson and Sennet. Do professional identities live in the workplaces, or are there more important shared symbols that create the sense of belonging, such as common tasks or goals, or perhaps processes or roles in the work process?

2.6 Data gathering

This thesis has its foundation in the social anthropology, although it has ramifications in other areas, in the spirit of the multidisciplinary program, within which it has been written. Therefore, the principles in data gathering can best be described as following guidelines of ethnography. Characteristic to ethnographic research and other cultural studies is that many types of data are utilized, like field notes from observations, interviews, written material and so forth. I started collecting relevant material at once, when I was informed that I was accepted to this program. I did not select the material carefully in the beginning. I just copied relevant articles, made some notes and read some books. I had a faint idea that I wanted to research an area that was familiar to me, but I did not have a specific question in my mind yet. Therefore, that part of my data is

quite miscellaneous. The principle used here is the same as Alasuutari (2000, p. 2) suggested, namely ‘bricolage’. The approach in collecting data and methods was pragmatic and to a wide extent based on my own experience in working in the field before becoming a novice social scientist.

When I joined the courses, I started to keep a diary. This was first done for the ethnography course, but later on I included notes on everything that happened during the days. I wrote about events like meetings, lectures and seminars. I also recorded my ideas and thoughts about books and articles I read. In practice, I had a little PDA - device that I used also for recording interviews. I dictated my comments and every evening, I added the day’s catch to the diary. This phase was more consciously directed at the research and coming thesis. I also reflected on interviews and other visits to places of interest. This part of my material I consider my field notes on observation, although I did not separate my roles as a researcher and an ordinary worker. The method was my version of participatory observation. (In this phase I should mention that in addition to my studies, I continued working part time in R&D.)

When the focus of my research became clearer, I had to think of new data, purposefully created to answer my research questions. It appeared that professions were essential for my research, so I needed material about them. In order to limit the scope of the research, I selected three professions that are typical in the research laboratories of industrial R&D, namely engineers, economists and designers. I was interested in both the institutional discourses and their interpretation among people in the field. For tackling the institutional part, I decided to analyze the web pages of the selected professions’ trade associations and universities. The pages represent institutional speech containing the essential features of the professions as they want to be seen. The organizations were HUT (Helsinki University of Technology), UIAH (University of Arts and Industrial Design in Helsinki), HSE (Helsinki School of Economics), Ornamo, the Finnish Association of Graduate Engineers TEK and SEFE – the Finnish Association of Graduates in Economics and Business Administration.

In addition to that, I interviewed 15 students and 5 teachers in these universities. I also conducted one group interview with students belonging to an IDBM-project team. This group interview was recorded with a video camera. All interviews except one were recorded. One is missing only because of a technical failure. Almost all interviews were fully transcribed.

I approached the universities by calling the switchboard and asking who was responsible for research permissions. I was connected to the right person and a permission to interview the students was granted. At HSE, a written application form was required for the permission. The interviewees were mainly found simply by searching for them in the premises of the universities. The only other selection criterion was that they had to be students of the university in question. Some of the students had participated a multioccupational summer trainee program, 'MURJOTTELU'. In HUT and UIAH, all students whom I asked for an interview, agreed immediately. In HSE, about half refused, because of other commitments or lack of interest.

The main question in my thesis is related to everyday practices in R&D. Therefore, all material concerning that aspect was important. My own notes form an important source of data. Because it was essential for me to collect experiences also from other employees in the R&D, I made a set of interviews in three companies other than the one I was working for. I decided not to use the employees of 'my' company, because it would have had too strong an influence on the interview situation and my colleagues could have felt obliged to participate in the research. The companies were therefore from the periphery of my network, companies that I knew beforehand, but with whom I did not have daily cooperation. The interviews of the workers required the companies' permission. This was granted quite easily. One of the companies was a small engineering office, the second was a middle-sized design subcontractor and the third was a company that has its own products and product development. One of the companies required a non-disclosure agreement, which stated that I could not disclose any confidential material that I may come across by accident. On the other hand, it was clear from the beginning that I did not want to hear anything confidential, because it would have been useless to me. All interviews with professionals took about an hour. Altogether, I interviewed 9 people in these companies.

The most important part of the data consists on 29 interviews. About half of the interviews are approximately one hour long and they are not strictly structured. I had a list of issues I wanted to cover and usually I started by asking the interviewees to tell how they ended up in their current profession and position. I then asked them to describe the work practices, cooperation with colleagues, and other related issues. When needed, I made more focused questions. The shorter interviews with students were semistructured in the sense that I had a list of questions, but I added more details when the discussion progressed. At the end, there was one open question that

made it possible to continue free conversation. I had a form for the interviewees that included the most important issues of the research, confidentiality statement and the contact information of the person responsible. As additional material, I recorded public speeches from seminars. I also read some trade magazines, popular among professions selected for the research. All but two interviews were conducted in Finnish. Therefore, I have translated the quotes and also included original transcripts for those readers who might be interested and able to read them.

By now, I've described the landscape of my research, defined the research question, developed a research theory and described the data I've used in this thesis. Now it is time to go to the results. The next chapter delineates the communality of professions as they appear today in the institutionalized discourses and the student's and teacher's speech.

3. THREE CASES: PROFESSIONS IN R&D

3.1 Professions as communities

The previous chapter explained my theoretical frame, meaning the degree of communality in a continuum that has ends in two extreme cases: a real community where all members of the community share whole system of meanings and an imagined community, where only *some*thing in a system of meanings is shared. Now I'm going to apply this frame to three professions. The purpose of this chapter is to present a picture of the three professions as they appear today. There is special emphasis on understanding the nature and degree of communality among professions in connection with current societal changes. The professions appear in their purest form in the socialization phase, during education and in their trade associations. So, these are used as the sources of the data. The views of Benedict Anderson, Arjun Appadurai and Richard Sennet are used in elaborating societal changes. This step of presenting professions is necessary for later analysis, because the intention is to evaluate the role of professions in work place practices in the following chapters.

The sociology and theory of professions is its own scientific discipline but it is not the purpose of my thesis to dive deep to this area. However, some preliminary words are needed. In the theories of professions, a profession is defined as a monopoly. There are two traditions in the research of professions (Konttinen 1991, pp. 11-32). Earlier tradition follows functionalist approach that interprets professions as a part of society's integration. Each profession has its own purpose and task in a society and the development of a profession is evaluated based on its efficiency to fulfill certain needs in a society. The second tradition is based on Max Weber's theory of social closure (Konttinen 1991, p. 14). This tradition explains professions as a result of competition. Individual craftsmen joined forces and cooperated to achieve a better position in markets. Larger organizations tried to affect the political regimen in order to form legal basis for their monopoly in a certain field. This is called professionalization 'from below' (Konttinen 1991, p. 16) and has been especially relevant in the USA and England. On the European continent, professionalization took place more 'from above'. Political power has controlled the contents of education and qualifications for certain profession. This tradition is still strong in Finnish society.

With early modernity in Europe, division of labor caused the rise of organized professions, especially after the 1600's. The work was done close to the places of residence when craftsmen worked in their homes. In factories, work descriptions followed the manufacturing process and departments were organized according to the professions. Specialized professions were also quite transnational, because craftsmen had to travel throughout Europe to learn the skills necessary for mastering their field, as there were no schools like today. At that time, craftsmen changed location but not profession. This then became their community. In addition to the face-to-face real community, professions created an extended imagined community that shared common skills, symbols, rituals and stories. Academic professions were such cosmopolitan communities already in medieval times. Latin was the uniting language of scholars and universities formed an early network of the academic communities. Boundaries of professions in the form of membership criteria were extremely strict and the initiation rituals were widely used. Professions back then were closer to real communities than they are today.

Since the 1600's, communality in western societies has changed towards imagined communities, as described by Benedict Anderson. Links that supported shaping the modern imagined communities were the printing industry and especially newspapers (Anderson 1991, pp. 33-35). Books were the first mass-produced industrial commodities. Reading newspapers created kind of a common ceremony as they appeared regularly and were conceived as a generally accepted picture of reality. People read the same texts and saw similar pictures of news and events. Capitalism supported this development (Anderson 1991, p.38) because it vernacularized printed products when seeking for bigger markets. Therefore, local languages began to define the borders of the nations. The same development enabled the emergence of trade magazines and the written manuals both for craftsmen and for academic professions. Scientific literature emerged and helped develop also professional jargons other than Latin as well.

Benedict Anderson introduced the idea of nation states as imagined communities where a sense of belonging was produced as mediated. Arjun Appadurai is an anthropologist that has developed similar ideas by analyzing more post-modern societies. The key word in this development is deterritorialization (Appadurai 1996, p. 38), which has been replaced by global flows. Appadurai also names the two basic drivers in the post-modern subjectivity, namely electronic media and mass migration (Appadurai 1996, p. 3.) His notion of modernity implicates that the modern subjects experience a fragmented world that is shaped by ingredients from several continents in

the form of mass media and neighbors from different countries. An important feature is that these two phenomena, electronic media and the mass migration inspire imagination (Appadurai 1996, p. 4). Imagination is also important for professions of the post-modern world because older industrial professions offered only a finite amount of professional possibilities (Appadurai 1996, pp. 53,55). Today, the images of professions are also important. In the process of youngsters choosing their future career as well as when practicing professionals consider their career moves, imagination has a vital role.

Appadurai is relevant in my thesis because according to him the sense of belonging is mediated and all members of societies do not necessarily share whole system of meanings. He speaks about solidarities created by collective imagination (Appadurai 1996, p. 8). One example could be the fact that occupational groups also create their identities by looking at the Internet and other media. Electronic media enables various methods for creating connections and belonging to an imagined group besides the work group at the office. In the past decades, the local office and work mates created the work sphere. Now, it is possible to form links to former schoolmates by utilizing virtual groups, discussion groups and chat rooms on the Internet. The interesting question then is: how are these loyalties formed and maintained in real work life? Are they based on occupational interests or company interests or are professionals primarily pure individuals?

Richard Sennet is the third author who has analyzed recent changes in communities. His work is especially interesting because he has written a lot about work life. He (Sennet 1999, p. 9) puts a name on the most important change in current workplaces: the call for flexibility. It means openness to a change on a short notice and willingness to accept more personal risks. On the other hand, it means less regulations and formal procedures. It also means that the nature of work has changed from life long careers to short ‘tasks'. Sennet defines a 'character' as the ethical value we place on our desires and on our relations to others. The changes in the workplaces have challenged the nature of such a character. Belonging to a professional community in today’s workplaces brings a certain sense of security but results also in restrictions.

Another development that Sennet describes is the ‘drift’ (1999, p. 19). The older generation used to live in stable communities, had a predictable career and a social network that was often based on a profession. Career orientation nowadays forces people to relocate more often and this causes a feeling of insecurity, as there are no life-long relations. This may result in suffering of

the inner, emotional world. "The qualities of good work are not the qualities of a good character" (Sennet 1999, p. 21).

Subcontracting in companies has also increased. This is due to the fast pace of consumer-driven economy and the call for quick financial return. Flexible networks have replaced fixed organizations. In such an environment it is difficult to create trust, and the willingness to commit has disappeared. "Superficial cooperativeness is a better armor than loyalty and service", writes Sennet (1999, p. 34). This is the essence of today's dilemma. Virtues need a long time to emerge while requirements of economy call for short-term return. It is also interesting that freedom from rules is followed by obligations of individual risks. In essence, recent developments challenge the basics of communities.

The talk of professions as communities almost constitutes institutionalized discourse and that discourse forms the most important perspective of my analysis. Indications of such discourse are community symbols like membership, initiation, boundaries, rituals and so forth. Another relevant discourse is that of post-modernism and its consequences as presented by Sennet and Appadurai. These perspectives or discourses establish the basis for the analysis in the following sections in this chapter.

When studying real communities, anthropology has a traditional set of concepts that are used in comparing and differentiating. Eriksen's book (2001) has a table of content, which is a good place to start: local organizations, marriage and alliance, politics and power, production and technology. Professions as communities today are closer to imagined communities and they are relevant only as a part of an individual's life. They form only one social system. So, different issues are relevant in the context of professions. Bechet (2001) has used one set of themes when doing his interviews: the structure of the subject, epistemological issues, career patterns, reputation and rewards, aspects of professional practice, cost and benefits of disciplinary memberships (Bechet 2001, p. 210). This was the starting point when commencing the interviews for my thesis, but during the work it appeared that narrower analysis is sufficient for this thesis.

3.2 Communality and change in professional institutions and education

This section describes three professions through the lens of communality. The purpose of this section is to locate professions in the continuum of communality to serve as a reference point for the analysis of the next chapter. In fact they could be called professional orientations because education in engineering, economics or design can result in several different professions. In the level of abstraction needed in this thesis, I found it fruitful to search for orientations that are relevant in the scope, that is, R&D, because it is impossible to find only one faculty of engineering or economics that works in R&D. Another reason is that according to Weber's theory of closure of professions, the professions aim at monopoly by presenting themselves as a group. Seen from this point, groups having common presentation in trade unions define a profession. These boundaries do not completely align with education because for example in UIAH there are several faculties (media, cinema) that are not represented in Ornamo. Therefore, I have collected my material focusing on professions that have both common trade associations and an educational institute. As a summary, I will also present a more elaborated and abstract analysis of the professions, by using the R&D lenses and by using Ylijoki's (1998) method of constructing key narratives of academic tribes. Following her, I will construct a kind of key stories of socialized professionals as they appear when they have got their degree and are ready for work life.

In the beginning of my work, it was necessary to select the professions to be used as cases. The anthropological field consists of R&D in technology industries, which are traditionally occupied by engineers. Therefore, the engineering profession and the technical universities were unavoidable and had to be included in the study. The number of people with another profession is small and depends a lot on the specific industry. Earlier, I have mentioned that one of the indicated boundaries and detected problems in communication was between engineering and business, including management and marketing. Therefore, it seemed natural to choose economic sciences as the second example. The third choice was based on the fact that all material products have a certain appearance. Sometimes it follows from function and it is then a side product of the engineering process. In some businesses the appearance has been the base of development for a long time already. Therefore, it is reasonable to include industrial designers as the third profession. These three aspects (engineering, business, visual appearance) are usually present in

all technology industries, so they are quite common. On the other hand, three examples are sufficient for making the point, although more professions might be found in specific areas. All three are also sufficiently different to make a sensible comparison.

I started my analysis by traditionally coding the data by using Atlas.ti software. The interviews were done keeping in mind Bechet's list (Bechet 2001, p. 210), but after going through the material, I found slightly different categories more useful. The data consist of both interviews and an analysis of the web pages of professional organizations and universities. Another choice could have been separating institutional speech in written material and lived experience from interviews. Further on, it would be interesting to treat staff members of faculties separately from students. I abandoned these approaches for two reasons. Firstly, my data was not wide enough for such an analysis. Secondly, the purpose of this part is to understand the main differences of professions as a contrast to one another, not to explore the finer structure or processes within them.

3.2.1 Boundaries as defined by core professional skills

As explained earlier, professions are originally based on division of work. Therefore, the most important elements characterizing a profession are the skills required for a specific task. These skills were easily detected as a natural differentiator in the material and they form the first category used in the analysis. Here I am interested in how professions define their boundaries against other professions.

The essential professional skills in the education of an economist can be listed as follows: accounting, marketing, management skills, macro economy, method sciences and communication skills. These stem from the history of systematic education for business in Finland. The schools were established for supplying workers for companies (Michelsen 2001). The education was based on practical needs of work life, not for advancing science. It seems that academic economists are still quite close to practices of work, although the difference from Universities of Applied Sciences is emphasized. Entrepreneurship is valued, though the students claim that the education did not provide the sufficient skills. The implicit job description of an economist is to serve big companies. There were no clear boundaries against other professions, but lower level schools were thought of as non-scientific. On the other hand, it was mentioned

that employers do not appreciate academic merits. This an interesting dilemma: Universities try to be a scientific institutions but still the practical skills are highly appreciated and working in private companies is as basic mission for economists. Some of the specialized professional occupations, especially those that have bearing with legislation, are closed. Formal competence required for an auditor could be a good example.

Unlike engineers and designers, the economists did not refer to any specific talent or inclination (mathematics or visual skills) as defining a boundary. They seemed to find their orientation based on the practical need to have a job. This attitude is clear from one student's comment:

> *I ended up to study, no, it was like, when no actual calling was found, so, it was a kind of practical decision...*[1]

Another student put it this way:

> *So, I wanted something, I wanted to study in a university and, but then nothing too specific, that could close the future doors and medicine or technology weren't my things, so this was left, then.*[2]

Students of economy often found then the boundary in not having the special talents or calling required for engineering or design. They mentioned marketing and management as their main interests.

The engineers' profession is large and divided into several specific areas, like machine building, computer technology and software technology. Common for all is the general understanding of physics and mathematics. One of the interviewees mentioned 'functionality', which refers widely to the skills needed in applying knowledge to practical applications. The education of engineers also started with the wish to meet the needs of industries. This can clearly be seen from the inclination towards practical applications (Michelsen 1999). Many specific occupations in

[1] *Päädyin opiskelemaan, no, se oli lähinnä semmonen, että kun ei löytynyt mitään kauheen kutsumusalaa, niin, niin semmonen järkevä päätös...*

[2] *Elikkä, tota, mie halusin jotakin, halusin kuitenkin korkeekouluun opiskelemaan ja, mutt sitte en mitään sellasta kauheen spesifiä, mikä vois sitt sulkee noita tulevaisuuden ovia ja lääketiede eikä tekniikka ollu niit omia juttui, niin sitt siihen oikeestaan jäi tää.*

engineering are closed and require formal education, like leading electric installation work. A minimum of competence is needed because of safety issues.

The core of engineering sciences is in applying mathematics and physics to functional products. Many of the students mentioned that their selection of profession was based on interests that had showed already before starting education. A clear boundary was also the inclination to use factual argumentation, stemming from the natural sciences and concrete problems that are easy to understand, because they are visible and tangible. The virtue of engineers is to distance themselves from personal opinions and rely on facts and tests, as many examples prove:

> *I ended up here because I've always been interested in natural sciences, or they have been easy to me...*[3]

> *As an engineer, it is so easy to say that all the other sciences are feeling-based sciences...*[4]

> *But somehow, in my opinion, like for engineers it is somehow more concrete or, so, we wonder some building or a bridge or a beam and twist it and calculate something for it. But like, in my opinion money and those are like non-concrete things, or like that...* [5]

The factual basis of the argumentation was most striking when engineers drew the boundary towards designers. They recognized the designer's inclination for a personal rather than factual work approach:

> *If you just let a designer free and s/he wants his/her own stamp on it and thinks that s/he will have a place in history for it, so, so, it will, be to original then and then the main issue can be forgotten...* [6]

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[3] *Ja päädyin tähän siksi, että mä oon aina ollu kiinnostunu luonnontieteistä, tai ne on ollu sillee helppoja mulle.*

[4] *insinöörinä niin on helppo sanoo, että kaikki muut paitsi insinööritieteet on musta-tuntuu –tieteitä*

[5] *..mutt siis jotenkin mun mielest niin kun insinööreill se on kuitenkin jotenkin konkreettisempaa tai, no, me ihmetellään jotain rakennusta tai siltaa tai palkkia ja väännellään sitä ja lasketaan sille jotain. Mutt siis niin ku, mun mielest raha ja nää on semmosii niin ku vähän ei-konkreettisia asioita, tai jotenki sillai..*

[6] *jos pelkästään päästää muotoilijan irti ja hän haluaa siihen oman leimansa ja kuvittelee, että hänet*

On the other hand, the engineers are aware that their own view might be too narrow and that the economist's role is the selling the engineer's products.

> *The economists could then manage the marketing part, so that the product could be put in the market...*[7]

Industrial designers have roots in craftsmanship and arts. In education and in trade unions, design professions are divided into several specialized areas, but according to web pages of Ornamo,

> *what is common is a good understanding of shape and strong knowledge about materials.*[8]

The roots in craft are very apparent in departments of interior architecture, fashion design and furniture design, whereas industrial designers try to distance themselves from arts and move towards technology. It seems that industrial designers feel insecure because of their position between arts and technology. It might be so that industrial design is a bridge between arts and technology in a similar way to social psychology being described as a bridge between sociology and psychology. Like social psychology sways between psychology and sociology, industrial design sways between arts and technology. An interesting finding was that a lot of research in industrial design department in UIAH is based essentially on social sciences.

Industrial designers also emphasize links to manufacturing industry and issues like manufacturability and usability. This unstable nature of the identity of designers is quite clear from the research literature containing continuous redefinitions of the role of an industrial designer (Valtonen 2007). It is also clear from the quite general job description of an industrial designer on Ornamo's web pages:

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tullaaan historian kirjoihin sen perusteella viemään, niin, niin, tota, sehän tulee sitt liian, tulee liian omaleimanen leima sitt siihen ja sitt voi unohtuu se, unohtuu se pääasia sitt siinä..

[7] *se ekonomi varmaan sitte vois hallita sitä markkinointiosuutta siinä sitte, että saatais se tuote markkinoille.*

[8] *Yhteistä on hyvä muodontaju ja vahva materiaalien tuntemus.*

Industrial designers work as product- and concept designers for companies and industry, strengthen the customer's brand by utilizing design in cooperation with other special designers. In addition to product design, the job description may contain design and research of user interfaces, ergonomic solutions, furniture and exhibition design and innovations. Professional, customer based design aims at a durable and user-friendly end result.[9]

At the other end of the range are the artists of the design industry who want to leave industry and commercialization. They want to be called artists and specifically state this. Web pages of TAIKO, one of the subgroups of Ornamo (Association of Craft Artists) indicates this goal setting very clearly:

The purpose of the new organization is to advance and develop the contemporary arts of design industries and strengthen its position in the complex field of arts.[10]

Many of the interviewees mentioned that the design professions require distinct talent in arts or drawing, so it is not even possible for everyone to study this field. All students had a conscious artistic interest or a calling to design artefacts for people, both for ordinary people and for every-day use. Many students had a background in crafts. The comments were clear:

I had thought just... that design things and products that people use.[11]

I have been artistically inclined whole my life.[12]

Fashion design was like only alternative, it as like... a life and also like, in blood.[13]

Many students in UIAH mentioned that in fact they could be engineers, perhaps because

[9] *Teolliset muotoilijat toimivat tuote- ja konseptisuunnittelijoina yrityksille ja teollisuudelle, vahvistavat asiakkaan brandia muotoilulla yhteistyössä muiden erikoissuunnittelijoiden kanssa. Toimenkuvaan voi kuulua tuotesuunnittelun lisäksi esim. käyttöliittymäsuunnittelua ja -tutkimusta, ergonomisia ratkaisuja, kaluste- ja näyttelysuunnittelua, innovaatioita. Ammattitaitoinen, asiakaslähtöinen suunnittelu tähtää kestävään ja käyttäjäystävälliseen lopputulokseen.*

[10] *Uuden järjestön tarkoituksena on edistää ja kehittää taideteollisten alojen nykytaidetta sekä vahvistaa sen asemaa taiteen monimuotoisessa kentässä.*

[11] *Että mä olin aatellu vaan, ett suunnitella esineitä ja tuotteita, mitä ihmiset käyttää.*

[12] *Kyl mä oon ollu taiteellisesti suuntautunu koko ikäni.*

[13] *Vaatesuunnittelu oli ainoo niinku.. vaihtoehto, se oli jotenki niinku... elämä. ja myöski niiku... verissä*

technology is part of manufacturing the process of the design industry. For an industrial designer this is natural, but also others mentioned a small mental distance from engineers.

> *We often laugh that there is smaller distance from the eight floor in UIAH to Otaniemi (HUT) by a bus than to the seventh floor here in UIAH, so.*[14]

What design students saw as distinguishing designers from engineers was the attitude towards tasks. Engineers were seen as having a narrower perspective and emphasis on details, whereas designers have broader view.

> *Students of technology have like, perhaps a more functional or like ... rational approach, so, so that there is this kind of problem and this problem will be solved like putting two nuts in there and there it is. Quite like a straightforward thinking, when designers easily start with thinking that for what... like are the nuts needed at all, like couldn't it be solved in another way.*[15]

The design profession's boundary to economists was clear and it can be best described as ideological. Money is a distant concept for devoted designers and most of them mentioned that inclination as normative. Selling and commercialism were areas where the designers do not want to be or that they do not understand. Money was also said not to be concrete enough.

> *Often they come. ... I have many friends in the Business School and yes, they have really twisted notion of the world and a good life.*[16]

Designers recognized their need to express themselves and to be individualistic. This was also seen as a professional danger when designers begin to perform for each other as professionals, instead of designing for customers.

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[14] *naureskellaankin usein, että, että TaiK:ista kahdeksannesta kerroksesta on lyhyempi matka bussilla Otaniemeen kun hissillä seitsemänteen kerrokseen TaiK:issa, että.*

[15] *teekkareill on enemmän semmonen niin ku, sellanen, tota, ehkä tämmönen funktionaalinen taikka semmonen järkiperä, rationaalinen lähestymistapa, että, että tässä on tällänen ongelma ja tämä ongelma ratkastaan sillä, että tähän laitetaan kaksi mutteria näin ja tämä on tässä. Aika semmonen niin ku, niin ku straight forward -ajattelu, kun muotoilijat helposti lähtee taas siitä, ett sitt mietitään, että mihin, että tarvitaanko tässä näitä muttereita ollenkaan, ett eiks sitä vois ratkasta jollaki muulla tavalla.*

[16] *Monest tulee,.. on monii ystäviä tuoll Kauppakorkeessa ja kyl, niil on kieroutunu käsitys maailmasta ja hyvästä elämästä..kyl ihmisellä pitää olla jotai idealismia pään sisässä..*

Quite soon it begins to be like ... one makes glorious, one wants to make good looking. It is a bit like, when you think, like for example, like some theatre people, they act for other actors. And a bit like… like if a designer makes for other designers...[17]

Craftmanship and manual work were also recognized as the designer's core skills. Many design students had a lower education in crafts and manual skills before starting in UIAH. Industrial designers also think that usability is important, whereas engineers are more interested in technology and function. On the other hand, engineers think that functionality and usability are their issue whereas designers should take care of aesthetics. The tools and work methods of designers and engineers were also mentioned as being different.

The researched organizations have clear boundaries against other professions, but one interesting boundary is the level of professional skills. Academic universities have a pressure to be different than lower level of education institutes, e.g. the Universities of Applied Sciences. That has especially made HSE emphasize its scientific nature, but all schools are aware of this difference and strict as regards titles. Scientific orientation is somewhat problematic for all professions in this research, because they still draw from applied sciences. This area might be worthy of some research of it own.

As a summary it can be said that all three professions have roots in practical skills that are thousands of years old. In engineering, it stems from building pyramids, in design professions from decorating them and in economists from book keeping of slaves and gold. Required skills still define the core of the profession. All were servants of a king. In this level, core skills differentiate professions. They mark the boundary of the community.

3.2.2 A common destiny as benefit supervision

The second category, benefit supervision, is important because it is a shared interest that unites members of a profession in constitutive way, according to Weber's theory of the closure of professions. They aim at monopoly. Originally, I divided this category into two parts, work

[17] *..aika äkkiä tulee sitte taas sellasta, että, että tehdään hienoo, kun halutaan tehdä hienon näköstä, että vähän, vähän niin ku sillee, niin ku ajatellaan vaikka joku, joku, jotku teatteri-ihmiset, että ne näyttelee toisille näyttelijöille. Ja vähän sillee, ett, ett jos muotoilija muotoilee toisille muotoilijoille,...*

through trade unions and political influence, but it appeared that they aligned so strongly that the division did not make any difference. Benefit supervision also refers to one of the common aspects of communality, namely the shared destiny. In that category, professional tribes appear as clearly separate and competing.

Trade unions are the key actors in benefit supervision. They are established societal institutions and their role in benefit supervision did not appear much in the interviews with students and teachers as it did in trade union web pages. In a sense, the operations of trade unions make the boundaries clear by keeping the records of members, using formal membership criteria and so forth. What unite them are common practices of benefit supervision.

All trade unions collect statistics on salaries and negotiate collectively about them. They offer career services, occupational training and so forth. All have negotiated benefits like price reductions, cheap leisure time possibilities, trade magazines and so forth for their members. SEFE and TEK have significant possessions that are the basis of many benefits. All trade associations had a stated mission or goal that included an idea of benefit supervision, but they had slightly different emphasis.

For my thesis, it is interesting that SEFE calls itself as a community. The mission of SEFE was stated as follows:

> *The SEFE - community creates possibilities for participation and success for it members and supports them in the career as economists in many phases of life. SEFE take care of the economist's position in society both through its influence and in cooperation with other actors…. Benefit supervision in the labour market is an important subfield…In education politics, SEFE cooperates together with universities and its own member associations. SEFE supports Universities giving education in Economics in order to ensure high quality education and a strong position of economists in the labour market*[18].

[18] *SEFE-yhteisö luo jäsenelleen osallistumis- ja onnistumismahdollisuuksia ja tukee häntä ekonomiuralla elämän eri käänteissä. Ekonomiliitto huolehtii ekonomien asemasta yhteiskunnassa sekä omalla vaikuttamisellaan että yhdessä muiden toimijoiden kanssa. ... Työmarkkinallinen edunvalvonta on tärkeä osa-alue... Koulutuspolitiikassa Ekonomiliitto vaikuttaa yhdessä yliopistojen ja omien jäsenyhdistystensä.. Suomen Ekonomiliitto tukee kauppatieteellisiä yliopistoja monin tavoin varmistaakseen osaltaan ekonomikoulutuksen korkean laadun ja näin kauppatieteilijöiden vahvan työmarkkinakelpoisuuden.*

TEK is also a typical actor in the labour market, leading negotiations and through political activities. TEK has the following self-definition:

> *TEK is the benefit supervision- and benefit offering association for Masters of Sciences in Technology and others having similar education from a university. It advances technology for the benefit of people, the environment and the society.*[19]

Interesting is that TEK emphasizes more general humanistic values than only their members' benefits when including interests in society and environment in their mission. It might be a preventive measure in order to resist a discourse in which technology is often treated as a source of environmental problems.

The third profession, designers, has a trade association named Ornamo. Ornamo defines itself as follows:

> *The Association of Industrial Arts (Ornamo) is the national, ideological and professional organization of designers. Its members work in industrial design, textile, fashion, furniture design, handcraft and arts.*[20]

In addition to member service and work contract negotiations, all associations exercise political influence. HESE regularly publishes press releases on its opinions about education, taxation and legislation. The specialty of TEK is that its management is selected by elections that are openly political and the representative groups belong to political parties. The goal of TEK's political influence seems to be supporting emergence of new industrial companies, which is crucial for the member's subsistence, of course. Ornamo's speciality is its role in cultural politics, in addition to boosting education and the position of the design industry in the society.

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[19] *Tekniikan Akateemisten Liitto TEK on diplomi-insinöörien ja vastaavan yliopistokoulutuksen saaneiden etu- ja palvelujärjestö edistää tekniikkaa ihmisen, elinympäristön ja yhteiskunnan parhaaksi.*

[20] *Teollisuustaiteen Liitto ORNAMO on muotoilijoiden valtakunnallinen, aatteellinen ja ammatillinen keskusjärjestö. Järjestön jäsenet toimivat teollisen muotoilun, tekstiili-, vaatetus- ja huonekalusuunnittelun, sisustusarkkitehtuurin, taidekäsityön ja taiteen aloilla.*

3.2.3 Community symbols

Professional skills and benefit supervision that were covered in the two previous sections have to do with a certain important, even constitutive aspect of communities, namely boundaries. On a certain level of abstraction it can be said that skills also refer to the history and benefit supervision refers to the shared future of professional communities. In the third category, I am searching for other community symbols shared within professions and used for strengthening the sense of belonging. It may be said that they are used for maintaining the community. In the original coding, this category was divided into more detailed categories, but such detailed treatment seemed to give only little new understanding on the level of this thesis.

An important aspect of communality is the distinction between *novices* and *full members*. In professions, students belong to the group of novices. All trade unions devote a large portion of their activity to novices, knowing well that without new members the community will disappear. Students of economy have a special name, ‘kylteri’. Students of engineering are called ‘teekkari’. All professions require formal competence for membership, that is formal education or shown competence.

Lengthy sections of web pages are devoted to the *history* of the professions that creates the continuity and the sense of common roots. All trade associations have their history summarized on their web pages and all have printed literature. The communities also have nominated honorary members that are the *heroes* of the community. This is especially clear in Ornamo, who celebrates Tapio Wirkkala, Alvar Aalto and so forth.

The heroes are not only historical but also contemporary, they are the winners of many competitions of trade associations. Competitions can also be seen as an attempt to act as a judge for maintaining the status of the profession and as defining *norms* within the discipline. Competitions bring the members together and help creating and maintaining networks. An additional function of competitions is that they give an opportunity to catch the attention of the public media. HESE has the Pro Oeconomia - competition for business books. Ornamo organizes a remarkable amount of competitions and annual rewards. It also tries to authorize competitions, thus aiming at controlling the boundaries. The challenge here seems to be connected with the relation between arts, craftsmanship and industry. There are many internal discussions about

mission and constituents of the area. Competitions are important for design professions because they are close to arts and it is difficult for an outsider to evaluate artifacts. Engineers award inventions. Their pages also contain lots of competitions, but they were mainly directed at novices. The different competitions are meant for conveying the habits and manners and the kind of *attitude*, including competitions on practical jokes (‘jäynäkisat’). In that sense, the engineering competitions are a form of *rituals* that are important for maintaining the we-ness among students of technology. Part of the story is that only engineers may understand the humor that appears in their practical jokes.

In addition to competitions, other signs of *normative power* of a community are the written rules of the associations and their governments, although they only have effect on the professional part of a member’s life. It is interesting that engineers elaborate their connections to philosophy and ethics in their web pages a lot. In the TEK-pages, there is a large section containing *ethical rules* for engineers made by Engineering Office Kant and Kierkegaard. There is also a written *value statement* for engineers. What makes engineers so interested in ethics? One of the reasons may be that public opinion and a certain part of other scientific disciplines blame the engineering professions for having too tight connection with money and commercial interests, which are seen as the reason for many environmental problems. Another reason might be that legislation in many countries, especially in the USA, has emphasis on personal responsibility of product quality and safety. Making a mistake in calculation can be expensive for engineers because their work is often related with safety.

Engineers, as many other professions, use many *symbolic artifacts*, like a DI-*ring* and a *songbook*. Trade unions and student’s associations also have logos, T-shirts, flags, special hats, overalls and other signs.

Engineers have tried to create clearly international organizations and therefore they have established common membership criteria for being a ‘European Engineer’, (EurEng). The idea is to harmonize the qualifications needed for being recognized as a member of the global engineering community.

Many tools and artifacts that are connected with professional skills also have symbolic value. Students mentioned IT - tools as an important differentiator between professions. Excel is seen

as an economist's tool. Designers use Rhino and engineers trust in Autocad. Another example was that the difference between an engineer and a designer was defined according to the type of paper they used: an engineer uses paper with a grid, a designer just a plain white sheet. Other dividing aspects are literature, trade magazines and so forth. It may be interesting to research these symbols more also in the spirit of Bourdieu, but it is not task of this thesis.

3.2.4 Creativity unites and makes a difference

The former three categories were found quite easily in the data and they are in a way a consequence of the theoretical frame. It was a kind of 'foreshadowed' assumption that professions can be treated as communities and therefore, finding boundaries and community symbols was more like finding the various forms of them. However, the data had also surprises that were not so much 'foreshadowed'. The fourth category, 'creativity', was not obvious at all in the beginning. Perhaps it appeared in interviews because I had to explain roughly that I was studying R&D. That may have induced a certain variety of thoughts. However, when I was reading the transcriptions and listening the recordings, I understood that creativity both united and differentiated the professions at the same time. It unites because all the professions exist for the purpose of creating something. The underlying mindset is synthetic, not (only) analytic. Engineers create gadgets, designers create artifacts, economists create capital, or wealth. But all of them also have different approaches of the methods of creativity. In the thesis this is also important because the core skills of engineers and designers seem to refer a certain type of creativity. 'Creative accounting' has quite different connotations, but still, 'innovation' as a term is originally used in business theories.

I have called this category 'creativity' although it would be tempting to call it 'innovation', as it is the currently used word in public discussion and is actually the term used in many places in the data. The reason for the high frequency of occurrence might be that 'innovation' is a commonly used approach that is borrowed from the business world and applied to almost anything from the academic world to politics. However, creativity is more a general expression and covers a wider area and will therefore be used later on. What makes it interesting is that interpretations of the word differ depending on the speaker. Creativity seems to be one of the common dimensions, in which competition takes place. Creativity is a bridge between the traditional skills of professions and today's orientation towards business life. Emphasis and changes of the concept of

‘creativity’ indicate the change of communality in these three professions.

Engineers connect creativity with inventions, patents and applications of science. In this view, technology is the field of creativity and success depends on the level of technology. Universities convert money to knowledge, companies convert knowledge to money, so goes the saying. This approach has to do with the role of technology in producing more and more efficient production methods. Technology boosts overall deflation and therefore raises the standard of living in societies. The myth of scientific progress and applications of technology is a major ingredient in the identity and self-respect of engineers. Engineers use their skills for inventing more efficient methods for utilizing scarce resources better and better and making people’s life easier and more comfortable. They think that it is vital for a nation to develop a high level of technology and engineering skills in order to produce new inventions.

The design professions’ core skills are connected with artistic creativity that today, also means the ability to manage emotional meanings in products. In a business context, this view challenges corporate branding departments through visual design. Therefore, design professions try to capture the notion of innovativeness in public discourse by calling themselves the ‘creative professions’. Ornamo is a member of LUOVA (‘Creative’ in Finnish), that is (“luovien alojen neuvottelukunta”) the Association of Creative Industries. Their mission is to lobby for design professions. An element in this discourse is to call themselves ‘creative’ industries. The connection with business is clear when LUOVA says that it tries to boost export. Designers think that the success of a nation depends of its ability to create innovative designs that can be sold on a global market that calls for branded products.

Economists also have an important role in this competition for creativity. It was the business literature that launched the term ‘innovation’ and the separation between radical innovation and incremental innovation. ‘Radical’ means leap-like progress whereas ‘incremental’ refers to more continuous evolution. Innovation today is defined in a more general way. It can be a new business concept or an earning logic that may or may not include the participation of engineers or designers. Business innovation can mean options, securities, callable loans, stock-bound pension policies and so forth. Economist’s web pages call for more freedom for operations within companies in order to make space for innovation. Service innovations were also emphasized, as well as the commercialization of products and the application of business

knowledge. Creativity also appears as a call for problem-solving skills. Economists think that the success of the nation depends on its ability to commercialise its products and find novel earning logics that are needed in a global market place.

Both in HUT and in UIAH, the premises support an idea of the roots in real life and craftsmanship. The different source of creativity appears unmistakably when walking in the premises. UIAH is full of prototypes and models that look pretty or interesting but none of them works. HUT is full of prototypes or models that may be ugly or noisy, but they work well. HSE is different. Visible there are the names and statues of sponsors. Business creativeness seems to crystallize in getting money from as little as possible, or, maximizing the revenue with minimum effort: no prototypes. For an engineer or a designer it might look like idling. However, trade and exchange are important for tribes and in the modern world we have a profession taking care of exchange. The results are not as visible and traceable as when it comes to engineers or designers. Prosperity appears as handsome buildings or big numbers on the bottom line. One way to explain the difference is that the contribution that entrepreneurs make to the economy is the capital, which is not as easy to present as a concrete outcome of skills. Perhaps the right name of creativity in HSE is entrepreneurship, which is a skill difficult to teach, it is more like an attitude.

3.3.5 Business orientation as an indication of change

The fifth category, ‘business orientation’ as an aspect of communality, refers to the change, not the actual traditions of communities. Business orientation was obvious in both interviews and web pages. Although I had recognized the importance of business in common discussions in the media, I did not expect it to be so common in engineering and industrial design. This is a bit complicated issue among economists, because business knowledge is one of their core skills. When talking about engineers and designers one might call this as a secondary skill or a common skill, because business is not in the core of their profession. What stood out however, was how clearly many students of both professions were directed towards big companies and management positions. Business orientation is also relevant in this context because it refers to real work life and its actual communities.

In the interviews, it became obvious that the division into two distinct groups of students still exists. Actually, this is exactly the concern that I mentioned in the beginning when I spoke about

real subjects and secondary subjects, ‘hanttiaine’ (ibid p 14). During the analysis, I remembered this again. Part of the students are interested in the profession’s traditional core skills. There are engineering students who have tuned motorbikes or cars and feel it natural to study technology. They are design students who have drawn and made clothes and they want to develop their skills in that area. There are youngsters that have received stocks from their grandparents and who want to understand the logic of moneymaking. These students are interested in the core content of their profession.

Then there is another group who plan a career in management. They see the core skills as necessary but not very interesting. They concentrate on team working skills, management methods, presentation styles, strategic planning, logistics, languages, in short: business skills. And they are not wrong; those are the skills that employers appreciate. It seems that the basic interest is in the lifestyle of an imagined community: the management. The future vision of a student oriented towards business is a successful manager, who gets hefty bonuses and discusses fluently using all the latest buzzwords of the business books sold at the airports.

Some anecdotes can tell the story. ‘Strategy’ and ‘strategic’ are examples of the words used in order to be a competent ‘business person’. This is so common, that it shows in jokes. Two of the teachers in the Turku School of Economics have published an article, “From Bean Counters to Change Agents” that attempts to motivate controller’s professional development from an information processor to a member of the strategic management team of a company. (Granlund – Lukka 1997). Somebody suggested that it would be easier to hire controllers by calling them ‘Strategic Bean Counters’. In technical education, students of Industrial Engineering and Management (‘tuotantotalous’) are notorious for wearing black suits and ties from the second year on. They are sometimes called ‘summer strategists’ because some of them once looked for a summer job in the ‘strategy department’, where they could revise the company’s strategies while the real management is on holiday. Industrial design in UIAH concentrates so intensively on management and expanding the use of design that a new position was once suggested, ‘Strategic Design Director of Cleaning Services’, earlier the boss of the cleaners.

One reason for why this phenomenon appears in my material might be that I collected it in Helsinki. HSE has a history as an independent school, devoted to business. The attitude in economics faculties, working as a part of scientific universities, might be different. In

engineering, the university might not make that big of a difference, because Industrial Engineering and Management is thought anywhere. In UIAH, the impact of school might be the largest because professor Peter McGrory in UIAH has been interested in management of design and he has done his Master's thesis about management styles (McGrory 1992).

This reality of business life also shows in practical advice that the web pages give to both students and graduated professionals. As an example, TEK's pages list values for success in work: competence, management skills, hard work, interaction skills, intelligence and judgement, goal setting and ambition, networking and presence as a writer. This business orientation forms the level that unites the parts of the professions and on the other hand, divides them internally. It might be said that business orientation is like a new religion that has entered into the old tribes, with different vices and virtues. Business orientation can be seen as a challenge for the communality of professions, because it crosses the old boundaries. Another way to see it is to treat it as a rhetorical tool in the competition between professions in the surrounding society that has adopted liberal market economy. Creativity as a category mediates the old and the new. Creativity stems from the traditional skills of professions but it is now used in the terms and language of business.

3.2.6 Summary

Students were quite aware of the profession they have selected. They make a fairly clear distinction between themselves and the students of other researched universities. This might be due to the fact that their every-day life includes their fellow students. The university is also a territory of socialization. The students have made a choice when they selected their specialty and it is natural to defend that choice. Some students in all professions, however, tried to distance themselves from virtues of their profession. They emphasized their future careers as managers, instead of relying on the traditional skills of their profession. Most students recognized the discourse of multidisciplinarity. Their main concern was that applying multidisciplinarity in education would perhaps require too much time and effort.

The analysis done so far has shown the relevance of using a community or even a tribe as a metaphor for professions. It has described some of the characteristics of their communality, as well traditional and as indications of changes. In terms of my theoretical frame, professional

skills, common future in the form of benefit supervision and community symbols define the area of shared meanings within all professions. The notion of creativity is an interesting special case because it is recognized among all professions, but each of them has their own interpretation of it. The reason for the difference is that the notion of creativity (or 'innovativeness') links the professions to the business world and the competition there.

In the following, I will try to summarize the key aspects of these communities. Oili-Helena Ylijoki has made a similar effort in her analysis of four academic disciplines in the University of Tampere (Ylijoki 2003). Her way to present the summary was to create a key story of an average student in each discipline and collect typical features in a table. I found this way interesting and enlightening and therefore, that I am going to use the same approach, although there are some problems. The biggest concern is that my scope is larger as I'm not describing the students of one subject only, but a study area of a whole university. Therefore, I can only say something very general, because there are large variations between faculties in each university.

The observation that business orientation divides all tribes forms another challenge for a specific key story. Perhaps I could say that the students oriented towards business can be described in this metaphor as a converted minority; like some Christians individuals among tribes that have traditional beliefs still dominating. I may call my groups as clans instead of tribes. In a way, they would need their own key story. However, I am only going to concentrate on the issues relevant for my subject and perspective, namely professionalism in R&D. Ylijoki has developed her method based on Rom Harre's ideas of psychological space and transitions there. The idea is that each community has a key story that reflects the moral order of that community. Socialization can be described as adopting the key story of the community and creating own version of it. Ylijoki has used five aspects of key stories for describing them: the subject, focal point, basic action, goal and type of narrative. For my purpose, a slightly different classification is more useful. The following table is (the format is loosely based on Ylijoki) a rough description of the professional tribes.

	Engineering	Economics	Design professions
Focal point	Science	Capital	Arts
Intervention to world	Controlling nature	Controlling money, selling	Controlling meanings
Creativity	Invention	Earning logic, entrepreneurship	Expression (artefact, aesthetics, meanings)
Virtue	Factuality, accuracy	Smart, reward	Individualism
Basic skills, function	Calculation, construction	Marketing, communication	Imagination, craft skills
Sales argument in business	Efficiency, quality	Return on capital	Added emotional value

Although I have described whole professions, their features are clearest in the phase of education, because that is where the socialization takes place. In terms of Berger and Luckman (1994), this is called secondary socialization. Therefore, it is useful to describe the key stories of novices in the profession. The work life after graduation forms the third socialization, or re-socialization, again in terms of Berger and Luckman. (This would be yet another way to describe the task of this thesis: the description of the differences in social worlds in the second and third socializations.)

3.3 Key stories

3.3.1 The story of an economist

> *Students of economy might have a special interest in entrepreneurship or perhaps they only want a decent work indoors. They are not any revolutionists in society. On the contrary, they take the norms of business life for granted and natural. Business people are those who have the money (or at least they would like to have it) and their job is to be smart in using it: buy cheap and sell expensive, be aware of the margin and control the risks. Economists do not admire physical work or manual skills as their own strength. In fact, they feel to be a lot smarter than ordinary people, who must touch grease or stone for a living. Hard work and long days are appreciated, even glorified, but sweating is*

not. The work must have class. Sweating is okay in a gym. Economists want to be orchestrators, people who hold the strings, hire and fire, invest and divest, always keeping accounts clear and risks under control.

Economists are aware of the impression they give and therefore, they pay a lot of attention to fitting into dress code of business life. If they are dressed casually, the outfit is carefully considered and must be in fashion. The impression is crucial also for one of their key skills: marketing. An important part of being smart is to understand what people want and to be able to change people's minds, so that they give money. However, money might not be the ultimate goal. The goal may be being smart, knowing the difference between fundaments and sentiments, finding new earning logics and achieving wide margins.

Economists know that at the end of the day, the motor of the nation's economy is business. Without trade the state cannot pay back its debts or collect enough taxes. Therefore, entrepreneurship and putting ones own stakes at risk are valued, although the controlling the risks is important for avoiding unnecessary loss. An economist knows that craft skills in business are accounting and marketing, but the real talent is the 'nose' for money, based on intelligence and a wide network. In the work place, the economists are valued for their ability to understand money and create new earning logics. However, sometimes they forget that people are not only resources or customers and then economists may be left alone with the ROI-calculations.

3.3.2 The story of an engineer

Engineers are interested in making iron and copper serve them. They are prepared to work with 65000 colleagues in an industry, planning more and more efficient systems and equipment. They are proud of the knowledge that the prosperity and comfort of present life is created by of engineers and scientists. Therefore, they equal progress of civilization with creation of inventions. Engineers enjoy being members of this big story of technological progress. Exact sciences and mathematics are the basis of technology and therefore they must learn how to use the tools efficiently. They feel great when they have made some gadget work and proved that they can control nature. They understand

that it would be good to get something sold, as well, but they often loose interest when the puzzle has been solved and the engine has started to puff. Personal appearance does not matter as much, not when it comes to their clothes, nor in the products. Appearances are not essential. They cultivate the 'teekkari' spirit that includes practical jokes and makes laughs from use of technology.

Engineers think that designers and economists are too abstract and play with illusions, whereas engineers work with something real, facts, measurements, samples and test results. Their work is easy to prove and discuss. Therefore, engineers feel uncertain with issues like brand value and aesthetics. They are aware that some styling is needed for commercial products. However, if engineers make visual design it is always functional and preferably tested by other engineers.

Engineers think that development takes place by scientific research done in laboratories. Companies utilize the knowledge that researchers have developed. Designers then make a nice package out of them and economists find the market and print brochures.

Engineers are valued in the workplaces because they can make nature do what they want, like make motors run and phone calls transmitted via air. However, every now and then engineers forget that products have other features than functionality and efficiency and then people with better stories may leave them alone with well-functioning but boring gadgets.

3.3.3 The story of a designer

The tribe of designers is small, only 1000 full members in Finland. It is also fragmented into 5 smaller groups. All of them are interested in understanding shape, creating experiences and having an impact. They know that creating experience requires a personal touch and that's why they want to be the authors who have a personal style. That makes designers quite competitive. For getting a job, they need to have an own portfolio and a CV, which are then presented and evaluated against the portfolios of the other designers. They want to be recognized by name, they need personal rewards and they dream of their own product; 'designed by xx'.

The community is small and many members know each other. The myths of the designer community are based on examples of named heroes, like Tapio Wirkkala, Alvar Aalto and so forth. Designers are also aware that the merits in their career are individual pieces of work, like artefacts rewarded in competitions. There are lots of design competitions that are launched and reported on the web pages of trade associations, also globally. Students participate in these games that encourage a competitive and an individualistic atmosphere. Every year, five sub-groups of designers select the designer of the year. Because there are only 300-400 members in each group, the possibility of being rewarded is rather big.

On the other hand, the small size of the designer community results in the feeling of being threatened in the pressure of larger communities. This creates solidarity and loyalty towards the profession. They all feel a sense of belonging to a special creative group with specific talents. Designers are aware that a big part of their core skills are inherited from arts like music or drawing. Therefore, they also recognize their root in arts, sculpting and painting, essentially, esthetics.

Because designers want to be authors, they see other professions as their assistants. A glass factory is only needed for enabling the creative work of a glass artist, construction workers are only needed for implementing the visions of interior architects, a cell phone factory makes their products under the guidance of industrial designers.

Because appearance is important for a designer, they are easy to recognize. But not because of a common uniform as is the case with economists or because of unaware casualty in dressing with is the case with engineers. Designers are also their own authors. If they use a uniform, it is planned to be such, but it is a personal application of a uniform. Designers are authors and therefore they also need an audience. They are fluent in visual presentation, which makes the communication with more number-oriented disciplines, like engineers and economists, sometimes difficult.

Most students of design cannot imagine themselves as economists but some of them can name common interests with engineers. This is due to the concreteness of their craft skills

and the similar challenge to solve problems by creating artefacts. They feel economist's world to be too abstract and imaginary.

Designers have a love-hate-relationship with arts and business that divides the tribe. On the other hand, all designers know their roots in arts and they utilize the methods and mental setup of artists. On the other hand, part of them know that exactly this connection with arts makes the perception of a designer slightly unstable and difficult to deal with when seen from the outside, like from business life. Therefore, part of the tribe consciously distances themselves from their roots and wears the mask of a business person. Or at least see it as a new country to conquest.

Designers are valued in their workplace because they can produce attractive visualizations of new ideas as well as find new approaches for the problems. However, sometimes they want to see themselves as omnipotent 'Designers' that are born to lead the others. Then they can be left alone with their nice illustrations but without anybody willing to make them work.

4. THREE CASES: COMMUNITIES IN R&D

4.1 Organizational practices define communities in R&D

In the previous chapter, I studied the nature of communality among professions as it appears in institutions like trade unions and universities. In their communality, traces from their historical roots are clearly visible. They are imagined communities if studied as an integrated whole and even close to real communities when investigating only the education phase. In real work places, one might expect that communality is based on territoriality in the same shared office. Then it might look a lot like a real community. However, a big part of today's work is performed in virtual groups because work teams are spread around the world. In this chapter I will concentrate on aspects of communality have in work places. Relevant questions then are like: what impact does the professional background in real workplaces, and what kind of communities are R&D-departments of technology industry? I will also introduce professional key stories in R&D similar the ones in the previous chapter.

When I started to analyse my data concerning companies, the first glance made me desperate because it seemed impossible to find any regularities that could offer analytically useful categories. In fact, typical for many interviewees was that their connections were numerous and that they operated in networks that seemed to vary a lot from individual to individual. So, my first round of analysis resulted in disappointment since R&D seemed to lack a clear-cut community that could be used as a basis for the analysis of communality. Then, after a longish thinking, I discovered that I must divide R&D somehow. That thought led me into the first research result of my analysis. It appeared that the decisive factor is the way of organizing the work. Usually people work in one of the three forms of teams or groups that define the local community. Some teams are arranged according to professions, so that although a team worked under R&D, all machine-building engineers were in the same team, all software designers in another team and so forth. This may be a necessary and useful arrangement due to the equipment and laboratories these groups need. It may also be so that these teams serve all the needs that the company has in a certain area, like mechanical or software engineering. These teams are often called competence centers. This organization has advantages when highly specialized skills are

needed and developed. It also leads to a strong professional communality and maintenance of jargon and professional values. Many people prefer that sort of organization, because it provides a continuation from the education phase and matches with the vision of the work content of a profession. The second alternative is to arrange the teams according to projects. Projects are specified tasks that usually require the efforts of several people. Such projects can be the design of a new machine or making a customer survey. This is a practical arrangement if projects are big enough to employ several full time workers. This leads to easy communication between the members of the team and directs the attention to the task. Projects are a good way to manage development tasks that are large and well planned. The third way to organize work is an attempt to find a process organization, so that for example concepting in the early phase of R&D is concentrated in the same team.

It seems then that it is not practical to analyse the communality of only one type of R&D, but three rather distinct forms can be found. I will call them *a specialist community*, *a project community* and *a transprofessional community*. This is in concert with Eriksen's definition of a social system based on interaction (Eriksen 2001). When it comes to professional education, the core skills define the most important boundary against other professions, because during education, schools are almost like real communities. When looking at R&D, the first defining factor is the collection of people with which an employee works and the task type. Therefore, interaction is again a relevant aspect in finding boundaries for social systems, or communities. The three types of teams differ in the perceived work environment that results in different boundaries of the communities.

There are also other potential boundaries in R&D that may be relevant when investigating the communality. Such boundaries are between R&D and other parts of the organization, between the main company and a subcontractor as well as between the industry and the academic world. These boundaries will be commented on in the analysis.

The first two groups, a specialist community and a project community, are widely studied in the management literature, but the third is new in industrial R&D. Specialist teams appeared first and were used in traditional first and second generation R&D – models. The third generation brought project organization into companies and it seems that the fourth generation has resulted in yet a new form, *transprofessional teams*. Therefore, this distinction of three types of teams

also refers to the theme of change in my thesis. Further on, they differ in the type and degree of communality that makes the distinction interesting. In the early phase of my work with the thesis it appeared that the issues of multidisciplinarity are most interesting in the last form of an organization, because the other two are more profession-based and the teams maintain the old professional boundaries. It also seems that mixed teams are typical of the front end of the R&D-process and that they are quite recent phenomenon.

I will divide my analysis into five aspects of communality as I did in the previous chapter, but I will comment on all types of communities separately. Firstly, I will present an analysis based on coding and then a summary and the key story for each community type, as I also did in the previous chapter. I will use similar aspects of communality, namely boundaries, common destiny, community symbols, creativity and a variation of business orientation, meaning the notion of a customer.

4.2 Communality and change in the R&D practises

4.2.1 Boundaries defined by work processes and organization

Specialist communities

In a specialist's team, the group has been established around a task or for part of a process that requires certain professional competence. Performing the task often also requires specialized physical facilities like laboratories with certain equipment. The work process is understood as a specified way of doing a task. This means that the roots of the work processes are in the discipline and profession, whereas the management of a company has not enough expertise for leading it as regards substance. A process may be performing a FEM-analysis, making drafts for visual design of certain details of the product, making sales leaflets or market surveys. Professional processes are efficient in repetitive tasks, which are needed in the later phase of R&D when the final products are made. If a company is big enough to make long-term basic research, specialist teams are also used because of the high level of skills needed. Specialist teams make it possible to bring professional routines that create feeling of safety, as one of the interviewees stated.

"Some people want to do such, you could say more routine-like job and they may even get stress from, that there is lots of these thoughts, which are thrown in the air. So, more natural place for them is to be in the development phase of R&D. And for those who are more open to new ideas, they will go to the front end of R&D-process"[21]

"When we speak about basic mechanical designers, there they hit on their own limitations there, so that they do not want to take any risk and play for certainty always..."[22]

Specialist teams are also common in companies operating as subcontractors. This is natural because they make only part of the product. People may feel safe in such smaller organizations when there is a sense of community and the possibility to get help. When working as a subcontractor, the boundaries of the community, defined as amount of interaction, are very clear. Subcontractors have strict agreements on time, money and results. Therefore, they cannot take risks but have to ensure the minimum result required by the contract. This both allows and requires for concentrating on agreed tasks only, whereas within a larger company there may be lot of requests for help from the other parts of the organization. The advantage of working as a subcontractor is that there are no such small jobs but it is possible to concentrate on the key tasks only.

"But the outsourced ones has many time the benefit that they can concentrate more to the task what is given, whereas internal functions often have lost of other jobs inside the company, when the quality and speed of work can be better outside..."[23]

Competence is one reason for subcontracting. A company may not have enough of a certain type of work to justify having a laboratory and a work group large enough. Sometimes, the development work is done together with a subcontractor and the main company. In this case

[21] *Että jotku haluaa tehdä semmosta, vois sanoa niin ku ehkä rutiininomaisempaa työtä ja niille saattaa tulla jopa stressiä siitä, että on paljon tällasia ajatuksia, mitä heitetään ilmaan. Niin niille sitte luonnollisempi paikka on olla siellä tuotekehityksen siinä tuotannollistamisvaiheessa. Ja sitte taas tämmösille uusille ideoille avoimille, niin ne siirtyy siinä tuotekehitysprosessissa sinne alkupäähän päin.*

[22] *...ett kun puhutaan ihan perusmekaniikkasuunnittelijoista, niin siellähän tulee ne omat rajat vastaan heillä, ett he ei halua ottaa riskiä ja pelataan aina varman päälle...*

[23] *Mutt sitten ulkoisella on se etu monesti, että pystytään paremmin keskittymään siihen tehtävään, mikä on annettu, kun sisäisellä funktiolla on usein kaikenlaista muuta tehtävää siellä organisaation sisällä, jolloin työn laatu ja nopeus voi olla ulkona parempi*

there is a risk of problems.

> *"Then the internal resource may feel that the outsourced one can do the job with better set up and therefore gets better results."*[24]

However, there might be big mental gaps between the departments of a large organization that create similar problems.

One boundary that emerged from the data was the one between the public research institutes and the industrial companies. Universities are organized as faculties and are like specialist organizations. Therefore, universities were treated as subcontractors when long-term cooperation was needed, but he problem was to find the right partner.

> *"But how I see the use of universities, is that, that you must find a right partner there. There is quite a large supply, with whom you can cooperate. So the real challenge is that, to find just that, just right partner for our purpose. And it is such long term partnership with some key players."*[25]

One possible role of an employee is to be the company's only specialist in a restricted field. This role is demanding because the specialist represents that field for the whole company and there is no clear group for them to rely on. The professional identity must be very strong in order to survive. Such positions are typical for design managers, environmental specialists or controllers. Such a challenge may be interesting and rewarding, but sometimes people feel lonely without colleagues and may even leave the company because of that.

Project community

In a project worker's community, life is organized according to the project management manual. It consists of deal-lines or milestones, tasks, roles like project managers, task forces and

[24] *sitt taas niin ku sisäinen resurssi saattaa kokea, että ulkoinen resurssi pääsee paremmin eväin tekemään samaa työtä ja saa sen takia parempia tuloksia aikaan.*

[25] *Mutt miten mä näen yliopistojen käytön, on se, että sieltä täytyy löytää niitä oikeita kumppaneita aina. Siellähän on varsin laaja tarjonta, kenen kanssa voi tehä yhteistyötä. Niin se todellinen haaste on se, löytää se juuri, juuri oikea tähän meiän tarkotukseen. Ja se on semmost pitkän aikavälin partneruutta sitte joittenki avainpelaajien kanssa.*

stakeholder contacts. The basis of the work is the process and the required skills are related to management. Project teams are often multidiscliplinary, since they consist at least of members from different branches of engineering. The different roles in the project life define the required skills. One natural role is that of a project manager. They are responsible for meeting the specification of the project. A project is a specific entity; it has a specified outcome, named resources and planned progress, which are usually reported on a regular basis. One reason for using the project organization is that projects force several people to work together and settle their differences by creating a common frame for the work. Project organizations are traditionally used in manufacturing. Typical examples are house building or shipbuilding. The same work model was first introduced in the product development phase and there is an increasing tendency to apply it in concepting phase in the front end of R&D. A salient aspect of a project worker's community is that it is often temporary. Projects come and go and the co-workers often change.

Communication defines the boundaries of the community also in this case. The project environment requires tasks to be efficiently communicated to other team members. This is a challenge if the team consists of members from several professions, organizations or different organizational units of the same company. In such an environment, the different languages of the groups may cause severe conflicts.

> *"... there are certain challenges in communication, when the other has a strong background in software and the other like in graphic design, so they do not always speak... speak the same language, so that both must the stretch to the other's quarters, so that they can understand what is really the issue..."*[26]

> *"In the worst case the situation may be such that in the meeting, where some decisions are made, some professions are not taken along, because it is thought that they start doing things from their own viewpoint and thinking issues that do not belong to this phase of the project...*[27]

[26] *..siin on tiettyjä kommunikaatiohaasteita, kun toisella on se vahva softatausta ja toisella esimerkiks joku graafisen suunnittelun tausta, niin eihän ne aina ihan puhu, puhu samaa kieltä, ett siinä sitten pitää pystyä vähän molempien osapuolien venymään sen toisen tontille, että pystyy ymmärtämään, että mistä, mistä oikeesti on kyse.*

[27] *Sillonhan pahimmillaan tilanne on jopa se, että palavereihin, joissa tehdään jotain päätöksiä, ei oteta*

The boundaries of a project community are also defined by the specific roles within the project. The role of the task force is to do their part of the project by using their professional skills. In that sense, the mindset is largely functional and therefore similar to specialist communities. However, the project is set up to accomplish something concrete and the group has usually brought physically together in order to achieve orientation around the task. The professional skills are the reason for belonging to a project group but the work is oriented towards the task. Fast problem solving and fixing the problems are also necessary skills because the virtue of a project worker is meeting the dead lines.

> *”It is like typical to us that we have certain time schedules and we have certain school, we have to go, so we have this like, we have horrific bursts, so that then we go like... so that we really are in a hurry. And then we get results.”*[28]

This sort of setting is difficult for those who want to create things freely, as in the academic circles. The difference between the academic world companies is that in industry, a group needs to do what is agreed with the customer, and not only research for the sake of curiosity. A joke illustrates the point: A manager once complained that “the problem in our R&D is that R’n’D means ‘research, no development’ instead of ‘research and development’”.

> *”For example, that someone has really... really academic attitude, so it is... at once alarm bells ringing, that this is not necessary... not a good engineer, in the sense that here we should get things done also and not always research and research and research. So that’s one. That there is, are many applicants that have so in principle been like based on papers been extremely good applicants, but it has just in the interview appeared, appeared that it does not, not necessarily fir into our kind of project, project job.”*[29]

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jotain ammattikuntaa mukaan, koska ajatellaan, että ne alkaa heti tekemään asiaa omalta kantiltaan ja ajattelemaan asioita, jotka ei kuulu tähän projektin vaiheeseen.

[28] *Se on niin ku tyypillistä meille, ett meillä on tietty aikaskenaario ja meill on tietty koulu, mihin meiän pitää mennä, niin meille tulee tämmösiä, ett meill tulee ihan hirveit rypistyksiä, ett sitt mennään niin ku, ett on tosi kiire. Ja sitt syntyy.*

[29] *Esimerkiks, että on hyvin, hyvin semmonen akateeminen suhtautuminen, niin se on, heti hälytyskellot soi, että tää ei välttämättä ole, ole sillä tavalla hyvä insinööri, siinä mielessä, että kun täällä pitäs saada asioita aikasekskin joskus eikä vaan tutkia ja tutkia ja tutkia. Niin se on, se on yks semmonen. Että on, on monia hakijoita, jotka on periaatteessa ollu näin niin ku papereiden perusteella erittäin hyviä hakijoita, mutt sitt se on vaan haastattelutilanteessa käyny, käyny ilmi, että ei, ei välttämättä sovellu tähän meidän kaltaseen projekti, projektihommaan.*

The role of the project managers is to integrate the whole project, and to make sure that everybody in the group understands what is expected of them. They are also representatives of the project outside it. Project managers report progress and explain deviances. They must start the project by translating the requirements of the customer that has given the assignment, that being the management of the company or other company in the case of subcontracting.

The project work requires certain virtues or skills in addition to purely professional skills. These are the capability to deal with time schedules, dead lines and fixed resources. Certain flexibility is needed in order to keep the schedules when something unexpected happens. It is also necessary to be able to communicate your ideas to others under time pressure. This is an area where management skills and group dynamics are in focus, at least for the project managers. Being a manager is often seen as a profession, and many managers are proud of their ability to lead any project without knowing much about the content.

In a way, the boundaries of a project community are then clear. Things are more complicated if a person has to work in several projects. In this case, they might form their own social systems, as defined by Eriksen. It is also common that specialists have to work in projects. Therefore, a pure 'project community' can be treated as an ideal type, in the spirit of Weber. Professionalism has a different role in a project community than it has in a specialist community. In the latter, the profession is constitutive for the group and it defines its boundaries. In a project community, the task of the project is constitutive and defines the boundaries of the group, although certain professional skills are needed for completing the task.

Transprofessional community

Professional specialty defines specialist communities, orientation around specific tasks defines a project community, but work process defines a transprofessional community. The concept of transprofessional communities is rather new and not as easily defined as previous ones, already widely analysed in management literature. Powell and Pickard say (2005) that "traditional professional demarcation points are subsumed within a wider 'trans-professional' understanding of what it means to be good at your job." Transprofessionality is a very important concept for the rest of the thesis and it may be useful to make a contrast between multiprofessionality and

transprofessionality. Project groups may be multiprofessional in the sense that they contain members with different professional backgrounds. Professional skills are the reason for being included in a project team and therefore, professional limits are maintained. In a transprofessional team, the members perceive professional boundaries as negotiable and blurred. It is possible to surf in anybody's field if it benefits the process and if ones own competence allows for such surfing.

Transprofesssional teams take care of certain parts of a company processes making multidiscliplinary staffing necessary or beneficial. Such parts may be the front end of R&D (often called concepting) or the marketing department, which designs the product portfolio of a company, or a design office, which creates product proposals for bigger subcontracting companies. Typical of this process is that a combination of different professional skills are needed, such as technical knowledge, business skills, understanding user view, delivery chain planning and so forth. It is clear that transprofessional teams have emerged in connection with R&D but they can also be close to academic research, empirical studies, finding new knowledge and learning.

> *"I run like concepting department nowadays, where we have then one designer in addition and four engineers, engineers here. So I'm in charge of concepts of new products in the house and industrial design, ergonomics of the products and so worth. And then I'll be with... like marketing and communication to deal with... so that we got the message from them... what is done in R&D, so that we'll get it into market. And then I'll be awfully lot with the customers."*[30]

> *"...I don't want to continue there in like a closed community but I wanted more to the boundary where research is interested on user, consumers, design, all that in addition to R&D"*[31]

[30] *vedän tämmöstä konseptiosastoa nykyään, missä on sitte lisäks yks muotoilija ja neljä insinööriä, ea-insinöörejä täällä. Eli vastaan koko talon uusista tuotteiden konsepteista sekä teollisesta muotoilusta, tuotteiden ergonomiast, käytettävyydestä ja niin poispäin. Ja sitte oon näitten, elikkä markkinoinnin ja viestinnän kanssa hirveen, hirveen paljon tekemisissä, että saadaan niistä se viesti, mitä tehdään tuotekehityksessä, niin saadaan se markkinoille. Ja sitte lisäks vielä hirveen paljon asiakkaitten kanss tekemisissä, elikkä.*

[31] *..mä en enää haluukaan jatkaa siellä niin kun tietyssä suljetussa yhteisössä, vaan mä halusin enemmän siihen rajapintaan, missä tutkitaan sitten sitä kaikkee, mikä liittyy käyttäjään, kuluttajaan, muotoiluun, kaikkeen tähän sen tuotekehityksen rinnalla.*

The work process may consist of projects but the briefing is more flexible and open. The process separates the phases of opportunity searching and implementation. The ideal process contains concepting, product definition, product development and implementation. A different group may take care of each phase. This means that the task must be transferred from one group to another. These transfers are called handovers and often cause friction.

A big problem in the process may be the large amount of decision makers who want to have influence. The compensation of mid-level management might not depend on the quality of the final product. Then the time-to-market may be more important in management's minds. This shows how the process defines an important boundary. The concepting team is responsible for the concept that they have created together, but the rest of the organization is 'outside'.

> *"Let's say, the big kind of problem is the decision making process. So, that the more, there is, is decision makers, the more difficult it always is. And, and all cannot be present always and however, it is a pity that there are lots of decision makers, who always want to put their own thumb into the supper, although they have not been... so closely involved in the process..."*[32]

Because transprofessional teams often have a permanent assignment, like being responsible for maintaining a product portfolio, they are rather lasting. People may work together for a long time in the same premises. Therefore, communality may be very real. On the other hand, the whole team must have lots of outside contacts due to the nature of their task. The role of professionalism is small since it does not define identity and it is not used as defining boundaries. Flexibility and diversity are appreciated with regards to professional skills. Characteristic to a transprofessional team is that the members may have several professional competences.

[32] *Sanotaan, että niin ku suuri probleema on, on päätöksentekoprosessi. Että mitä enemmän on, on päättäjiä, niin sitähän hankalampaa se on aina. Ja, ja kaikki ei aina pysty olemaan paikalla ja kuitenkin se on harmi, että on paljon sellasia päättäjiä, ketkä aina haluaa laittaa sen oman peukalonsa siihen soppaan, vaikka ei oo niin, niin tiiviisti ollukaan mukana siinä koko prosessissa.*

4.2.2 The role of core professional skills

Specialist

In this group, professional skills are the decisive source of identity and group membership. Therefore, the myths and stories align with those described in the previous chapter. Specialists are doing the work they are trained for and their aim is to become better and better in that. Engineers make calculations or code software, industrial designers create visual concepts or make icons for user interfaces and marketing economists write sales leaflets or plan product-launching campaigns. They work in devoted departments or teams with other professionals from a similar or related field. The boundaries of the communities are similar to the ones in the education phase.

Engineers are described as being fact-loving, designers think visually and work for themselves. Specialists often mention problems with boundaries, e.g. a like a designer's idea might be impossible to implement or the engineer's ideas lack imagination and emotion. Engineers are proud that they can produce equipment approved in real tests. Designers are proud of their ability to draw, present wild concepts and understand materials. Marketing economists are proud of their skills in creating appealing campaigns that invite buyers.

> *"Well, typical example is such, that like user interface designer make a nice user interface and then it was said to be quite fine but impossible to make in practise."*[33]

> *"...if like an ordinary software designer is let to design user interfaces, they'll be a bit difficult, because they work with this engineer pretty well, but when we take ordinary passers-by from the street, they cannot necessarily use those interfaces."*[34]

In a specialist community, the core professional skills have a similar role in drawing boundaries as is the case with students. The skills unite members of the group and make the others outsiders who cannot understand the jargon.

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[33] *No, tyypillinen esimerkki on semmonen, ett tämmönen käyttöliittymäsuunnittelija tekee hienon käyttöliittymän ja sitt se todetaan, että ihan hieno, mutta sitä ei voi käytännössä toteuttaa*

[34] *jos tämmönen tavallinen softasuunnittelija pääsee näitä käyttöliittymiä suunnitteleen, niist tulee vähän vaikeita, koska ne toimii tällä diplomi-insinöörillä ihan hyvin, mutt sitt, kun otetaan tuolta tavallisia kadun tallaajia, niin ne ei välttämättä enää osaakaan käyttää niitä käyttöliittymiä.*

The project community

Project work squeezes professional skills into a certain format that requires manageability, detailed description of work tasks and regulated interfaces with other members of the organization. Typical project manuals define close connections with other functions of an organization and the company IT- tools enforce this in practice. There are systems like CAM (Computer Aided Manufacturing), CAD (Computer Aided Design), design for X, where X can be maintenability, manufacturing, user, accessibility etc. These systems create links across organizational boundaries and connect the work processes. In big companies, there are 'Enterprise Systems'; information systems that spread over all activities in a company, like writing technical information, maintenance and storing. These systems often dominate the project work completely. All drawings may be made for a company-wide database and used by manufacturers, maintenance departments and spare-parts stores. This data system then controls and defines the whole work process and the life of a project worker. The key words are dead lines, specs (specifications), gate, approval criteria, cost target, performance measurement and so forth. They constitute the language of a project, not traditional engineering or design language. Normally, is that there are written descriptions for both the content and approval criteria of project phases. They are called gates or decision points. They are used for deciding whether the project is allowed to continue. Often, subcontractors are required to comply with the main company's processes.

The project environment is a challenge for professional differences. Everyone working on a project must accept that they are judged based on the success of the project, not on the virtues of their profession. It may be a very stressful situation and it is common that representatives of different professions start to compete. The individuals in a group see themselves as representatives of their own profession and defend it.

> *"I've developed like, when we speak about age racism and and others... other racism problems, so there are such concepts like 'engineer racism'. So that some people who are not engineers, so they think that engineers are simple tube brains that cannot think but only one thing at a time. And of course other way round, so that I think, that against such a very artistic person a tight engineer feels it like, like illogical and wandering, or*

troublemaker. So that in there such a tolerance for difference, so it is a challenge in a mixed group like this and it may be a difficult thing."[35]

A project community is a challenge for people used to work in a specialist community. The solution is to emphasize the common task uniting the team in that way. In a good project team, members have accepted the differences and learned to attenuate them. Instead of competing, the contribution of others is accepted as necessary for completing the task. The project management language, surviving in the common environment and many common IT-tools supplement the professional skills. This also allows project workers to change the group easily. They can find a similar language and project manuals and orientate towards the next task and the outcome of a new project. Working in R&D projects can be perceived as a professional skill itself.

The transprofessional community

When people are continuously working with the same colleagues with different backgrounds, they gradually learn basics of each other's skills. This makes even switch of roles and tasks possible. Professional differences are blurred. The project language is also present as part of the overall skills.

"And, and, at the moment is more like a team, reverse cooperation. Like designers have become engineers and engineers have become designers and, and, perhaps marketing people have become designers. I mean... it is... it has got so open this game and... and... and the way we work has changed awfully much, like concepting has become more important all the time, that is cheaper to do in that phase, before going into developing phase"[36]

[35] *..mä oon kehittäny semmose, kun puhutaan ikärasismista ja, ja muistaki, muistaki rasismiongelmista, niin sitte on tämmösii käsitteitä, kun "insinöörirasismi". Ett jotkut, jotka ei oo insinöörejä, niin ne tykkää, ett insinöörit on yksinkertasii putkiaivoja, eikä ne pysty ajattelemaan kun yhtä asiaa kerrallaan. Ja sitt on myöski tietysti toisin päin, että kyll mä luulen, ett tämmöset hyvin taiteellist ihmist kohtaan niin ku tiukkalinjanen insinööri kokee sen, sen, tuota, niin ku epäloogiseks ja harhailev, harhailijaks tai häiriköks, että. Ett kyll siin tämmöne niin ku erilaiste, erilaisuuden sietämiskyky, niin se on tietysti se haaste tommosessa sekaryhmässä ja se voi olla vaikee asia...*

[36] *Ja, ja tällä hetkellä se on enemmän tiimi, kääntöyhteistyötä. Elikkä muotoilijoista on tullu insinöörejä ja insinööreistä on tullu muotoilijoita ja, ja ehkä markkinoinnin henkilöistä on tullu muotoilijoita. Siis se on, se on muokkaantunu hirveen avoimeks tää peli ja, ja, ja, tota, muutenkin niin kun tapa, miten me tehdään, niin on muokkaantunu hirveen paljon, elikkä konseptoinnista on tullu tärkeempi koko ajan, mikä on niin kun siinä vaiheessa vielä halpaa tehdä, ennen kun se menee sinne varsinaiseen tuotekehitykseen*

”But, eh, it has been mixed all the time that,.. that boundary, so that why I’m glad, is that... so that engineers have started to make so good pieces that there no need to touch them anymore. And the designers have begun to make so good mechanical things that they do not require any changes.”[37]

It is possible then to even change the professions, depending on where your interests lay. Organizational boundaries are more important than professional ones. It is important to find problems and their solutions. A willingness to learn new skills is also crucial. An academic interest in research is not enough. Practical work is also required. The workers must also have a wide understanding of the goals. They must understand the customers, the usability of the products and company’s business conditions. The implementation phase of R&D is shared between designers and engineers. However, this flexibility does not mean that they have to abandon their own roots. Sensory issues like the visual appearance and the tactile feeling of materials are the designer’s jobs and making exact strength calculation still requires engineers. Typical to transprofessional teams is the willingness to stretch to other professional fields, and avoid defending ones own professional skills as forming boundaries. A transprofessional team is willing to invite new professions along as well.

”And we should get like in the product development teams we need, so, there are engineers, but we’d get more marketing people, what is really clear view already and... And in some places there are priests and policemen in the R&D organizations, but like wider skills... like personnel more than just engineers and designers.”[38]

Typical to these teams is that they are organized as multidisciplinary teams, containing representatives from many areas. The difference to other units of the same company can be big. Although flexibility is a virtue, there are different roles as well, e.g. innovators and administrators. Different roles can be selected according to personal character or they can be adopted based on the phase of the task.

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[37] *Mutta, tota, kyll se koko ajan sekottuu se, se rajapinta, että mistä mä oon ilonen, että, että insinöörit alkaa tekemään niin hyviä tuotekappaleita, että niihin ei tarvi enää puuttua. Ja sitte taas muotoilijat alkanu tekeen taas niin hyviä mekaniikka-asioita, että niit ei tarvi muutella, elikkä.*

[38] *Ja pitäs saada niin kun tuotekehitystiimeihin muotoilijoiden lisäks tarvis, no, siell on insinöörejä, mutt pitäs saada enemmän markkinointihenkilöitä, mikä on ihan selkee näkemys jo ja. Ja joissain paikoissahan on myös pappeja ja poliisejaki tuotekehitysorganisaatioissa, mutta niin kun laajaosasempaa niin kun henkilöstöä, kun vaan pelkkää insinööriä ja muotoilijaa.*

The introduction of a transprofessional organization has resulted in a call for new skills. Old and traditional professional skills must be managed in order to get things done. Management skills typical to project organizations are also needed in order to orientate in the company in general. Multidisciplinarity, flexibility and learning are the new virtues and skills needed. As communities, the transprofessional teams are more permanent than the project teams. That makes it possible for the members to learn and feel safe, without a need to keep professional skills as their fundamental source of identity, which must be defended against other professions.

4.2.3 Community symbols

The specialist community

Because the community is based on professional skills, the community symbols are also very often related with the professional symbols. The professional language is the easiest to recognize, but also the way tasks are formulated as well as briefing are important. Briefing must be done with the professional interest and competence in mind, otherwise it will be rejected. Physical premises often shape the symbols of the specialist communities. They may work close to laboratories and carry equipment needed in the work. Work places are decorated with samples from the production, prototypes, mock-ups and so forth. Engineers encircle themselves with components, colourful FEM-analysis pictures, complicated assembly drawings and test reports that are hanging on the walls of an engineering team.

> *So that if for example in this product development process we use like functional specs, so it is functional specs that form then operational specs. And it is very typical this way to manage engineering work. So that we have this functional specs that is then written open and so we get operational specs, that defines like such technical performance values and others. And it is rather efficient way to manage engineering work. But in the design, you can try to write such a specs, but it is a bit chall..., or difficult. So that there we try to capture certain feeling and then we stat describing that feeling, for example with words like calm, intelligent, and alike, and start looking for it."*[39]

[39] *Ett jos esimerkiks täss tuotekehitysprosessissa me käytetään niin ku semmosia funktionaalisia spekseja, niin se on funktionaalinen speksi, mistä muodostuu sitte operationaaliset speksit. Ja se on hyvin tyypillinen tämmönen tapa ohjata sitä insinöörityötä. Ett meill on se funktionaalinen speksi, mikä on sitte auki kirjotettu ja siitä tulee ne operationaaliset speksit, missä määritellään jo tällasia teknisiä*

Each group has its own tools, which are the only correct and possible ones. It is impossible for an orthodox industrial designer to touch Vertex, they must have Rhino, whereas Excel is the economists' tool and engineers need Matlab. Specialists visit the same trade fairs, read the same trade magazines, are invited to join the same supplier parties, and they know the same professors and so forth.

The project community

The tools are also important in a project community, but common tools are now project management programs, email, voice mail, shared calendars and the like. The walls are decorated with time schedules, specifications, and lists of recorded defects or punctuality curves. There are also many performance measurements, like costs or technical qualities of the specification, like speed or noise or something similar. Every member of a project group also has own professional tools, but they are now personal. A common reporting system forces everybody to use Excel or possibly the company's enterprise system. All have the same templates for writing research reports and submitting drawings to the data management programs.

The success of the project is often reported in the company's management group meetings, where the project managers must present the progress of the project, report the costs and compare them with the budget figures. Many companies have common forms that are filled for the meetings and those forms are important symbols. Every member of a project is informed about the status of the project. In this way, all the sins and achievements of the project teams become public and open for discussion and speculation. This makes project groups aware of each other, because they often need common resources and must compete for them.

Quite often, project groups celebrate their progress, like meeting a dead line on time or meeting the specifications. They are a kind of transition rituals. Rewarding a project group is also based on the success of the project, so a certain part of the salary is dependent on whether the objectives of the project are met or not.

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suorituskykyarvoja ja muita. Ja se on tällanen aika tehokas tapa ohjata tota... insinöörin toimintaa. Mutta sitte taas muotoilussa, niin kyllähän semmosta speksiä voi yrittää kirjottaa, mutta se on vähän haas, tai hankalampaa. Ett siellä lähetään sitte niin ku tavottelemaan ehkä jotain tiettyä fiilistä ja sitte lähetään

The transprofessional communities

Transprofessional groups are mixtures of several professions and an important part of the professional skills are project management skills. The community symbols are a mix as well. Characteristic is that the symbols refer to the process for which the group is responsible. Often, it has something to do with concepting, innovating, taking care of a product portfolio or creating a product specification. Language and a set of professional tools have emerged around these tasks as well. Typical terms are trend analysis, open innovation, concepting, user research, networking, killer application, customer orientation and so forth.

This group emphasizes flexibility, creativeness and a sort of playful, relaxed and individual attitude. Their walls are decorated with pictures illustrating creativity, alternative solutions, brain teasing exercises, icons of killer applications and symbols of success stories in business. Pictures from their customer's environment are common, too.

> *"We have, how should I say, we have these, we speak about, this is not an official term, but speak about [song]-meetings. So that we listen [Finnish pop-music] and, and generate ideas. It is that, that we have designers and engineers mixed and, and we try to solve new things and, and and so it is really open game, so we do not have any roles, we don't, I don't feel that we have any roles there, so that, that you are in charge of mechanics and don't come to my quarters or other like it..."*[40]

4.2.4 Creativity

The specialist community

The R&D function deals with creativity, aiming at new products. In commercial contexts, the legal dimension of creativity is important. This appears in the form of intellectual property rights

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kuvailemaan sitä fiilistä, esimerkiks jollain sanoilla rauhallinen, älykäs, tälläsillä, tai lähetään hakemaan sitt.″

[40] *Meill on, mitäs mä sanon, meillä on tämmösiä, me puhutaan tämmösistä, tää ei nyt oo mikään virallinen termi, mutt me puhutaan [biisi] -palavereista. Ett me kuunnellaan [Finnhitsejä] ja, ja ideoidaan. Se on se, että, että siell on muotoilijaa ja insinöörejä sekasin ja, ja me yritetään ratkasta uusia asioita ja, ja, ja, ja, siis se on tosi avointa peliä, niin ei meillä oo sellast roo, ei meill, en mä ainakaan tunne, ett meillä on mitään semmost roolitusta siellä, että, että sä vastaat nyt vaan pelkästään mekaniikasta, että älä sä nyt tuu mun tontille tai muuta vastaavaa.*

(IPR). When it comes to engineering, the property consists of inventions that are protected by patents. Designers may have copyrights and the company in general has trademarks, protected logos and so forth.

Creativity is then part of the professional skills and its form varies from professions to profession. The tool used for boosting creativity varies as well. Engineers rely on methods like TRIZ and root cause analysis. They use analogies based on other technologies and systematic reasoning. Imagination is a more common term for designers, since they concentrate on the context of use, cultural aspects and so forth. Economists' market communication finds its roots in advertising. All are familiar with brainstorming and other general instruments used for collecting ideas.

Professions have different positions as regards IPR, because Finnish legislation separates patentable inventions from other creative products. If the inventor has a work contract, the employer has a right to make use of the invention. Moreover, the employer must compensate financially if the company takes over the rights to the invention. Similar legislation does not exist for all groups, except for copyrights to artistic products like photographs, musical compositions and so forth. This may cause communication problems inside teams, because the inventions are personal. The individual employees are treated as inventors in the legislation. If the rewarding system of a company is not well planned, it is the beneficial for the individuals to keep the information themselves and invent alone.

IPRs are also an issue in subcontracting. According to the contract, the main customer usually has the right to the inventions made by the subcontractor's personnel. They do not have the motivation to encourage inventions, but merely execute what is agreed. Long-term innovation is especially difficult for subcontractors. The problem is emphasized if the same kind of work is done both inside and outside a company.

> *"... some problems anyway. In the sense that in contracts, the inventions done by the subcontractor belong to the customer. And the customer pays always for its own resources, they are under the work contract. But customers never pay to subcontractor's worker's for similar inventions. And the subcontractor cannot start paying for making inventions to customers, if it does not bring money from customer to the subcontractor.*

Because it would lead to such that if there was a project that had suddenly lots of inventions, the project would run totally red in subcontractor's side and there should be a brake in the next project, so that do not invent so much."[41]

The project community

Creativity in this group appears in the problem solving of every-day issues. It is related to the fluent progress of the project and answers questions like: who will do the job when X is sick? What to do if part X is delayed? What to do if component Y failed in the test? Practical orientation is needed because rewarding the group is based on meeting the deadlines. Expressing own professional skills may be difficult and this is what often creates conflicts between professional groups. Engineers want solutions that put their expertise in the front, like quality and power or efficiency. Visual designers want their imagination to be the point of departure. Economists are interested in relations to competitors, unique selling arguments and market price.

This might be a problem for those who have professional ambition and a willingness to shine through their individual skills. It is also a problem for the perfectionist who wants to continue developing endlessly. The experience might be that management (the project management or the company's management) suppresses innovation.

"So that even if in principle there is a date, so that it is in this point and it must, it freezes the design, so they still have kind of... like a skill that they can anyway tell to the management that, this can be still done. And after a while, this changes more."[42]

[41] *..jotain ongelmii kyllä. Siinä mielessä, että sopimusteknisestihän alihankkijan tekemät keksinnöt kuuluu aina asiakkaalle. Ja asiakas omille resursseillensa maksaa aina palkkiota keksinnöistä, työsuhdekeksinnöistä. Mutta asiakkaat ei koskaan maksa alihankkijan työntekijöille vastaavista työsuhdekeksinnöistä palkkioita. Ja sitten taas alihankkija ei voi työnantajana lähteä palkitsemaan siitä, että joku on keksiny asiakkaalle asioita, jos ei siitä tuu mitään rahaa taas sitt vastaavasti toimeksiantajalta alihankkijalle. Koska sehän johtas siihen, että, ett jos tulis projekti, jossa olis valtavasti yhtäkkiä keksintöjä, niin se projekti menis pakkaselle totaalisesti tän alihankkijan puolella ja sitt täytys seuraavassa projektissa laittaa jarruu, että älkää keksikö niin paljo.*

[42] *Ett vaikka niin ku periaatteess annetaan joku päivämäärä, että se on nyt tässä kohtaa ja se pitää se, se jäätyy se design, niin silti niill on jatkuvasti joku semmonen, joku semmonen taito, että ne kuitenkin pystyy sinne päättävään portaaseen sitte niin kun kertomaan, että kyll tää viel, että kannattaa tehdä vielä. Ja sitt pienen ajan päästä, tää vielä kannattaa tehdä.*

The transprofessional community

This group wants to create something brand new instead of solving problems in existing products. The scope of innovation is perceived as wide, but usually it is based on searching for a business opportunity by finding a new solution for a new or emerging need. This group does not want to limit their creativity to physical products, they create services, earning logics and, if somebody asks, even constitutions for states, because they feel limitless.

A transprofessional group wants to have a big paintbrush that they use for colouring large visions with radical innovations. For that, they use concepting or scenario analysis or perhaps global PESTE –analysis (Political, Environmental, Social, Technical and Economical trends). A concepting team is the most recent form of organizations in R&D and it is connected with the fourth generation of R&D. It attempts to go further than merely concentrating on incremental improvements that contain no real paradigm changes. It also has a bearing with the development of markets, where the products are more and more similar and the differentiation from competitors must be based on other issues than technical performance. It also has something to do with the world being smaller and customers more remote.

Concepting teams are common in the front end of the R&D, but maybe these teams will take care of the development through whole R&D – process in the future. This could reduce the difficulties of handovers.

Innovators in transprofessional groups may feel that the management suppresses innovation. The reason is not necessarily the time schedule or the costs, but the right to initiate. There is a gap between the concepting team and the strategic management team, because the top management wants to control the fundamental issues in the business. A too innovative group is a risk. A means of maintaining the control is often regulating the access to information, sales figures, customer contacts and so forth. Mid-level management may also use its position as a gatekeeper.

> *"But the biggest problem is then, so that, even if we find something new in the concepting phase, like that, in a way, is that the new thing then goes to the strategic management, who then develops the new ideas and brings, no, or like defines where the company is*

going. There might be also the problem that, as I mentioned before, that middle steps may sometimes censor even too much"[43]

Creativity is a uniting aspect in the life of transprofessional team members. What makes it different from other communities is the inclination to understand creativeness as a wide perspective and a new vision.

4.2.5 The 'Customer' as a symbol of business orientation

The specialist community

The term 'customer' often has two meanings in an industry. The customers are divided into internal and external ones. Of course, the first use of the word is as a metaphor that emphasizes the fact that in private companies there are other interests than purely professional ones. The talk about internal customers was launched in specialist communities precisely to direct attention to these interests. Today, this is still a relevant point. In a way, the customer of a specialist team is the person or department who gives the briefing for the job.

External customers tend to be quite distant from the specialist community. In the position of a customers in this group may be the boss, other department or the company that allows the individuals to exercise their job and offers them challenges. The customers of subcontracting companies are the larger companies who order the work. The customer of an industrial designer might be the user of the product, but the customer can be also a design director or a colleague. Economists speak about the one who makes the buying decision, meaning that the customer is the man with the money. They also theorize with other stakeholders.

The notion of a customer is diffuse and negotiable. However, it is used in discussion as a rhetoric resource in an interesting way. The purpose of industry work is to manufacture products for money. However, it may be difficult to understand the needs and preferences of external customers, if individual's work is very specialized and the work is divided into many teams that

[43] *Mutt suurin probleema on sitte, ett jos, jos siinä konseptointivaiheessa löydetäänkin jotain uutta, niin se, ett tavallaan se, että se uus asia sitte menee ihan sinne strategiselle johdolle saakka, ketä sitte niin ku kehittää niitä uusia ideoita ja tuo, ei, tai niin ku määrittelee, mihin suuntaan yritys on menossa. Siinä voi usein tulla myös se probleema, mitä aikasemmin mainitsin, niin, niin ne väliportaat voi joskus sensuroida jopa liikaa.*

all make only a fraction of the components.

> *"The more, more we have organizations, so, especially when we speak like there are many teams involved, or it is. All do not always understand that we are running at, and working together and there is the common goal."*[44]

In a discussion, however, the word 'customer' is used as a means of emphasizing the importance of the individual professional group, but in different ways. Engineers talk about efficiency and customer savings in energy costs, designers talk about a sporty appearance or usability, marketing people want to create a brand and add customer value. There is a continuous negotiation going on between teams, because different aspects mean different challenges for the professional teams.

> *"And from technology point of view we have for example in the next or in the following year's technologies and feature that can be realized. And they create benefits for the customers and those benefits create the value before the customer actually buys."*[45]

This kind of reference to business language is an indication of change in R&D. Even specialists have to understand that argumentation must be done in the language that is used by decision makers. An interesting research area would be studying the language of funding applications of universities and other research institutions. This change may also be visible also there. 'Benefits' and 'customer value' might be in the vocabulary of funding application forms as well as scientific truth seeking.

The project community

Project as a way of organizing tasks originates from the delivery process of a company and therefore, it is easy to think that the customer is the part of the organization who has 'ordered' the project. Usually, it is the management of the company or, when speaking on subcontracting,

[44] *Mitä, mitä useampi taho on, niin, varsinkin jos nyt puhutaan, ett niin ku eri tiimejä on mukana, niin se on. Kaikki ei aina ymmärrä sitä, ett ollaan ajamassa niin ku, ja ollaan tekemässä yhdessä töitä ja että on se yhtenäinen tavote.*

[45] *Ja teknologiasta lähtien meillä on esimerkiksi ens tai seuraavana vuonna käytössä olevat teknologiat ja piirteet, mitä voidaan toteuttaa. Ja sitt niistä syntyy hyötyjä asiakkaalle ja sitt niistä hyödyistä syntyy arvo ennen kun se asiakas itse asiassa ostaa.*

another company, which has ordered the subcontracted task. The customer is not necessarily the final user of the product at all. In fact, project workers are interested in what is actually written in the specs, not if the specs are right or wrong. There is then a concept of a customer used in this community. However, the customer is the next group outside the boundary of this community, not necessarily the paying customer on the boundary of the company, the external customer.

What was said about the specialist community is also to large extent valid in the project community. However, the presence of customers, internal or external, is made explicit by defining their interests clearly in the specification of the project. Business orientation is obvious in discussions, where projects compete for the same resources. In such discussions 'customer benefit' is often used as an argument in a way similar to the way it is used in the competition between professions in specialist communities.

The transprofessional community

This group's is orientation is outside the company. They look at the outside world and the real customers. They are also interested in the users of the final products. The concepting teams are often departments within a company but they may also be design offices that have expanded their offering to 'product definition' by incorporating engineering solutions as well. The concept of 'customer' is then embedded into the thinking of the transprofessional teams. They have recognized and use all the professional stories elaborated in chapter 3. The customer is the king, because doing business is only possible when somebody pays. Technology is needed for functionality and is therefore always important. Sometimes technology is a limiting aspect or 'the bottleneck' and the emphasis of the work lies in developing technology. Sometimes the symbolic values and the user context are more important and this gives the designers the possibility to make a big contribution.

> *"[user perspective] is R&D's responsibility and we typically have, in bigger projects, that were launched five six months ago, so we had twelve professional users involved when we developed the product. So that we saw them weekly, those users. And actually the users are for us, they are like the question life and death. We do products for them, so we have to listen them. Not must, of course... but we want to treat them... we got better*

products. But like users are a thing, with key customers we deal and therefore we deal with users, what they want. And we let them to test the ideas and, and, and prototypes."[46]

The problem of concepting is that handovers may dilute the original idea, while the project progresses through all the phases of R&D. At least during implementation, all departments of a company must be involved, from factories to marketing. The discourse of 'customer' is then again used as a weapon in competition. Now the competition takes place between units of a company. Often marketing departments want to 'own' the customers. Marketing people are jealous of their direct contacts with customers and they want to keep other functions like R&D out. They may use the 'customer's voice' as an important resource in the internal competition. If industrial design is a separate function, it tries to compete with other units by emphasizing user experience and designers' alleged capability to create this experience. In many industries, technology has enabled the success of the business and engineers want to keep their position within a company by adopting wider views that emphasize the understanding of the 'customer view'.

4.2.6 Summary

The goal of my thesis is to describe aspects of communality in R&D. There seems to be three distinct types of communities in R&D. In a specialist community, the most important aspect defining the community is the commitment to professionalism, the symbols and the stories that are internalised already in the education phase. In a project community, professional symbols still exist, but they have a more instrumental role. The community is built around the task of the group, the project, and also around this particular mode of working with symbols of its own. The shared part of he systems of meaning consists of project management language and tools. In a transprofessional community, the constitutive aspect is more difficult to define, probably because this type of community is still on its way. A good definition is that transprofessional teams treat professional boundaries as negotiable and blurred, not something that should be defended. There are also reasons to say that the constitutive element is attaching to business life's notion of

[46] *[käyttäjänäkökulma] on tuotekehityksen ja meill on tyypillisesti isoimmissa hankkeissa, niin mikä nyt kuus, viis kuukautta sitte lanseerattiin, niin meillä oli kakstoista [käyttäjää] kolme vuotta mukana kehittämäss sitä tuotetta. Että me nähtiin esimerkiks kuukausittain, viikottain niitä käyttäjiä. Ja oikeestaan ne on meille, tai käyttäjät on meille niin ku elinehto. Me tehdään heille tuotteita, ett meidän on sillon pakko kuunnella heitä. Ei tietysti .. pakko, mutta me halutaan kohdella niitä, me saadaan parempia tuotteita. Mutta niin ku käyttäjät on, tuotekehitys on meillä asia, avainasiakkaitten kanssa ja me ollaan tekemisissä sitä kautta käyttäjän kanssa, mitä ne haluaa. Ja me testautetaan heillä ajatuksia ja, ja, ja protoja.*

innovation. However, this is too narrow a view to be used as definition, and it refers too much to neo-liberal ideologies that raise emotional connotations. In professional life, transprofessional groups seek the same as multiculturalism in the society in general; integration of different views and opinions. Perhaps the term ‘professional cosmopolitanism’ captures the essence of this group, should the name ‘transprofessional’ not be descriptive enough.

The problem with big single discipline teams is that they tend to forget the whole and are prejudiced against other professions, just like monocultural societies react to minorities. Project organizations try to consciously overcome this problem by creating common work methods and by forcing people to work together. The project community develops a project culture. The transprofessional community tries to stretch one step further and strives for genuine and non-forced cooperation.

The differences of three types of communities can be presented as follows.

	A specialist community	**A project community**	**A transprofessional community**
Focal point	Profession	Project	Process
Key activity	Professional tasks	Meeting dead lines	Creating new
Creativity	Professional	Practical	Visionary
Virtues	By profession, such as factual or visual	Punctuality and conformance	Individuality, novelty, flexibility
Customers	Distant, internal	Customers of the project	Users of the product, the company
Root metaphor	Development	Performance	Creation
Community symbols	Professional tools and jargon	Management tools and jargon	Innovation tools and jargon
Type of community	Monocultural	Multicultural	Mixed, fluid, nomad

When thinking of the continuum of communality as defined in chapter 2, it seems that specialist work closest to a real community, where locality and daily interaction define the boundaries.

These groups are also quite permanent. This supports the maintenance of communality, as well as the common roots in education. Therefore, no ‘third socialization’ is needed.

Project workers share this locality, but the locality is reduced by numerous interactions with other parts of the corporation. Because of many stakeholders, education does not provide good protection against other professional groups. Moreover, organizations are temporary and require regular relocations. A common denominator is the orientation towards professional management. Therefore, project workers are often like nomads that wander around in organizations or people living in a multicultural society where cultural distinctions are clear.

Transprofessional workers have the weakest link to professions. Quite often are ‘business oriented’ as described in chapter 3. They are ready to change the work, group and location and have a cosmopolitan attitude also in their private lives. They might even be willing to change companies regularly, acting like hired soldiers who fight for money, not for the community.

The other theme of my thesis, change, appears in the data in many ways. The emergence of the three types of communities in R&D refers itself to change, because historically R&D was first organized according to professions. Project work was introduced afterwards and transprofessional groups are actually just emerging in some parts of organizations. Another connection with change is the fact that many aspects of transprofessional communities in R&D suggest that they mirror other, more general societal changes, as described by Sennet. The connection to business and its many features require personal responsibility and risk taking, and it also appears in transprofessional communities. Perhaps the most obvious and striking signal of change is the vigour of business orientation in professional discourses. It was visible in some part of the students, but in work life it has the more concrete form of the ‘struggle for customers’ when competing for resources and recognition.

4.3 Key stories of R&D communities

4.3.1 The story of a specialist

A specialist in a company works in a department that has clear tasks in the company processes. It may be the mechanical engineering department that produces drawings for the factory, or it can be a visual design office, where designers make mock-ups and models as subcontractors, or it can be the marketing department that takes care of the company's sales material. The colleagues of a specialist have similar education and often also a similar work experience. They work together in an open office or adjacent cubicles. Sometimes they work close to the factory or the laboratory where their products are easily accessible. The group has a rather long history together, so they know each other well; the family, hobbies and diseases. They have a certain set of trade magazines available in their office and they read and discuss them regularly.

Other departments give them tasks by email attachments and they deliver their 'products', drawings, program files or brochures, to other departments.

Most of them are enthusiastic and proud of their professional skills. This is what is valued in the department. Engineers want to manage even more complicated FEM-models, designers want to create even more expressive concepts, marketing people try to carefully measure hit rates and sales figures.

They are aware that the company they work for has a mission and that it delivers products to customers. However, their nearest neighbours are the departments from which them they get jobs and the necessary information as well as those who need specialist's deliverables.

4.3.2 The story of a project worker

Project workers live in the world of deadlines. They are aware that they are in a company that makes money and time is money. So, unless they do have professional ambitions, part of them is the ability to make job fast, still keeping the required quality. This means that best is not always good, meeting the specs is good enough. There is an internal struggle inside project workers, because they would like to do things better, but if they do not understand themselves that life is full of compromises, they will be soon reminded. So, the key virtues in project people's world are timing and costs. Gradually, they become proud of that rationality that is part of their nature, kind of faceless bureaucracy. The process is the king, although it sometimes creates frustration.

The project people are not too closely attached to their group, because they know that projects will end and the people around will change. However, this creates an internal resistance as well and they try to find new projects in the same surroundings. This is a headache for their boss, because s/he only wants certain skills or resources and is not that interested in worker's personal preferences. This worries the boss, but at a management level, faceless bureaucracy is even more cultivated virtue.

Project workers are connected with their surroundings outside the project group in many ways. They see other projects as competitors for the same resources and other departments as sources of resources or customers. The team, however, keeps together, because they have common bonuses and they are celebrated as a group if the project is successful. Therefore, they have a small party after each deal-line and meeting a deadline is announced in the company's internal bulletins and billboards.

The bible of a project person is the R&D manual, which describes all phases of the R&D process and all requirements for passing the dead line in details. The specification is the catechism that explains how the manual must be read in this very project.

4.3.3. The story of a transprofessional worker

Workers in concepting department are interested in wholes, not just in parts. They want to know what the earning logic is, how things work and why people buy a certain product. They are curious and ask questions. Therefore they are not necessarily very popular outside the department. They are interested in learning more and want to know about other people's jobs and their role in the company. They hate bureaucracy, fixed rules and work descriptions.

Transprofessional workers are doing their jobs in a big, global company or in a full-service design company. They are aware that business is needed and this links them to the business world, making money, controlling brands, creating needs and finding them. They want to be cosmopolitans and try to be always up to what that takes. Habitus is important for them; their reference group is a management consult.

In R&D, concepting people are playful and ask for time and freedom. The time is spent in future research, studying market trends and looking for emerging technologies. They are needed to understand the potential of new technologies and the possible new markets the technologies enable. Concepting people also want to understand the products in their right context. Therefore, they use experts of many disciplines and have adopted a wide range of methods from social sciences, like user studies, observation, behavioural patterns analysis and so forth.

Transprofessional workers know that their strength in the labour market is not their capability to master an area to perfection but rather their flexibility and willingness to learn and be adaptive. Therefore, they create their own portfolio of skills, a network and a library of business books. They know that organizations change and therefore, they are always prepared to take on a new challenge, a new job and to move to a new company.

5. DISCUSSION

5.1 The rank of organization types

The previous chapter completed the empirical part of my thesis. This fifth chapter discusses the findings and their possible consequences. It is speculative and even polemic in its nature.

Fruitful point of departure for analysing the communality in R&D appeared to be making a distinction between three types of communities. Two of them are described and studied in management literature before but the third and the newest is only emerging. The aspect of change is also valid here, because the organizational models have emerged in succession. Does this mean that they represent development stages in organizations in the sense that they can be ranked from the worst to the best? I do not think so.

The organizational types are products of the progress in business towards a more rational and efficient practises. Generally speaking, they follow Weber's model of increasing rationality. There is an attempt to make creative professions manageable and predictable as well. Traditional long-term research, however, is still needed for making new scientific discoveries. Time is also needed for finding a safe and efficient use for those discoveries. Let us illustrate this with some examples: While writing this thesis, newspapers wrote that a well-known helicopter manufacturer, NH-Industries, has failed to deliver its products to the Finnish Defence Forces on time, asking for several years of more time for development. It was also in the news that the public transport authority in Helsinki has almost been forced to cancel the contract with Bombardier, when the trams ordered from this old and respected supplier did not work properly. Further on, the construction of the fifth Finnish nuclear power plant suffers delays of several years. In IT-projects, delays and failures are more the rule than the exception. For a person like me, who has worked a long time in R&D, these news show that business optimism and management theories may have replaced good engineering. (Oops, the engineer in me surfaced. An alternative interpretation suggests that it is just common tactics and politics to at first promise more than one can deliver and then explain later.) New development still needs the time and possibility to concentrate on a focused area. The communality offered when working with colleagues from the same area, allows professional development. The feeling of safety allows for

cross-fertilization among professions in the same way than perceived safety and respect are needed in multicultural societies for ethnic groups to co-exist peacefully. Therefore, specialist communities are also needed in the future. Another question is whether these communities should be in public research institutions or in the private industry.

On the other hand, projects, as a way to organize work, have proven efficient in the tasks that can be planned carefully beforehand. A customer who wants a ship or a building is naturally interested in getting it on time and with a fixed price. Therefore, project work is a tool for any professional today, but it should not be the only one. Project environment is necessary when many parties must co-operate, many schedules must be synchronized and contracts must be kept. However, applying it to areas where there is too much uncertainty to plan details will be frustrating for everyone. Especially in R&D, the skills of the management are weighted by the ability to know which tasks can be planned in advance and be run as projects, and which contain so much uncertainty and learning that they must be done within an organization that allows for more flexibility. Communality in pure project organization also faces challenges, due to the limited project time. This may cause a feeling of insecurity and stress in the employees.

When seen from a distance, it might seem that transprofessional teams are the best and most flexible form of professional organizations. Transprofessionalism adds one tool or skill to the toolbox of a professional: the ability to move between professions, though a limited amount of them. The difference in professional skills stays, new issues relate more with attitudes. Professional skills are not seen as a way to defend one's own quarters. The transprofessional community uses the T-model of skills, meaning the in-depth knowledge of one area and the possibility to surf in other areas. The difference between a multiprofessional project organization and a transprofessional organization can been seen in the role of the professional skills. In a project group, professional roles are clear and maintained, whereas in transprofessional communities they are blurred and negotiable. This is beneficial to the individual when the new 'portfolio type' of employee develops his/her selection of skills.

The positive side of a transprofessional community seems to allow for the most flexible and efficient way to organize work. If the attitude required in such groups becomes common, it might be possible for people to move from one community to another and thus work in different phases of R&D. The same group would follow the project from concepting to production. This would

require great flexibility from the workers, because so many work forms would be required. On the other hand, it would make the management of handovers over project stages easier; in fact difficulties related to handovers might disappear entirely. So far, transprofessional communities have emerged and are really only needed in the beginning of R&D process, that is, in the concepting or in the product definition phase. The real benefit here is in combining all the aspects of innovation, earning logic, symbolic values and technical performance.

In practice, a transprofessional teams are a product of their time. With increased individualism and flexibility, skills are seen as a personal property and the strong feeling of belonging to a profession might be threatened. Business life's call for quick profit may reflect in R&D-worker's reluctance to take personal risks by concentrating on a long-term research program that could result in break-through innovations. Transprofessional workers want a career. They want to move quickly from job to job in order to collect experience and to add items to their portfolio. This may not work for the companies who will subsequently lack real innovations or at least somebody who would implement them.

After all, I think that transprofessionalism is a valuable addition to the palette of R&D skills. The need for crossing professional boundaries has also been noticed in universities, which have launched multiprofessional programs like IBDM (ibid p. 8). It is only one of many programs aiming at bringing academic disciplines together in order to boost innovativeness (Itkonen 2006).

5.2 A suggestion for finding the right skills for a transprofessional concepting team

By now, it has become clear that professional boundaries are not important in the early stages of the R&D process ('the front end' or 'concepting') and they do not define the necessary skills. The scope of this research still covers many different areas of products and production and therefore, it may seem that nothing has been be said about the alternative for professionalism as a guideline for selecting skills for the front end of R&D. Who should do the concepting? The importance of the customer and the user as seen in the interviews of the transprofessional teams, suggests a possible solution. A new, tentative set of skills is based on the idea that three components are needed for a successful product: the need or desire of a tentative customer, the

solution for meeting this need and the business opportunity, meaning the customer's financial possibilities to buy the product. Therefore, my suggestion is to divide the front end of R&D into three competencies: the understanding of customer needs, understanding the solutions the company could provide, and an understanding of the market and business conditions in commercial terms.

The first competence group consisted of people who understand the life of the customers and users. There the priests and policemen come into the picture, as mentioned in one of the interviews. This approach provides social anthropologists with an opportunity to participate as well, because the purpose of this set of people is to understand the values and needs of the target group. This is what social anthropologists are used to do. Customer groups vary between industries and products serve different purposes. Therefore, the skills needed for understanding the contexts of the products differ from industry to industry. In a tractor factory, the competence group could consist of farmers and agriculturalists. In an elevator factory, there should be architects. In the medical equipment industry, there should be nurses and medical doctors. In the telephone industry, well, perhaps sociologists and social anthropologists. In a nut and bolt factory, they need more engineers. If we expand the speculation to service industries like banking or travel, an entirely new view opens.

The second competence group is needed for finding and developing solutions for the problems and needs of customers and users. They must understand the competences of the company and especially the competences the company does not YET have. This group should probably consist of engineers, industrial designers and other groups needed for implementing the products and for developing production methods. This is the case in the technology industries that are the scope of my thesis at least.

The third group must look at the financial side of the company and the customers. They must be aware of competitors, market prices, cost structures and so forth. This is the traditional competence area of economists, but, as described before, the business orientation needed is popular and necessary among other professions as well.

It is important to realize that none of these groups or competences is enough by themselves. People have many practical problems in their work and private life, but they do not know how

these problems might be solved. They must be in contact with people who have the means to make their lives easier. On the other hand, many engineers are fascinated with new gadgets and many designers with fancy-looking concepts for their own amusement, without having a real use for them. And finally, those who have the capital cannot find profitable ventures for investments if there is no basis for profit in real life, at least not on a long-term basis. Moreover, there are many known problems as well as solutions, both big and global, but there is no capital or purchasing power to make a business out of them.

It could be said that in R&D, transprofessional skills form the horizontal part of the T-model of competences. Those who want to work in commercial R&D must be able to understand the whole context, at least on some level. This fact could be recognized in education as well. The vertical, in-depth competence is still required and it must be deep enough to stay on cutting edge on long term.

5.3 Alternative treatments of the subject and further research issues

The approach in this thesis is ethnographic and based on social anthropology. Therefore, communality and changes in communities are used as the theoretical framework. Of course, there are many other ways to look at the same issues.

One of those might be Pierre Bourdieu's (1986) social space and concept of class, where habitus indicates the position in a society by the symbolic values that it carries. It is obvious that the business life tries to dominate the public discourse and create symbols that make people aim at the symbols of a successful business life. This could be the basic reason for the business orientation that can be found throughout the empirical material.

The second possibility would be to look into the professional scene as the competition of professions, an attempt to close the profession, like Weber has suggested. In this respect, the situation of industrial designers is especially interesting, because they seem to be mainly attacking marketing people but also engineers to some extent. They have the benefit of being a small group creating loyalty as well as competitiveness learned in education. However, they cannot do industrial business without other groups, so cooperation is also a benefit to them.

The third way to look at changes is through the research of an organization, or organizations in general. This is a branch of social psychology. Especially interesting, is working in virtual teams enabled by net meetings and other coming technical tools. It is likely that when the energy prices rise, companies will look for fewer flights and more electronic meetings. This is a challenge for communality. In this context, the discussion of post-Fordism and neo-Fordism is also relevant. It can be said that project communities represent a certain kind of neo-Fordism or Taylorism, where the work planning has been separated from its performance in order to boost efficiency and to allow for lower level of skills. The transprofessional approach may be understood as a variant of post-Fordism, where a worker's motivation is taken into account by allowing greater possibilities for personal development and work planning. It seems that everybody wants to have the role of an integrator and take care of the strategy. The social prestige and salary that come with a management position are also relevant here. There is also another aspect, however, namely people aim at 'flow' in their work and management of some whole. This is the opposite of cutting tasks into pieces, away from 'conveyor belt' of information processes.

The fourth obvious way to look at the phenomena caused by globalization would be an evaluation of globalization itself. This in turn would lead to a critical analysis of free trade, global markets, lowering of the trade barriers and other aspects of neo-liberalism. There is a wide selection of polemic writings dealing with this debate that is still going on. Naomi Klein's 'No logo' (2002) is one of the most well known books against the exploitation of poor countries by global companies. Johan Norberg's 'Defence of Global Capitalism' (2004) is one of the books that emphasize the positive effects of globalization and argue directly against Klein. I have tried to take an impartial position. I recognize many of the negative effects of neo-liberalism described by Klein. Neo-liberalism is also under attack from Richard Sennet who has been widely quoted in my thesis. I think that the free movement of goods, people, funds and ideas is a good and worthy of promoting. However, these also bring changes that cause problems in the transition phase, problems that must be addressed. The role of the critics of globalization is therefore important in pointing out the issues to be taken into account. I also agree with one of the ideas I found in Norberg's book, namely the idea that market economy brings long-term benefits but market economy should not mean market society. This means that there are aspects and values of life that should be left untouched by monetary exchange.

The transprofessional teams are a new phenomenon. Therefore, they form a natural area for

future research. This includes the research of the changing of work practices, having information technology shaping the means of communication. Virtual teams and remote work are already under research in many programs. In the R&D, the challenge is in the front end of the process, where cross-fertilization and sharing knowledge are especially important and the work cannot be divided into small pieces as easily as during the implementation phase. The proximity of market and innovative environment are crucial in understanding and analysing users and customers. Engineers need access to sophisticated manufacturing technologies and suppliers of components in order to be on the edge in efficient production. This is a real challenge for Finnish industries that move factories to countries of lower labour costs.

6. CONCLUSION

I started my research by wondering why people working in the same department in R&D sometimes experience difficulties and even conflicts. I had an intuitive or 'foreshadowed' idea that different professional backgrounds may have an impact on the work places, but I did not know exactly how and why. The reason for my studies in social sciences was based on a willingness to find new concepts and models of thought for understanding the work phenomena.

In order to accomplish my inquiry, I created a simple theoretical frame that was based on common social anthropological concepts, namely community, communality and the change of communality. I introduced a continuum of communality, based on Cohen's notion that the constitutive idea of a community is that only *some*thing is shared. On either end of the continuum are the 'real' and 'imagined' communities. The real community is close to the ideal type of a village, where inhabitants share the whole system of meanings. The concept of an imagined community follows the thinking of Anderson, who introduced the term and applied it to nation states. The central idea is that the feeling of belonging to a community is only imagined and mediated by technical means of communication. The great story of sociology and social anthropology is to explain how real communities have been changed into imagined communities, where the members belong to several groups that share only *some* part of their systems of meaning. I set up my research task accordingly. I asked what are the elements of communality in professions, which meanings are shared and how can the perceived differences help in understanding the problems at the workplaces.

In order to understand professions as communities, I researched trade unions and educational institutions. I found that it is possible to treat them as communities. Historically, professions have been close to real communities, but today they have moved towards imaginary communities. They still share a common history, historically defined professional core skills or abilities and a notion of a common future in the form of benefit supervision via trade unions. I selected three professions that are typical and important in R&D. They were engineering, economy and industrial design. It appeared that they all had different ways of understanding the meaning of 'creativity' in the development of commercial products. Engineers think that creativity is a series of technical inventions, economists see it as an orchestrated venture of

investing in the most profitable projects, industrial designers see it as designing new concepts that have a symbolic value in addition to merely their function. These different approaches are important for the professions' self-understanding and moral order. Therefore, they are also potential troublemakers in real life, where people from different professions meet. Different views on creativity are a good example of a part in the system of meanings, which is not shared by all professions.

The next step in my research was to look at real life in companies. When analyzing communality, I found it necessary to divide communities in R&D into three groups; a specialist community, a project community and a transprofessional community. A specialist community consists of colleagues from the same profession and it is similar to the universities' division of faculties. This makes specialist communities to nearly similar to real communities. Locations and symbols of professions are shared. The difference from other professional groups is clear and based on professionalism exactly. Business orientation is far from this community and this is why it is disappearing in commercial companies. A project community is organized around certain task. The model is borrowed from factories that have to deliver certain products at certain time and at fixed price. In R&D, development projects still use professionalism, but it has an instrumental role only. The language and tools of the project management constitute the shared part of meanings in addition to each profession's own jargon. This enables multiprofessional work. However, an individual is still a representative of his/her profession as the profession is the reason for them to be a member of the project. Professionalism is still part of a person's identity and it is a means for making boundaries and defending them against other members of the project group. In a transprofessional group, communality is based on a shared business orientation and its language constitutes the shared meanings. This also includes the inclination to adopt a flexible attitude towards professions as well as a willingness to learn. Professional skills are part of a personal portfolio and having skills from other professions does not mean a lack of loyalty. On the other hand, communality in this group is not strong after all, due to a strong sense of individualism.

An important result of this thesis is then finding the role of business orientation. It seems that it has become the most important weapon in the competition between both individuals and professions. This is understandable, but also a risk, because all traditional skills are still needed both in economy and in the scientific world. Business orientation may be an additional tool,

similar to project work. Everybody must be familiar with business orientation in order to have some success in work life. At least, everybody needs skills to market their skills in the labor market.

It seems that in the front end of R&D, the transprofessional organization is the most efficient. There is no need to build fences around professions. All modes for development still exist: these are areas where development depends on inventions and progress in science. Miniaturization of electronics is a good example of this. In these areas, engineers are still dominating. On the other hand, in large market segments differentiation happens through symbolic values only. This is not a new invention. Georg Simmel wrote already in 1896 in his essay on the Berlin trade fair that "when the competition on features and the internal properties of goods has ended the interest of consumers must be gained by emphasizing external features and even their presentation". Industrial designers have there better answers. And finally, financial resources are needed and the 'nose' of an entrepreneur is needed in order to make production profitable.

In this thesis, I have treated neo-liberalistic economy as a fact, without challenging its internal values. The position is the same as for most individuals who must find a livelyhood and the best means of surviving. In this sense, I have followed Sennet's line of merely describing the development in work places. Although Sennet's analysis seems to be quite pessimistic as regards the possibilities of communities in today's professions, he also argues that companies are in fact more local than they might seem. (Sennet 1996, p.136). "A place becomes a community when people use the pronoun 'we'". Community means shared beliefs and the different forms of shared everyday practices. The social bond arises from mutual dependency (Sennet 1999, p. 139), which has not disappeared. In the future, when environmental problems become more topical, the values, dependencies and conditions of work life may change rapidly.

In the beginning, I used Anderson's notion of nations states as imagined communities as a heuristic tool. It is clear that nations as well as professions are imagined communities and this imagination has changed qualities of communities stemming from the recent developments of mobility and information technology. Nations and professions face similar challenges, such as the question of loyalty when both the pressure and the possibilities for crossing borders are present. Still, both nationality and a professional background are important for people's identity and the feeling of belonging. In both cases, favourable circumstances may make the belonging to

a group more absent and optional, but under pressure and uncertainty, the nationality or professional identity is taken into use. However, modern workers are aware of the opportunities involved in expanding life circles to other nationalities or professions. Being able to tap on transprofessionality may be the key to success in many areas of work life.

Professions are good examples of communities, but their nature has changed with time. Traditionally, professions have been both genuine, face-to-face communities and transnational imagined communities that are constitutive for an individual's identity. Today, they may be local communities during the education phase (if it does not turn to the Internet!), but further in career professions are more like imagined communities that may engage in looser connections but offer much wider communities on the Internet. Professions are still needed at least as a skill base, but it may be more common to have several professional identities in the future, but there is an increasing amount of people having 'a dual citizenships'. There will be more hyphenated or hybrid people, based on profession.

The key finding of my research is the importance of transprofessional teams. It is also the answer for my research question. Professionalism is needed for skills, but if it is used for creating a community, its nature as a two-edge sword appears; strong we-ness increases loyalty but creates distant 'others' at the same time. Transprofessionality allows cooperation across professional boundaries in similar way than transnationalism blurs ethnic and national boundaries.

When the research is approaching its end, I must say that I have become aware of the unconscious motives to start this social scientific enterprise; I have felt certain uneasiness as regards my own choices in professional life. My point of departure when choosing my education was my hobby, my interest to solve problems and apply technology to practical problems. It was essential to me to think of problems as whole entities. During my career, this sort of approach has been possible, because a certain degree of freedom was granted. With increasing project work I have partly lost interest. According to my observations, the same has happened in the academic world. Assignments have become temporary and my experience with academic posts is that they contain only a little learning but quite a lot of discussion on funding as well as administrative tasks. In the professional world, it has become a risk to concentrate on one narrow segment only, as it offers too few options if a reorganization take place. My way to find a wider perspective has been to study more. In today's terms: I have now expanded my portfolio.

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