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Strategies and Resistances in the wild

The mutual shaping of a small scale ERP technology and local practices.

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1 Introduction

In the year 2010 the software corporate group *SAP* bought the mobile data service provider *Sybase* for 4.6 billion Euro. The media framed this as a declaration of war towards *Oracle*, its competitor in the field of business software (manager magazin online 2010). In the following year *Oracle* struck back and acquired the cloud service specialist *Rightnow* (derstandard.at 2011) for 1.5 billion USD. Merely four months later SAP reacted with the absorption of the US-Cloud-Expert *Successfactors* for 3.4 billion USD. They did not need to wait long for a counter: in 2012 Oracle took over *Taleo* for 1.8 billion USD. (Urech 2012)

What kind of business is this?

Companies in this field are software providers with their main products in the field of Enterprise Resource Planning (ERP) systems, and it is big business with the 2013 ERP software market growing to 25.4 billion USD (Pang et al. 2014). The idea of these systems is to use software applications to manage the information flow within a company so to represent and steer the operational processes within the organization. The main difference between ERP and other kinds of business software is that ERP systems are not only able to collect information in single departments. They (more or less) entangle information from different areas like accounting, controlling, human resources, material, manufacturing planning and others. So they offer a very integrated and holistic "solution", lacing through every part of the organisation. Metaphorically speaking, such systems are in popular accounts often compared with the central nervous systems of the human body, transporting and processing information. So, such a technology is embedded in a wider system of interactions between different human, and non-human actors within organisations.

The general aim of this study is to identify not only these interactions but to increase the understanding of the underlying processes that lead to an mutual adaptation of technology and practices of related actors. More precisely, I am interested in how such a technology is created in the interaction between different actors, like developers, designers, programmers, users and other, often barely visible actors.

In the story above about the ongoing competition of Oracle and SAP we can start to imagine how big this business is. The user base of such systems goes into the millions. Often it is overlooked how far spread such systems are. For example, in Germany in 2011 about 92% of the companies used an ERP system of one kind or another (Konradin Mediengruppe 2011, 17). Therefore many people have to interact with ERP systems on a daily basis during their whole working life, demonstrating also the societal relevancy of gaining a better understanding of the genesis of this kind of technology . Some are involved in a more direct

fashion, like users and programmers, some in a more oblique way as resources administered through such systems.

To sum it up: One could say that ERP systems and the interaction with these systems in one kind or another plays an important role in the daily work life of a big part of the working population. Further the production of ERP "solutions" is an financially strong and highly competitive field of the software market.

More than that it is a field that is in constant change. I started with examples to show the huge financial movements of industry giants like SAP or Oracle. Their ERP solutions have a rich, sometimes decades long history of development. These products are often used in organisations, companies and company groups of formidable size. But time and again new competitors enter the market and try to claim positions in niche areas. They develop own business strategies based on quite individual ideas of technologies to settle in individual niches and walk on new paths of development, which are not occupied by the long-established giants of this field.

The company of this case study is situated in such a developing niche, focusing on its cloud based business software product with a focus on small and micro sized companies. These potential clients come with their very own, often quite divergent demands and ideas in regards of this technology for areas like mobile accessibility, customization to their needs and data security.

We find here an overall field in which many people are involved in one or the other way and at the same time it is about the assignment of huge sums of resources. The question of innovation and technology development is often closely connected to the ideas of failure and success. So why do certain technologies vanish while others hold sway? What makes some software "solutions" and therefore its producers successful while some other competitors products fail? Easy answers I have encountered in regards to this question revolve around exemplary statements like "The better one", or "The more sophisticated one". Such easy answers, often born from an underling assumption of technological determinism and a linear concept of technological development[1] fail to capture the high dynamics of the interrelation between the different actors both human and non-human. Because of that I am interested in the details of shaping of the technology developed by my case study company.

MacKenzie and Wajcman (MacKenzie and Wajcman 1999 (Version 2012, 27 ff.)) sum it up while discussing case studies of the Shaping of Technology in the STS field. They argue that

[1] On the problem of the assumption of technological determinism see for example the work of Sally Wyatt (Wyatt 2008) or for the problem of path dependency Bijker and Pinch. (Bijker and Pinch 1984, 405)

Shaping of Technology should not be understood as always being led by direct and conscious decisions, in a sense that it is indeed more complex than the simple imprinting of the human will on the material world. Further they argue that technologies typically emerge or fail to do so because of processes without a single dominant set of human actors and in which the relation to the material world cannot be ignored. Because of that the social shaping of technology is a process without a single dominant shaping force.

When organizations introduce ERP systems, they hope to gain a certain benefit from it. When a technology, which should be so deeply integrated into the organisation is introduced, the mutual shaping of organization and technology is inevitable. On the one hand, the more or less unique evolved structures of internal processes have to be adapted to be compatible with the software solution. On the other hand, we have the organization and its employees which tries through processes of customization on different levels, to shape the mostly generalized "solutions" according to their local context. Of course this processes often lead to conflicts within organizations with negative consequences for productivity and attitude.

A high percentage of 67,5% of actual ERP implementations fail to deliver at least half of the expected benefits. In addition costs and duration of adaptation and implementation exceeds often expectations. (2010 Panorama ERP study, 3-4)

This seems not unlikely from an STS perspective, because of the often invisible ways of adaption in the context of a local setting. These might be hard to grasp when planning the introduction of such a system. Through that, understanding the mechanisms of adaptation and how such systems might be designed, with certain users or usage environments in mind, becomes important for organizations using, but also other actors like companies developing ERP "solutions".

It further opened the question for me, if just asking for the shaping of technology would be enough? Through using Actor Network Theory as a toolbox for a theoretical framework, I think, that it is also possible to explore a more symmetric approach on the topic. This is made possible, by not only looking at how a technology within such interactions emerges, but also to investigate how the relation between human actors and their already existing material environment, and related practices are renegotiated though the introduction of a new technology.

To investigate this I have chosen to follow the inventor the ERP technology and the CEO of my case study company during his daily routine in which he tries not only to develop and sell his technology but during which he tries to negotiate the interest of various actors like users, possible business partners, and also in relation to fiscal regulations and practices.

The leading concept thereby is to look for the strategies of this "inventor" of a technology which he employs to enrol these actors in his plans of development and how he deals with often unexpected difficulties and resistances while doing this.

This focus on the role of the "inventor" of a technology was inspired by other studies in the field of STS, focusing and also deconstructing the role of the "inventor" like for example Bruno Latour's analysis of the Diesel engine (Latour 1987) or Thomas Hughes's analysis of the work of Edison and other system builders (Hughes 1983).

In contrast to these studies this work is not based on historical technologies or individuals which would later be positioned as the "heroic inventors" of certain technologies. I was much more interested in looking at contemporary, ongoing and most importantly, directly observable processes.

So instead of looking back from an historical or theoretical viewpoint, arguing why or how a technology becomes a success or failure, I am interested in the observation of the ongoing interaction and practices between the actors. Through this focus on the detailed and directly observable interaction processes between the actors, I hope not only to uncover otherwise barley accessible details, but also to bridge theoretical considerations with practical observations of strategies. This is especially true for the tight relations, between human and non human actors, and interrelated practices.

With the results I hope to make a small contribute towards a more in depth understanding on the problems occurring at the daily work base of developers and users, but also shed a light towards other, often not so obvious actors. I believe further research in this area is reasonable, because through a better understanding these processes of mutual shaping of technology and society, it is possible to avoid conflicts arising during such processes. This is especially true for better understanding of the relationship between users, developers and the technology of working environments.

This study is structured into the following chapters, beginning with the State of the Art, which is a short chapter dealing with the discussion of ERP systems within the field of Science and Technology Studies. In this chapter I focus on three topics, which are the context sensitivity of ERP technologies, the subject of "work-arounds" and the topic of ERP in academic institutions. In the following chapter, Sensitising Concepts, I discuss the theoretical framework for this thesis with a focus on using Actor-Network-Theory as a toolbox for research and the concept of scripts of technical objects. This is followed by the Research Question chapter in which the research question and various sub questions are discussed. In the following Methods chapter, the foundation of the research method is described. The main

part of this study is the following Analysis chapter. It starts with a short introduction, concerning the case study itself, to provide a better background not only about the company of this study, but also to reflect the actual environments of the collected data and the data collection itself. This is followed by the first of the three main parts. This deals with the onsite client/developer interactions, playing out as cross sections of the ongoing process of local adaption of a technology. Focusing thereby not only on the strategy of the developer or "inventor" of the technology building his network, trying to spread his technology and enrolling a client as a multifaceted resource, but also about the observed strategies of the client as user and as actor with own interests and expectations.

The second main part of the analysis deals with an interaction in which the "inventor" tries to establish and expand his network through enrolling a new distribution partner. As the meeting proceeds it develops not into the expected situation. The newly developing situation leads to a reconsideration and an adaption of the strategy of the developer.

The third main part deals with a very different actor which also influences the development process. The fiscal state has certain interests in the usage practices and development of ERP technology, not only through law by the books but also through the lack of regulation and through financial auditing practices. The introduction of digital technology in this field also leads to the renegotiation of practices and the transformation of traces of older forms of materiality. The last chapter of this study is the Conclusion. It consists not only of a summary of the findings of the analysis but also a discussion in relation to the research question.

2 State of the art

This chapter takes a short look at some of the topics regarding the STS field and related research into the area of ERP Systems in general. The goal of this chapter is to give a short overview of the state of the art in this quite specialised area. It is deliberately condensed into two major topics and a third more informational.

The relevant literature about Enterprise Resource Planning systems in the STS field can broadly be arranged around the two main topics of Work-Around practices on the one hand, and the discussion about the context sensitivity of generic software solutions on the other. Further, it should not be left unmentioned that there is also a subtopic in regards of ERP systems and their use in academic institutions from an STS perspective. This chapter is intentionally reduced to State of the Art which is also quite relevant for the context of this study. This is also the reason for the major focus on topics of local adaption e.g. context sensitivity of technology, Work-Around concepts and the overall idea of developing in regards of best practice "solutions" for certain industries.

2.1 Context sensitivity of ERP systems

Regarding the topic of context sensitivity one can often find the statement that it is impossible to create a generalized "solution" in the form of an universal software package. The reason for this is, that they are not able to travel because they are fixed within their context. On the other side, we find the study of Pollock, Williams and D'Adderio (Pollock and Williams, and D'Adderio 2007, 254 ff.) who argue that there are indeed highly mobile systems like ERP packages, which appear out of a local context and are formed to by quite generic. Their argument is that in the field of STS, scholars are far too much concerned with the question of how technical solutions are entangled with a certain context. As an example they use Berg's (Berg 1997) notion that such systems do not travel because they are fixed in "time" and "space". This means that they are deeply embedded into the local structures, actors and environments. Examples of studies about failed transfers of technology which came to a similar conclusions like Webster & Williams (Webster and Williams 1993) or Fincham (Fincham et al. 1994) are referred and contrasted with the phenomenon of actually working packages of highly mobile generic software. In their paper (Pollock and Williams and D'Adderio 2007, 274 f.) they propose, that the STS field should put less emphasis on the actual localization processes and connected problems of such technologies, but also should concentrate more on the processes that allow technologies to work under quite generic conditions. So a shift from the importation and domestication processes towards the processes which allow the exportation of technologies from a certain setting would be

needed. They state in their conclusion that generic ERP systems actually exist and that they do indeed travel to many different places.

2.2 The subject of "Work-Around"

Often the notion of "Work-Around" is encountered. Sociologists of technology are fascinated by the practice and processes of Work-Arounds which might suggest that there is a wider interest in showing how users are not only shaped by technologies but are also shapers of technology. (Pollock 2005, 497) The concept of Work Around is also a quite useful one for this kind of research. It describes the behaviour of users which try with intention to annul certain restrictions of a given technology to achieve a specific goal. I expected to encounter different forms during the fieldwork. The notion of Work-Around reaches back into the 80s, a time in which ERP like software solutions were still in their infancy.

Gasser (Gasser 1986, 216 ff.) used in 1986 the term to describe the intentional usage of computers in work processes in ways for which they are not designed. Through that alternative ways were found to accomplish certain tasks. He identified three forms of workarounds.
The first is the data adjustment, so the users of the software system makes up data and enter it into the system with the knowledge that the data is inaccurate. They do this to get desired, usable, and in an contextual sense, accurate results. An example mentioned for this are made up composite bills of material which could be entered into an system because it is unable to handle multiple bills of material. The second form is Procedural Adjustment where organizational procedures for getting services or making changes are reversed. So instead of working according to the stages of procedures of the software, the user attains the desired result beforehand through the change of the processes. An example mentioned would be, to get a certain permission using other channels before filling out the application within the computer system. One interesting aspect is, that this way of working around established routes, depends upon great knowledge of working procedures and access and support by key actors within this process. The third form of working around are backup systems, some of them are manual and based on duplicate records, others spear in form of additional data, not stored in the software system.

Neil Pollock deals also with the question of when a work-around actually is a work-around (Pollock 2005). In his paper in 2005 he is working on the exploration of the term work-around within the context of users as they attempt to tailor and roll out administrative IT systems within the departments of a university. He revisits Akrich's concept of scripts (Akrich 1992) where users try to resist and avoid constrictions by design, but he also points out that in the world of modern software development these processes become much more defuse. This is

due to the prominent role of the user in the shaping and customization processes of such a software. So the relationship between the designers or the providers of software solutions on the level of organisations, and the customers of such software becomes much less clear cut. In such new user-producer relations it becomes hard to account for the responsibilities of who designed which features. The single actors are neither only user nor only producer. Therefore work-arounds are seen as only one part of a superior negation process.

To sum it up so far I would argue that at the current state of the art, the topics of EPR systems often revolve around the question of the adaptation to an unique environment. While the overall question of the nature of generic software is debated, it can still be traced back to the question of the mutual shaping between technology and context. Pollock's work has shown that there is indeed a possibility for software to be relatively generic, because it can be designed that way. Thus we still have to ask for the individual processes of context adjustments if we want to know what the basics of the design concepts of generic software are.

2.3 ERP and Academic Institutions

Interesting enough it seems almost, that there is certain subfield concerned with ERP systems in the framework of academic institutions.(for example: (Pollock 2005)) In their 2004 paper Wagner and Newell (Wagner and Newell 2004) take a closer look at the notion of "best practice" of ERP systems in the academic context. They demonstrate in their study, that best practice seems to be a very arguable term in the academic field. Due to different user groups, work practices and epistemic cultures, (as framed by Knorr-Cetina (Knorr-Cetina 1999)) it becomes visible that there is not such a thing as an overall "best practice" in the sense of a single industry "solution". This becomes most obvious in their case study in which the alliance between a university and a software developer produced a "best practice" solution for the academic sector, that turned out to be not even best practice at the institution which was its role model. One reason for it was that this "best practice" was only the "best" for one constituent user, in this case the constituent central administration.

The next chapter about Sensitizing Concepts takes a deeper look at the theoretical framework of this study and connecting it to state of the art of this chapter. This is especially true for the ideas about concepts of actors like the archetype of the "inventor" and how to approach such a concept in the context of this study.

3 Sensitizing Concepts

In this chapter, a range of useful concepts is presented which are the basis for the conceptual framework of this study. The presented theoretical considerations are SCOT - Social Construction of Technology, the De-scription of technical objects and Actor Network theory.

3.1 SCOT - Social Construction of Technology

Due to the nature of the study, dealing with different groups of users and the development and shaping of a certain technology, I was at the beginning of the opinion that the Social Construction of Technology (SCOT) could give some interesting insights in the group dynamic of shaping processes of technologies. This changed during the development of the study when I realised that Actor-Network-Theory would be a better toolset describing various strategies and interactions between the heterogeneous actors. Still SCOT stayed within this thesis but changed in its application during the analysis parts towards a useful set of terms to describe certain situations in interactions. SCOT seems to be not usually employed for technologies with the high level of flexibility of ERP solutions and indeed the terms and the situations where I applied it were much more flexible and changing from one instant to another.

The concept of SCOT originates in the field of Science and Technology Studies and the work of Bijker and Pinch (Bijker and Pinch 1984). In their well known article about the social construction of facts and artefacts they described the influences of different social groups on the design of the emerging bicycle.

As a constructivist approach, it is inspired by the sociology of scientific knowledge. This is evident in the principle of symmetry which states that both, successful and unsuccessful science have to be explained by the same factors. Through this approach it is possible to avoid usual pitfalls, in which social factors are only accounted for failures. So under the umbrella of symmetry, the stories of success and failure in science need to be explained by the same factors. In SCOT the concept of symmetry is further expanded on successful and failed technological innovations. On this way the social context that does or does not support an innovation has to be uncovered in the course of the research (Bijker and Pinch 1984).

I expect that this point of view could have a significant impact on the process of data interpretation when applied on the matter of this study. Like mentioned in the preceding

chapter there are many cases of failed ERP implementation attempts. Under the light of symmetry, it could be interesting to see how stories of success and failure are accounted for these factors.

SCOT also refuses the idea of technological determinism because of the mentioned principle of symmetry of successful cases. Instead it offers us an approach in which it becomes obvious that the emergence of certain variants of technologies or technological artefacts results from interactions of groups. In the following I am going to summarize and present the most fundamental concepts of SCOT and reflect possible dimensions of this study at them. (Bijker and Pinch 1984)

- **Relevant social groups** - A relevant social group consists of members which share a certain set of meanings in regard to a specific artefact. Here it is important to note that even not user can be a relevant group, forming around a certain artefact. First I have to state that the social groups which I have encountered in this study were relatively small, consisting maybe only of a few people or even single persons. This is in contrast to usually much larger groups like in the described case of the emergence of the bicycle.
- **Interpretative Flexibility** - Means that there is not one best or optimal solution of a new technology. Each group has a unique view and expectations of how the artefact should be, based on the problem the technology is expected to solve. Documenting this Interpretative Flexibility is also an important part in dealing and understanding the processes of stabilization.
- **Stabilization processes** - A stabilization of certain variants of the technological artefact can occur through Rhetorical Closure. This means that the problem is seen as being solved by the social groups. Another form of stabilization is Problem Redefinition. In this the problem is redefined and solved by an existing variant of the artefact.

3.2 De-Scription of Technical Objects - Scripts and User Resistance

Another important contribution to the field of STS is Madelin Akrich's (Akrich 1992) notion of scripts which are inscribed into technologies by their designers. In her work she described so called mechanisms of adjustment, which are the reactions of users towards the native scripts embedded in technologies. Often these technologies are designed with certain users and their environmental context in mind so that the designer have a certain vision which leads to the inscription of certain qualities and scenarios into their artefacts. This can also be seen as

an attempt to predetermine the setting. Of course, it is not unlikely that the users will not anticipate the roles considered for them. Maybe they even start to create own roles. An example from the area of technology transfer is the attempt of a government agency to promote new energy source for lighting for less developed countries. Of course the attempt failed because the imagined user and the environmental context was based on the European context and not suitable for the local requirements. Further, local users where able to bypass certain restrictions which allowed them to repair the devices themselves.

The question that remains is the placement of work-arounds, scripts and ideas about users and their context in the overall processes of design through mutual shaping. In Akrich's example of scripts, we deal with the constructor of a technology who designs his artefact with a certain user in mind from a top-down approach. The resistance emerges if the real user deviates from this imagination. In the area of ERP systems and modern software development in general, and this case study in particular, we encounter quite different situations in which developers, from a technical perspective, still embed certain scripts. The emergence of its content might be in contrast, much more influenced by the actual user. This is especially true in cases of context adaptation of these ERP technologies.

This contributes back to the concept of SCOT with its different relevant groups with their own interpretation of a technology within an organisation or limitations of certain technologies. But this example should just make the point that if dealing with a technology like an ERP system we cannot expect to only find top down like relationships but a multitude of possibilities where scripts are outcome of quite intense interactions between actors.

3.3 Actor Network Theory

I am going to start the following section with a very short and abbreviated overview of certain basics of Actor Network Theory (ANT) followed by a more elaborated part, detailing why and how I am going to employ certain concepts in this thesis.

ANT is often associated with the works of John Law, Michael Callon, and Bruno Latour which coined the term Actor Network Theory in the 1980s and 1990s, when it also emerged as a distinctive approach in social sciences (Law 2007).The basis thereby traces back to a multitude of sources and concepts in science and technology studies, philosophy and history of technology like, for example, works of Thomas Hughes, Algirdas Greimas, Michel Serres and Michel Foucault to name but a few. (Law 2007)

In addition ANT authors were also based in the sociology of science and technology viewing the production of knowledge as a social product, as an effect of networks of heterogeneous materials, instead of the a creation of a privileged scientific method. (Law 1992 (2003), 2)

One definition of ANT by John Law (Law 2007, 2) describes as a material-semiotic approach the enactment of (materially and discursively) heterogeneous relations. Thereby it treats everything (in the social and natural worlds) as a continuously generated effect of webs of relations while studying and exploring these webs and entangled practices. As an material-semiotic approach It studies / explores and characterizes these webs and practices that enable them. Further ANT is not regarded as a theory, despite the term. While theories try to explain why something happens, ANT is strongly descriptive instead of explanatory. So it instead tries to tell stories of how relations assemble or fail to do so. It does so by being grounded in empirical case studies.

After this short outline about the ANT background, which is foremost pictured by the interpretation of one scholar, it opens foremost the question of how to employ such "tool"? Because of the complexity and different forms of interpretation and actual usage of ANT in academic studies and also due to the limits in regards of space and time of a master thesis, I am going to concentrate on those concepts which, I have found the most useful tools for my study to support me in answering my research question. Thereby following John Law's description of Actor Network Theory as diverse family of material-semiotic tools, sensibilities and methods of analysis (Law 2007, 2). This is directly connected to the idea of ANT as an "toolkit" to explore and tell "messy" stories about these relations.

3.3.1 Encountering Black Boxes: closing and reopening.

The first ANT "tool" I would like to discuss is the idea of being aware of, and interpreting so called "Black Boxes". ANT is interested in "science and technology in the making" *(Latour 1987)* before they are black boxed.

Bruno Latour first rule of method is:

> ***" We will enter facts and machines while they are in the making; we will carry with us no preconceptions of what constitutes knowledge; we will watch the closure of the black boxes and be careful to distinguish between two contradictory explanations of this closure, one uttered when it is finished, the other while it is being attempted. This will constitute our first rule of method and will make our voyage possible." (Latour 1987, 13-15)***

According to Latour *(Latour 1987)* it is necessary for studying science and technology, to enter through the backdoor of "science in the making" and not through the more obvious "ready-made science". So it is important to take a look at the ongoing processes of shaping of facts and technologies, and to take a look at its heterogeneous networks in all its complexity and messiness, before scientific facts or technologies become stabilized and through that black-boxed.

If this happens the underlying network becomes invisible which is termed "punctualisation" and it instead appears as a single block, leaving only the action itself and the simple author of the action. (Law 1992, 4 ff.)

> ***"Punctualisation is always precarious, it faces resistance, and may degenerate into a failing network. On the other hand, punctualised resources offer a way of drawing quickly on the networks of the social without having to deal with endless complexity." (Law 1992 (2003), 5).***

This awareness of the relation of punctualisation and black boxes is in cases of analysis quite useful. At the same time it is a complex task when dealing with a technology which is in a flexible state and in constant development process, like the business software system of this case study.

It is very helpful when entering the field to be reflexive about that contrast. Of course the question remains in how far it is even possible to state if a technology, or maybe just parts of it are already black boxed or if they are still open and negotiated , especially in the area of user practice driven software development. There is of course the possibility that there could be many shades in between. Using this basic concepts of punctualization and black boxes as practical guidelines, is none the less useful when dealing with the interpretation of statements, regarding the relation of software, users, developers and other actors together with their practices and their perception of the technology.

Further, due to the idea of a user driven software development, it also opens up the question in how far the actual processes of this interaction and changing of software interface, code, access etc. could become black boxed itself.

3.3.2 Translation of interests - Following which actor?

Due to the concept of ANT and its multitude of uncountable likewise human and non-human actors creating a heterogeneous network, it opens the mere practical question of selecting an actor or group of actors to study with the goal of answering the actual research question.

Law argues (Law 1991, 10 ff.) to take a look at system builders, similar to how the historian of technologies Thomas Hughes (Hughes 1983) follows Edison and other system builders when interested in the development of the electric grid infrastructure. Thereby Law argues, with Bruno Latour's advice, to "follow the actors" (Latour 1987). At the same time he also points out the various pitfalls of this method when warning against the concentration on "heroic" actors rather than treating heroes as an effect of the heterogeneous network.

In relation to this study I decided to focus, so to say to "follow" what I would have identified as the "system builder" of the ERP software system of this Case study. He turned out as the main driving force of spreading this technology through space and time and showed the typical characteristics of a "system builder". When I write here "follow", I mean it in a quite literary sense because I accompanied him on various occasions during his activities trying to building up this network.

One aspect of Actor Network Theory is the concept of the translation of interests. When following "Inventors" of new technologies it is necessary to take a closer look onto their strategies which they employ to enrol other actors into their ideas and concepts, be it new technologies or scientific facts. An instance of this, which also was one of the major inspirations for this case study, is Bruno Latour's analysis of the development of the Diesel Engine and how it relates to its father Rudolf Diesel. (Latour 1987) Latour uses this example to demonstrate that being the inventor of facts or technologies is not as straight forward as it seems at the first place. A technology or a fact does not simply "exist" in the form it is created by its inventor. It needs to be accepted by other actors.

> ***" The total movement of the ball, of a statement, of an artefact, will depend to some extent on your action but to a much greater extent on that of a crowd over which you have little control. The construction of facts, like a game of rugby, is thus a collective process. (Latour 1987, 104)***

In the case of the Diesel Engine which Latour describes here, it is made clear that the idea for the engine did not emerge as an idea in Rudolf Diesels mind. It was indeed an idea based on precedent ideas. Further Diesel needed to realize his idea of an engine, a large array of other actors. Further he needed to mobilize other actors to provide him with resources in forms of materials, skilled employees with knowhow etc. In the case of Diesel, these were the companies MAN and Krupp, prototypes, helping engineers with local know-how etc. Due to this multitude of actors, his original concept of the engine was transformed in this process. It has even been changed so far, that it is questionable in how far this realized engine would be the same as described in his original book. Further, as an inventor he was interested in

black boxing his engine so that it would run in a multitude of environments, in an unproblematic fashion. When the engine turned out to be quite problematic and breaking apart, this black boxing ultimately failed and Diesel went bankrupt. But the prototypes were further developed by other engineers which contributed without supervision of Diesel their solutions, modifying the original prototype and altering it in a multitude of ways. When a stable state was reached and the original patent ran out, this engine was again black boxed and sold. Of course now the question was if this technology was still the same original engine described by Diesel or if it was altered and modified so fundamentally, that it could no longer be attributed to a single actor inventor.

Latour details this in this statement:

> ***"This question is all the more difficult since all the actors are doing something to the black box. Even in the best of cases they do not simply transmit it, but add elements of their own by modifying the argument, strengthening it and incorporating it into new contexts. The metaphor of the rugby game soon breaks down since the ball remains the same- apart from a few abrasions- all along, whereas in this techno science game we are watching, the object is modified as it goes along from hand to hand. It is not only collectively transmitted from one actor to the next, it is collectively composed by actors. This collective action then raises two more questions. To whom can the responsibility for the game be attributed? What is the object that has been passed along? " (Latour 1987, 104)***

So in the case of a new technology, the "inventor" faces two problems. First he needs other actors to pick up his technology, invention, idea etc. The second problem is than that when it is picked up by others, his black box gets out of his control and is modified through moving from hand to hand, risking that his technology gets altered beyond recognition. Because of that, an inventor needs to do two things at once. He needs to enrol others so that they participate in the construction of his fact, technology, concept etc. In addition he needs strategies to control the behaviour of these actors to make their actions predictable. *(Latour 1987, 108)*

3.3.3 Strategies of translation

In the present master thesis I am interested in these strategies which are employed by an "inventor" of an ERP technology. Because of that I am very much interested in the details of how for example customers or possible distribution partners are enrolled in daily practice of this "inventor". What tactics are actually used by the "inventor" to translate their interests with

the help of his business software technology? What resistances are encountered and how are they dealt with? How is the technology changed in this process and, on the contrary, how are the involved actors or their practices changed? John Law questions what can be said about this translation and the methods which are employed to overcome certain resistances:

> ***" But what can we say about translation and the methods of overcoming resistance? Actor-network theory almost always approaches its tasks empirically, and this is no exception. So the empirical conclusion is that translation is contingent, local and variable. (Law 1992 (2003), 6)***

Besides stating a conclusion that translation is contingent, local and variable he further identifies four general findings which emerge regarding strategies of translation (Law 1992, 6 f.):

- Durability: Different durability of different materials. Which means that some materials are more durable than others and so they can maintain their relational patterns for longer So when relations are performed in particular through the embodiment on inanimate materials like text, buildings etc. they may last longer.
- Mobility: While Durability is seen as ordering through time, mobility is seen as ordering through space. This is about ways of acting at distance and in particular it explores materials and processes of communication from writing, electronic communication, methods of representation etc.
- Anticipating of reactions of materials: Which means that the affectivity of translation is increased if it anticipates the responses and reactions of the translated materials.
- Issue of Scope of ordering. Deals with the concept of quite general strategies of translation which ramify through and reproduce themselves in a range of network instances. These might appear to be more implicit than explicit and their nature is seen as an empirical question.

While the statement that translation is contingent, local and variable appear quite general, the concept of the general findings of these strategies of translation indeed turned out as quite useful while analysing the interaction in this thesis.

He also questions what such strategies might look like. This is one of the primary questions of this thesis:

> ***" What might such strategies look like? This, again, is an empirical matter. But since no ordering is ever complete, we might expect a series of***

strategies to coexist and interact. This, at any rate, is the claim made by several actor-network writers. " (Law 1992 (2003), 7)

Finding out what such strategies look like, and how resistances are dealt with is indeed one of the major point of the analysis part of this thesis. Though even if there is a emphasis on the details and the sequence of the interactions analysed in this study, it is primarily concerned with the identification of such strategies and related practices during contemporary and directly observable interactions. To antedate the content of the analysis chapter here, I would shortly like to point out that, during the analysis the first two strategies, Durability and Mobility became used concepts. The reason for that is that they were quite helpful to gain a deeper insight into the processes of local adaption to the user context and the triangular relation between user, developer and technological artefacts. While the anticipating of reaction of materials is only pro forma mentioned, the Issue of Scope of ordering serves as a more recapulatory concept in the end. Further it indeed turned out that a series of strategies coexist and interact also in a sense when strategies of translation of different actors coincide.

One concept used in the analysis is the idea of looking through these strategies and how through such strategies certain actors become defined and enrolled.

"Thus we are not primarily concerned with mapping interactions between individuals. Rather, in conformity with the methodological commitment to follow the actors no matter how they act, we are concerned to map the way in which they define and distribute roles, and mobilize or invent others to play these roles." (Law and Callon 1988, 285).

This is a quite general concept but this concept shines through the analysis of the interaction between developer and user during the analysis chapter when the developer tries to enrol the user through the translation of interests. Further also the analysis of the interaction between the developer and a potential business partner questions the idea of these strategies and the perception of roles and how through resistances, such strategies and role definitions need to be adapted.

3.4 Summary Sensitizing Concepts

In main purpose of this chapter was to discuss the theoretical framework of this study and to give a useful background for the concepts and arguments of the analysis chapter. Thereby I gave a short overview about the concepts used starting from the less used concepts of SCOT - Social Construction of Technology and the De-Scription of Technical Objects. The

chapter is concluded by the third, more detailed section about how concepts from the field of Actor-Network-Theory are used in this analysis to reach a better understanding and thereby to support the answering of the research question. In the following chapter the research question and various sub questions are discussed in detail.

4 Research Question

The main research question of this thesis is:

How are ERP technologies shaped by the interaction of various actors like users, developers, competitors and how, on the contrary are their practices influenced through this technology?

At first I would like to take a deeper look at the details of this research question. At first it asks how a certain technology, in this case, a business software used for Enterprise Resource Planning is shaped. So how does it reach, for example, a certain form or functionality? Further it asks about the influence on this processes of shaping, regarding specific actors which are involved in one way or another with the technology. In the second part of the question it is in addition extended, asking also how this new technology renegotiates, through new possibilities, the practices and affiliated relations of the actors which get involved in one way or another with it. To sum it up, the questions inquires the tight reciprocal processes which revolve around the genesis of a technology and practices surrounding it.

The case study to answer this question is a small company which is in the process of distributing and further developing their own Enterprise Resource Planning software and is in further detailed described during the first section of the analysis chapter.

To answer the research question in the specific context of the case study I further developed a variety of sub questions:

- ***How does the developer in this case study employ strategies to translate interests of other actors in regards to his technology, and what do these strategies look like?***

This first sub question asks for the actual strategies of the developer of the technology and how he tries to enrol other actors in his concept of a technology. It is therefore focused on the actor which is the developer, the CEO of the software developing company and the interaction with other actors from his perspective. It also relates directly to the second sub question.

- ***How do other actors react towards such strategies and how does the developer cope with resistances?***

This sub question is of course still focused on the developer but it is primarily concerned with the role of other actors which become involved and have own or divergent interests and ideas towards this technology. So how for example do they deal with the developers strategies in developing and spreading his idea of the technology? Do they develop counter strategies? Do they resist? How do they perceive the technology in question especially in regards of their own ideas and interests?

- ***How is in this interplay of negotiations of different interests the technology in question shaped and practices of actors renegotiated*?**

The last sub question asks, on the one hand, how the material artefact of the technology takes is form through this interplay of actors but also how these negotiations influence the practices of the actors in return. So this is a question of the outcome of this negotiations and is deeply intertwined with the idea of Akrich's De-scription of objects and "scripts" in general. (Akrich 1992) Other than in Akrich's original text it is not so much focused on inquiring how the idea of the designers about the potential user is inscribed in the artefact, but much more interested in how far the result of the before mentioned negotiation with various actors becomes embedded, or so to say inscribed in the technology in question.

With this framework of questions I hope to gain a deeper understanding at the underlying and detailed processes of this interaction between human and technology in regards of how a certain technology gets shaped, but also on how it in return shapes the practices of the other involved actors in the area of Enterprise Resource Planning .

In the next chapter the relevant background in regards of the research method of this thesis is discussed to develop a better insight in regards of the subsequent analysis. It starts with a short description of the two main methods used for this study and also explains the underlying concepts.

5 Method

The method I employed is based on two pillars. One is qualitative interviews with users and developers of the ERP software in the context of the cooperation between the client company and the ERP service provider. Before I conducted the actual interviews, there was an ongoing expanded research about the current organisational structures of the selected company. Based on that outcome I have decided to start at first with structured interviews with employees to get a better understanding about the internal workings and possible topics for my research. I was also drawing from the concepts of theoretic sampling, (Glaser and Strauss 2012 (1967), 45) which means that data gathering and analysis happen in parallel, which influenced further selections of interview partners and the focus of the questions.

The details of the interview process, the purpose of the study and possible questions of privacy and data protection were discussed with the interviewees beforehand. During my fieldwork I have not encountered any problems in that regard. The interviews were conducted in closed, relatively isolated environments with an emphasis of not getting disturbed by other persons, telephone calls etc. In addition, and because of the quite none-structured approach of the questions and the subsequent talks, there had been some instances of short interruptions by the interviewees themselves, to fetch certain pieces of equipment, hardware or even to change the room to demonstrate certain aspects or procedures which were welcomed and enriching events. In addition there were also more open and intuitive short interviews, for example during car drives or while waiting for appointments.

The timeframe of the structured interviews are roughly around an hour, depending on the development of the talk. The topics were prepared before the interview and elaborated during the talk for details. In addition, through the above mentioned theoretic sampling, new topics emerged after every interview which were incorporated into the next. I used a voice recorder and in addition a notebook to document the talks and my field observations.

This first approach was based on the concepts of Grounded Theory (Charmaz 2006) with the hope to picture a holistic view on the statements of the interview participants. Through that I hoped to generate a theory based on the available data. Following the concept of Grounded Theory the handling follows the iterative process of data collection - coding - and writing of memos. In addition I also used possibilities of short unstructured second round interviews, with a least a part of the same persons to deepen my understanding and new questions which came up in the iterative evaluations.

The second pillar of my method, and also the major part of the material which I decided to use, are ethnographic observation. This method was guided by two distinct activities which are participant-observation, and the based upon, written record of these observations and

related experiences as described by Emerson and Fretz. (Emerson et al. 2007 (1996), 1.) During the participant-observation phase, I spent time at the site of my case study which was the company offices, and was also offered accommodation in the developers private home. First I visited the location so I could spend some time with various employees during their daily activities. Later I also accompanied the developer and staff during trips to customers and potential partners, which was part of their daily operations. The creation of the record was based on written field notes which I took during the days on-site. They were systematically ordered and supplemented with additional notes at the end of the day. In addition they were supplemented with voice recordings of various interactions during which the participants were beforehand asked for approval. These recordings were transcribed and analysed building a major source of material for the analysis in the next chapter.

Eberle and Maeder (Eberle and Maeder 2006, 54) describe ethnography as using multiple methods of data gathering ranging from observation, interviews and a range of other sources like audio and visual records. In addition they also underline the aspect of data collection through "physical presence" as a key differentiator in comparison to other research methods. This is related to experiencing the field with all of the researchers senses and also taking into account the spatial arrangements.

I also tried taking this aspect into account by giving certain descriptions in regards of the actual situations during the interactions analysis part of this study. Further this was quite useful when considering the materiality of certain spatial arrangements of the environments and how they played a role during the interactions.

I would have preferred to visit the actual field more often than I did, but it turned out to be quite difficult because of costs of travel and time constrains, together with schedule related circumstances. Besides this focus on "physical presence" which resulted in the main body of the analysis, I also made very positive experiences when supporting the locally collected material with as much additional observations as possible, using principles of *Co-Presence* by Beaulieu (Beaulieu 2010). This was quite useful and gave me additional ideas about some quite practical approaches to enhance the ethnographic work within the limitations of a master thesis. In practice, this happened through telephone talks, Skype based interviews, email contact and the participation in so called "webinars" (Seminar like presentation/talk sessions which are facilitated through software applications.).

As implied, insights gained through these means were not the primary sources discussed in the following analysis chapter. They just served to deepen the background and understanding gained through the locally observed interactions, to gain a better insight and understanding at the overall background of my case study company, but also to refer to and deepen the insights of quite specific observed situations. Overall this strategy appeared to be a good strategy to enhance and improve the quality of the locally gathered material and also

to spread my own presence as a researcher through space and time to catch latest developments which I could not attend to through physical presence.

In this chapter I described the two main pillars of my research method. In the next chapter, which is the major part of this thesis, the material gathered through this approach is analysed.

6 Analysis

The Analysis is the central part of this master thesis. It starts with a short background chapter which serves to provide a context for the three main parts, both from an analytical point of view, because certain aspects are referred to in the later parts of the analysis, but also to provide a certain background for the reader to help to provide a context for the following interactions. This first part is followed by the three main parts.

The first main section is an observed interaction between the developer of the ERP Technology, and a client. It takes place within the clients shop. This part primarily revolves around questions of local adaption of technology, its context sensitivity and the mutual adaption of practises in this environment, in which different human and non-human actors come together. Further the concept of Workarounds, materiality of artefacts and their role in the overall strategies of enrolment of actors in the development and shaping of technology is discussed.

In the second main section I analyse an interaction in which the developer of the ERP technology attempts to enrol an IT specialist into his network of sales and distribution partners. The interaction develops thereby a quite unexpected turn when the potential partner resists the enrolment strategies and the developer needs to adjust his strategies and his perception. Questions of the strategies of translation of interests, mutual perception, the blurring of boundaries between roles like partners, competitors and industry peers, are discussed on basis of the observed material.

The last section of this chapter discusses the overall interaction with a third actor which is the fiscal state. This is in contrast to the two previous sections in which two direct interactions were analysed. It is much more focused on interview samples about the developers experiences with fiscal regulations and practices and which strategies and resistances he encountered. Matters of the materiality of technology and technological change and how it affects working practices in general are discussed in front of the background of fiscal regulations and technology development.

6.1 Case study background & context

This section deals with the Overall Background regarding the case study. Its goal is to create context and background to the three main analysis parts which follow up in this chapter. On the one hand, it has the function to provide a common and quite general context for the reader to embed the analysis of the following interactions and through that to create a better understanding of the entanglement of the different situations. On the other hand, it also provides, from an analytical standpoint, necessary information which are referred to during certain parts of the following analysis. It is dived into a short description of the field access

and the selection of this case study. It is further accompanied by a short introduction into the Analysis part and a reflexive note on the collected material and experiences, and the development of the analysis during the fieldwork in relation to the theoretical framing.

6.1.1 Field access & Case study selection.

There are of course many different organizations which are using ERP systems to handle their operations, like Universities or NGOs (Non Governmental Organisation). The focus of this project is the study of ERP systems in companies. This is founded in the fact that these are the main users of ERP systems, and also the cradle of these kind of systems.
I have found access to my case study through personal contacts within the field of different company networks, employing business software systems in Austria. The contacts I am referring to have access to a wide area of companies due to their field of work in the area of company restructuring and mergers & acquisition. Within this network I managed to negotiate access to a Austrian software developer. It is a rather small company, with less than ten employees at the moment of this study. Their main product, and the focus of my study is their rather young ERP technology. This product is, in contrast to classic ERP systems cloud based and designed for micro and small companies within the DACH region (Germany, Austria, Switzerland). The underlying design culture is very much centred about the personal interaction with a rather manageable number of clients.
These three aspects makes it a rather unique product within the ERP field, which makes it an interesting case to study the process of the shaping of a technology from an STS perspective. Through this emphasis on single persons and small groups on both sides I hoped that the individual processes during interactions, practices and the shaping of the technology would be easier observable. This is in contrast to companies with a fare higher number of user influences or a much longer development history.

Further the focus on the already mentioned DACH region in regards of the shaping of this technology opens from an STS focus the field questioning the stresses between locality and boundaries of technology policy and practices. This topic will be discussed in detail in the fiscal state section of the analysis when the influence of national law on the shaping of this technology will be discussed.

6.1.2 A reflective note about the development of the analysis.

At the beginning the study was only designed around the major idea of the mutual shaping of the technology ERP and its users, which was strongly founded in my thinking of the classical concept of the social construction of technology. This was still very much based on the prime example of thinking of a technology, or its artefacts as an object formed by relevant user groups. The classic example here was the very well known case of the bicycle (Bijker and

Pinch 1987) as discussed in the theoretical background chapter. So starting from this example my thinking was influenced by the idea of identifying the user groups and the connected concept of different form of problem framing by these groups. From this early point onwards the idea was guided to see in how far the technology is shaped between the developer and the users.

During my actual fieldwork at regarding my case study, I soon encountered indeed cases of this interaction of the user on the one hand and the developer on the other. But especially at the end phase of the fieldwork I encountered repeatedly the importance of other actors which were nether users nor the developer of this product but also influencing the forming of the software technology. This was especially conspicuous when I had the opportunity to join the company CEO for two days of visiting meetings with potential sales partners of very different roles like developers of competitive products, consulters, and others.

After this field experiences I encountered a certain identity crisis in relation to my thesis. I soon realized that by telling the straight forward story of a mutual shaping of users and developers, I would leave too many questions open through leaving a lot of actors outside of this picture. This is because I switched to a more pragmatic approach and decided to reflect on what I actually did during my field experiences. Most of the time, I actively accompanied or interviewed the CEO of a software developing company during his various activities. When I realised that it became soon clear for me that I was actually following the "inventor" of a certain technology in his daily practice of what he believed would make his technology successful, similar to following the advice to follow the actors (Latour 1987). This was the point when I realised that the usage of tools from the Actor-Network-Theory field would be useful to understand what he is actually doing out there and how he does this. This is because of the heterogeneity of actors I encountered in the field but also because of the their narratives. Through his interactions with various actors, not only the actual users of the technology, he tried to overcome resistances and translate interests of other actors to make his vision of an ERP technology successful. Due to the shear overwhelming amount of possible actors and interactions I decided to concentrate on three separate which are quite diverse and to analyse them in detail. The first is his interaction with a user of his software in the process of local adaptation. The second is his interaction with what was at first perceived a possible distribution partner and the third, and broadest is the interaction with the regulations and practices of the fiscal state.

6.1.3 The Pre- "Value Customer" development phase.

In this section I would like to give a short summary but also an analysis about the available material regarding the history of my case study company. I am of the opinion that to

understand the following sections, it is necessary to get a better view at the background of this development but not only as straight summary of previous events, but also with a certain reflection of the content in mind. First and foremost it is also necessary to keep in mind that this is an account of events told from the perspective of the team members, especially the CEO of my case study. This is in contrast to later chapters in which I analyze direct interactions with a customer or with an potential partner on site observed during the interaction.

The first sample is from one of the first Interviews I conducted with the CEO of the developer company.

> *Interview sample code: Common Interviews/Talks 01:*
>
> ***... and so the company formed, we have than filed some applications for research funding. One has to add that cloud computing for online based software was still very underdeveloped at that time. Services like GMX or online banking were around but they had a much lower distribution than today. This was around 2005, 2004 was the founding of the company and we started in 2005 with the product. This was a dual innovation. The first innovation was an ERP solution specialized for small companies, and the second innovation was that it was cloud based. We than started to apply for every kind of financial sponsorship. ... On regional state level they said that we should go to the federal government first and only if you are rejected there, come back to us. [laughing] but we were not rejected. Instead we were accepted into the FFG [Austrian Research Promotion Agency] basic programs with our project. We immediately implemented our four year project with the FFG basic programs ... till 2009 ... we tried a first time distribution of our product ... in 2010 we have reorganized our company into a Gmbh*** *[limited liability company]*

In this account we see how in an early stage the development of the software product was framed as an innovation because of two reasons which are the idea of an cloud based system in combination with the focus on small/micro corporations, which in itself carries preconceptions about the potential user. It raises the question according to which ideas of customers the development was conducted in this time. Instead we encounter a black-boxed period of the development about we just know about an idea of a product with two innovative features and how it was financed.

Following the idea of Akrich's scripts, designers define actors with specific tastes, competences, motives, aspirations etc. and assume that certain surrounding conditions evolve in particular ways. They inscribe their vision of the world into their technical objects (Akrich 1992, 208). The question which arises is: What were the role models and user ideas in this period, before the first actual clients were consciously acquired to participate through their feedback. This links very directly into the question how they came up with their ideas for these two aspects defining innovation in the first place. Further it becomes also visible that their idea about a technology was at this stage not so much focused on an specific idea of customer but much more around the idea of innovation itself. This opens the question of what is innovation in the first place? In case of this short account the answer appears to be quite straight forward. Innovation is what the developer here imagined to be innovative and what the Austrian Research Promotion Agency (FFG) deemed to be eligible in his proposal for financial aid. For me it is, from the present point of view, and without access to this documents, not traceable how this process preceded and how the meaning of "innovative" was negotiated. This is also not the focus of this thesis because I am much more interested in the details of the developers ongoing strategies of building up networks and enrolling other actors. Still it is noteworthy to keep in mind that certain basic ideas and concepts were not brought up by the actual observation of users or their practices, but by assumptions about the needs of possible clients, own experiences of running a business and outside actors like a business research promotion agency and their own conceptions, about "innovations". However it hints towards the multiplicity of influences which constitute the designer's imagination of the potential later user of a technology.

6.1.4 Employee fluctuation and various dimensions of knowledge transfer

Besides telling the history of the case study company, I also want a little to open up what later appears as a single actor. During most of the three main parts I concentrated my analysis on the case study company's CEO Gregory. This is because I accompanied him directly during the trips to the various sites. Another reason is that even if he has also other members of staff, he is an owner of a company and what could also be described as a "system builder" as discussed in the state of the art. Still it is important that what might sometimes appear as a single actor, is indeed an organisation in form of a company, consisting of different members. Further it might also give some context of how he in his role as CEO perceives his members of staff.

Interview sample code: Common Interviews/Talks 02:

//The employee numbers were always very.....depending on the situation of the research funding... it was always quite fluctuating. The maximum was about 14 employees... yeah I would say between five and fourteen.//

Question: Were more employees part time or fulltime, respectively more students or professionals?

//Both ... it was always a little bit mixed.

Question: Can you tell me a bit about your experiences, the advantages and disadvantages ?

//All in all it was more an advantage,... yes. But we had sometimes negative experiences were the outcome was less than we have expected. We have also made quite good experiences ... what we always did ... we were always a very international team, on the one hand, because we have not found many Austrian designers and programmers as common developers, but also because we had good experiences with "Erasmus" and "Leonardo da Vinci" students. We have made a lot of international contacts. We have acquired most of them as employees and many which have finished their bachelor studies, made their Master in a nearby university. We have had people from Hungary, Spain, Greece ... ... a fluid transition from academia to the practice is especially in the software industry a viable way. Only academic programming misses relevant industrial practices. It should happen together with a company.//

This part of the interview touched the topic of the composition of the employees. Of course a question coming into my mind is, how this fluctuation of employees has influenced the relations towards the clients. During my visit I describe in the next sections Fred, one of the programmers with contact to customers also joins us on site. He does this because he is interested in using the opportunity to meet the client he had already take care of, during non-local support situations, in person. He also wanted to get a better understanding of this clients local situation in regards of her work practices and her local hard and software situation. What also came up during this visit was the topic of internationality of the members of staff also mentioned above. While here this internationality is more positively outlined, it turned out that barriers of language played indeed a role, making not all staff members equally eligible to directly interact with users. Their counter strategy was therefore that they developed their internal organization accordingly.

Another relevant topic is then of course the relationship with a university which is situated in the vicinity of the office building in regards of exchange students. I would situate this within the area of knowledge transfer, on the one hand between academia and industry and on the other hand between different people and their cultures. Further it opens up also the stress field between novices and professionals in this field connected to the topic of costs, compensation and internships. It also connects with the idea of knowledge transfer between the academic context. In the following example Gregory, the CEO refers to during in response to a question of a user how they arrived at their concept for the arrangement of the on screen menu of their software.

Interview sample code: Common Interviews/Talks 03:

We have been... there was a own Master thesis written about this by an Spanish exchange student. We have than on small cards (K: ok ... ok) written down all menu items and we cut them out and then we did built up the points on gigantic flipcharts, like they are arranged now. Which items are associated with goods, what belongs to projects, what belongs to ... (K: yeah for sure!) ... than we put on our thinking hats! We did not do this on the level of our submenus in the sense you mentioned them, so we did not care about the arrangement at that moment. But still we have menu items which you can find under good and projects for example. This is because it is more logical configuration. (U: yeah, yeah) ... But we can just rotate this for you..

So it becomes visible that the Master Thesis of a student and her interaction during her internship with the technology left also traces within. This knowledge transfer is than not only between business and academia but also across borders. This serves as an small example , just touching also this heterogeneity of influences and at least giving a glimpse at the heterogeneity of this actor which is not just the "developer" but which has also a back story with a variety of other actors and different interests and influences.

6.1.5 User concept and user relations

Interview sample code: Common Interviews/Talks 04:

In 2009 we had our first public appearance where we managed to acquire the first few, ... we called them, Value Customers. Especially the marketing agency [note: one of their first "Value Customers"] ... we have had than numerous meetings and they gave us a lot of feedback und we tried to adopt this feedback promptly into the product.

Beginning with 2009/2010 the product development was nearly exclusive customer driven ... so we have just developed what our customers have told us ... this is a little bit of a double edged sword we have noticed ... customers have partially strange ideas....

In one of our cases the CEO of [name of company removed] ... it is a little bit strange, nearly funny if you like... he had very precise ideas how this product should be. But these ideas were in parts not realizable. He wanted features which ... we tried to implement, but one or two years later we rejected those features. //

At the bottom you could say that we had Value-Customers which we met in meetings again and again. They then received price benefits with the commitment that they give us as much feedback as possible. On the other hand we could assure them that they would receive a product which was developed according to their requirements because it was shaped to them. We hoped on the other side that these features would also work for many other companies. //

The term "Wertkunde" (Value Customer), is one of the major concepts in understanding how user driven production of the software is embedded in the corporate culture during the original design process. The origin of this concept was quite unclear during the time I spend in the field, but there were some hints about it, being based on an external concept which the members of the company have adopted from a the field of business studies. The origin of this concept is out of the scope of this study because the main interest is how this term is used by the organisation members and which strategies they relate to it. The main promise of this concept, as it was described by the organisation members, was that the product is developed with emphasis on the actual needs of its users. To be more precise, it was developed in an intense feedback process together with the customer. This is especially true

for the early version of this product, after the company first went public market vise. The advantage for the customer is a software which is adapted and developed towards their specific needs. In addition they profit from a special discount due to their role as partner in the development of the product. This is framed by the developers as two very positive arguments for their development strategy. It opens on the contrary the question if it could also have negative or unwanted effects for the clients, which might be at least in parts not that enthusiastic about this approach when they expect an already developed product. It should not be neglected that this processes of feedbacks and interaction were also described as a quite resource demanding one for the client. Also some negative notes were mentioned that initial "Value Customers" have underestimated how taxing and frustrating this process turned out.

The notion of Value Customer is quite blurred. In a narrow sense it incorporates only a certain group of users which participated in a kind of second development stage after going onto the market. They seem to be the role models for many features. It is not entirely clear in how far this term is used in present practice of product development. Of course there are feedback & interactions with clients in regards of new features and the solving of technical problems but as far as I could observe, these were not supposed be captured by this specific term in the developers usage of it. In addition there are other early developments going on regarding new editions for certain industries based on role models, where this idea of "Value Customer" could re-emerge.

One benefit mentioned for the developer is, that only little knowledge about the needs of the potential customers is needed beforehand. Also, only limited specific expert knowledge in the area of business administration like management, production processes, or financial law is needed, because it is provided by the client who is seen as an expert in his own specific field practices. This first considerations of the role of knowledge and expertise especially through practices in this process of mutual shaping between technology and practices, are another focus during the interviews and observations.

Using these role models, the risk of developing a product missing the needs of a market is reduced, which would be a more classic approach in which a product is developed with a certain user and its behaviour in mind before it is introduced to the market. On the contrary, the possibility that certain features of the solution are too specifically developed towards a single user needs is framed as a risk by the developer. In such a case, it would not be possible to use the developed feature for other customers, or only through costly adoptions. In addition the idea of this notion of a development which is only driven by these Value Customers is described by the interviewee as a double edged sword, so as a risk in itself.

The example of the demand of unrealizable features is used there. One of the underlying assumptions in this intense development processes seems also to be, that a client is able to evaluate, express, and communicate his needs and ideas towards the designer. Judging from the whole of the interviews I have conducted, this seems to be a much less straight forward process as it is considered by the developer.

> *Interview sample code: Common Interviews/Talks 05:*
>
> ***We have tried to evaluate if a certain features was only interesting for a single client... In that case we developed it in a way that it was not visible for other clients. ... Or, if these are features which can be used by other clients. This has led for example to the situation that it is now possible to use 19 different possibilities in our software to generate a statement of account.***

This part addresses a notable difference regarding the material aspects of software products and more classic examples of technologies . In the case of this software technology, all features which were developed together with other clients become (potentially) available for the ensuing clients. So each new customer can decide which of the features he wants to use. If we would apply this, for example on a classic artefact centred technology like the bicycle as in the example described by Bijker and Pinch (Bijker and Pinch 1987) we would end up with set of parts from which one could construct any bike, from racing bikes to boneshakers or mountain bikes etc. This would be of course an unimaginable thing and quite non-economic.

Software products which features don't have that kind of material substratum seem to be freed of these restriction that a single configuration must be found, at least, on the first glance. Going deeper one has of course to ask if this is a sustainable strategy. Carrying this growing backpack of features were described as possibly leading to problems in regards of service attendance, feature overflow, technical and juristic obsolescence, abundance and related costs for the provider. More than that, it is also a question which I am going to address in the next section which relates the boundaries of roles like "developer" and "user" and in how far the technological substratum changes boundaries between actors developer.

After providing a short overview about the company and some of their background history and internal workings in regards of the technology in this case study and also in regards to their potential partners and customers, I am going to discuss three interactions which are cantered about specific actors and their relation to this technology. The first is going to be the interaction between the developer, one of his staff members and an actual user in his

environment, when they meet as part of an ongoing process of local adaptation of their product.

6.2 Translation of interests and enrolment in detailed practice: The Bookshop example.

In the following I am going to analyze the interaction between developers of the software and an actual user in the field, to get a better understanding of the detailed practices and strategies of enrolment and interaction between developers and users. In the following example I accompanied the CEO of my case study company and one of his programmers on a trip to a recently acquired client. This user was still in an phase of adaptation, using the new ERP system only for a few weeks. Because of that, there were still several issues which needed to be solved, or at least discussed. This was done at the actual working place of the user. This was because in the centre of the discussion were not the conceptual features, but very also practice related issues of usability. These were, in addition closely related to the unique local environment of the owners shop, her co-worker and embedded components of hardware on site, like printers, the cash point system and others.

Altogether this visit at the workplace of the client can be seen as a part of the ongoing process of adapting the software and related machinery to the environment and this users needs. In this analysis my focus is in on the practices of this interaction. On the one hand I am interested in the processes and dynamics of this interaction between the actors on the one hand. On the other, I am interested in the actual topics of this interaction and the different motivations, sentiments and interpretation of it in regards to the technology. At first, I am going to start with a short description of the situation and the present persons.

The meeting took place in the morning within the shop of the client, which was a small retail book shop. Due to our visit on this day, the shop was closed for some hours because, as I was told by the shopkeeper Silvia, that even the small numbers of customers expected during the time we were present, would disturb the meeting. In the back end of the shop room the cashpoint connected to the personal computer of the owner was located. She took place directly at the counter to operate the keyboard and mouse of the system while diagonal behind her, the programmer Fred took a seat in a way that he also had a good view at the screen and equipment. Gregory, the CEO of the case study company took a seat on a coach nearby with his documents, which included several notes and records about this client discarded on a nearby table. He later changed places several times during the interaction to stand behind the shop owner to see what was going on, on the screen, and also to intervene during several occasions. I myself, was standing diagonal behind Silvia and Fred to observe the interaction during the meeting. From there I had a good look at the screen, all major actors and how they interacted with the equipment. My voice recorder was placed on the cashpoint counter to provide an optimal recording quality of the ongoing talks.

The participating persons were already acquainted to each other, from former meetings, talks, telephone calls, email interaction and last but not least, the original meeting when the system was installed. I was introduced as a master student, working on his diploma thesis and interested in the interaction between developer and users. This was quite positively acknowledged by the shop owner which allowed me also to record the whole interaction.

6.2.1 The structure of the interaction

The first focus of this analysis is the structure of the dynamics of this interaction. The main orientation and expectation towards this meeting was, that certain issues are directly tackled on the spot of the daily work routines. For this, Silvia had prepared a detailed list of issues she and her colleague had encountered during the first weeks of usage of the software.

Following the findings of Jan Svennevig (Svennevig 2012) in his study of interaction in workplace meetings, it is needed for researchers to incorporate into their analysis of meeting interactions, how written text, images and the manipulation of material objects are used. In addition a characteristic feature of meetings is the dependence on certain types of written documents. Meetings are also often organized by reference to pre-formulated, written agendas and need to be analyzed in regards to the relation to this types of document. Further written accounts of the meeting in form of minutes should not be seen as external content, but are manifested or reflected also in the talk itself and so procedurally consequential for the interaction.

Through Silvia's usage of her written document, the whole meeting was strongly structured by the point for point eradication of her list. Most of the time, this started with Silvia reading the issue on her list aloud, and in a way, that both Gregory and Fred were informed about the topic. In the following example this becomes observable. The underlined parts are the passages in the text which were read aloud from the list, by Silvia:

Interview sample code: Bookshop Interaction 01

Silvia: So... ok now we also got that concluded: cash point receipt. This is it (this). Style sheets. You are going to get them. Contacts, Creation of Invoices, Newsletter. This exists essentially. Do you also need a Style sheet (for these) from me?

Gregory: Yeah, in this case it would be the best if you send it to us ... yeah ... how will you do this? ... Yeah either also as an Word document or as an PDF document. It should approximately represent how the Style sheet should look like.

Fred: Yeah, or you send.. will send me a Newsletter once you have already sent out before.

Gregory: Oh I see! You already send out a Newsletter?

Silvia: Yeah

Gregory: So.. Yeah...

Fred: So please forward it to me.

Silvia: OK. <u>Forward it to Fred</u> [writes this part down while reading it aloud] So I will send you an old one ... to you ... for the present, so you can approximately see how it looked like.

Good ... So, that's that.

This example demonstrates a recurrent pattern during the meeting. The list, which is written on an ordinary notepad, is a vital tool for Silvia to structure the meeting. She goes through one point after the other and at the same time she adds new points or notes to older points if necessary, to remind herself about the next steps she has to take. In addition she also takes short notices for solutions of tackled problems.

Why do I discuss this relatively small observation in detail, or to be more precise, why do I think this is relevant to answer my overall research question? When I was in the field on that day, I did not pay much attention to this technique of the Silvia in the first place. Using a kind of agenda did not appear to be so significant at all and also taking notes during any kind of meeting is certainly not an unusual thing. Overall it did not appear to be an outstanding behaviour. When I started analyzing the material of that day, I soon realized that this "note pad" strategy of Silvia was more than just a marginal detail when analyzing the interaction as a whole. It turned out to be a core element, structuring the meeting which goal was the further adaptation of the ERP technology towards this specific users and their environment. Because of that it needed to be analyzed in this context with focus on the research question, in regards to the actual practices of local adaptation of technology, as a part of an overarching process of the translation of interests.

It indeed structured not only this meeting between the developers and the user, it also was based on earlier interactions between both. Also this incorporates the structuring of the spatial dimension, so the on-site interaction as demonstrated in this chapter, but also through other means of communication, be it email traffic, phone calls, or error reports etc. Further, in addition it also structures future interactions. This is because minutes were taken by Silvia

which incorporate next steps for these further interactions. These were anchored in form of short instructions in regards of the usage of the software which were noted down.

Through that, this notebook can be seen as part of a strategy of translation (Law 1992 (2003), 6) for Silvia to translate this technology towards her own interests. To be more detailed, it can be viewed as the embodiment of certain relations in regards to her own practices, her technical environment, the new ERP technology and the programmers of this technology into the material durability of her notebook. This allows her not only to order a set of relations through time, connecting past, ongoing and future interactions. It also allows her the ordering of relations through space, so to connect her relations through other materials like phone calls or emails, to interact with the developers if they are not on the site of action.

This becomes apparent in the example above when Silvia writes down what she needed to do in a next step to solve the point about her newsletter. Instead of using her old email architecture, she is now interested to send her newsletter with the help of her new contact management tool which is integrated in her ERP system. To do this, she first refers to the point when she noted it down, then she discussed this point with the developer and notes down what she needed to remember as a her next action or what she might expect to receive.

The way it is used also indicates that it is not only a tool used by Silvia as a user, but also supports the work of the developers. When she reads aloud what the next points in her agenda are, it also serves to communicate the agenda to the present developers.

The following example gives us a little deeper insight into the motivations of using this technique.

Interview sample code: Bookshop Interaction 02

Silvia: I simply will now always write it down if something noticeable strikes me. If I got the feeling that something is too slow ... or if something annoys me or ...

Gregory: Yeah!... please, ... please do this!

Silvia: I it really is ... now ... I have seen it now. This week it really worked well. So not once did I have to write something down or so ... Because for me, this is the indicator! If I start to write down something, or if I have to postpone the input into the system to a later point... This must not happen! This would be the sign for me, that something is not alright. Because this

did not happen to me using the old system. There I could do everything immediately! There must not be any situation on site where I have to postpone any data for later input. What is a little bit annoying is the cash point there ...

This runs in course with other similar comments, describing how through the act of taking notes, during the day to day usage in her shop, a documentation of issues arises. At the same time there is no written documentation about situations in which she describes positive encounters, in a form of praise. This does not mean that these positive comments are lacking altogether. On the contrary, there were quite a few occasions, during which she mentioned her positive experiences with this new system, in contrast to her earlier practices. These short narratives of positive experiences are indeed only formulated as verbal comments during the whole interaction in regards of positive experiences of Silvia in person, or retold positive experiences of her member of staff when working with their new system.

6.2.2 Taking notes as a form of individualized technical documentation.

Besides being a material tool to order relations through space and time, between human actors like herself, her staff member, members of the development team and non human actors like the ERP system, her shop and diverse pieces of hardware infrastructure, the note pad also fulfils the role of a living user manual which is trimmed to fit this users individual needs.

It is an example of how "knowledge" always takes material forms, and that it is a result within these heterogeneous networks, consisting of bits and pieces of various human and non-human actors. (Law 1992 (2003), 2). In addition it is also a matter of organizing and ordering of those materials.

From the perspective of seeing this notebook, and the taking of notes, also as a kind of living user manual, it tackles the question of how detailed such a manual needs to be. To ask it in another way, what kind of user, together with its environment, background, technical knowledge etc. is anticipated when writing such technical documentation? In this case the level of detail and the form of description is fitted to Silvia's needs as a user, through the process of writing and rewriting it during the interaction with the technology, the developer and her staff member.

6.2.3 Structured documentation of issues as the developers resource.

Also a noteworthy observation in the above example is the developers reaction to Silvia’s announcement to write down all the issues she will encounter. Gregory, owner and CEO of the developer company reacts very appreciative to her notion of writing down issues. This is

not by chance, but it runs together with other comments during the meeting where he deeply welcomes feedback in any form. In this case it is especially useful to him because of the way it is systematically written down by the user in daily practice. This goes back to the initial idea of the "Value Customer" discussed before. Even thou the developers do at this stage no longer use the denotation "value customer" for Silvia as a client, they still use similar concepts for design inputs, based on user practices of their individual daily business.

In other situations, and in a talk afterwards it was more strongly framed through the idea that these processes of adaption and adjustment were far more intense for "Value Customers". So the distinction by the developer was also connected by a distinction of intensity instead of a drastic change in the process itself. So when a "standard client" like Silvia bought this technology, both developer and user had certain expectations. In a standard case, these were for example a, in principal, fully developed software system. It comes together with an ongoing, and responsive support, an limited number of adaptations, to fit the system to the individual environment, and not least, payment of the full price standard price for software and services. In case of the "value customer" this was quite different, because here both parties expected an intense ongoing development of the technology, where from case to case only fragments of features were available, and in addition underdeveloped. Because of that, the user expected to receive a tailored system at the end of the process and a far lower price to compensate for his time, effort and expanses which he invested in this process. So even if there are still similar processes of user driven development going on, both types of clients were categorized differently because of other sets of reciprocal expectations.

In the following we can observe an example of how appreciated this above mentioned transfer of user practices is. Here it is directly addressed by the developer Gregory. Further it is an example that also for Silvia as a user, the actual practices of usage of this technology still differ from expectations. In addition, unsuspected situations and practices are also accounted from the user's perspective. Notable here is also how aware Silvia is, of my presence as a researcher and the presence of the voice recorder laying on the counter. She appreciates it in a humorous way as a tool, and especially addresses it to express her opinion in this regards in a very explicit way.

Interview sample code: Bookshop Interaction 03

Silvia: This is really funny! ... Where is your tape-recorder? [Bows forward towards my digital voice recorder lying on the desk.]

I am going to say it again towards it! Yeah this is really funny! ... During the daily routine you have no idea what could really disturb you! You can't just

know it beforehand! And I talk to my member of staff and she says: "I told you so, this annoys me, and that is just annoying every time this appears there, every time!"

Gregory: For us, this is the most important thing! If we hear of it in a form which ... we can use it one way or another. If I hear, like we have it here now: "This button up there, would be better over there..." This is an excellent information. I can implement this very fast. Also there are of course things which are more laborious to implement. In such cases you have to ...

Silvia: ... weigh the pros and cons .... but some things .... I mean for real, there are such bagatelles! What, if anything really disturbs me is this ... over there, but this is ....

Gregory, as a developer underlines here the formal dimension of user feedback and the importance for the further development of his software technology. This runs together with other comments in that regard, in which he clearly distinguishes between feedback about his software, which is detailed and helpful to counter a specific criticized element or feature, and critique in other forms.

In the context of other observations, these other forms are alluded to, for example unspecific negative critique, which at least gives him the chance to ask deeper questions. Another form is openly voice critique which he also sees in forms of clients, which terminate their contract without comment or, if they feel obliged to give deceptive reasons because of politeness or personal relations etc. To return to the formal dimension of critique, it is also valued by the developer of how this accounts of critique, suggestions, issues etc. are voiced.

Silvia offers a quite clear and structuralized way of how this feedback can be picked up by the developers. Based on various comments, I assume that this valuation and appreciation of feedback constitutes an important resource for his development processes, running from his clients back into his overall business and design concept. This is connected tidily to the idea of enrolment of the actors as users into his idea of technology, which is in a constant processes of further development.

With clients going into the hundreds and the expectation of more to come, the question of normalization in regards of structures and standardization of the flow of communication between the users and the developers, and in addition, the writing down and protocol logging of feedback, challenges ongoing strategies of enrolling actors as users and resources of

innovation. This is because this processes are still based on ideas of more personal relations and informal communication between the developers and the users.

The before discussed note pad is a materialization of this processes and negotiations between designers and user, which is concerted by the user to improve his own handling when he adopts the technology with the help of designers to his need. It is indeed not a tool introduced by the designer, but a very appreciated resource. Because of that they incorporated it, to support their own idea of this system. Thereby it is an example of a material embodiment of ordering strategies also used as a resource as part of the enrolment of the user as an actor, into the strategies of translation by the developer. It orders these relations and interactions through space and time and it becomes therefore an tool in negotiating the processes of adaptation between user, developer and technology. In the following sample it becomes better understandable how it relates to others heterogeneous resources. It demonstrates how they are employed in the wider strategies of the developer to enrol their users, not only as paying clients, but also as an resource of innovation for their technology.

6.2.4 Connecting to other resources of information

The following sample now demonstrates this interaction between the user and the developer, in which the developer also appears as an instructor, or an tutor, for his technology. Further it also demonstrates the heterogeneity of possible sources for guidance, in relation to this technology and how these different sources are related to each other. (Underlined parts are read aloud)

Interview sample code: Bookshop Interaction 04

Silvia: ... When stopping at the start automatically on ... [rest read aloud but fast and mumbling] Ah! this one we already have ... With that file explorer and network drives are displayed. Tutorial with pictures on www.companywebsite... ... pause ...

Fred: There you can find the tutorial, you know the one which Gregory showed you on the internet.

Silvia: Yeah exactly. This tutorial which I wanted to take a look at namely ...

Gregory: Just move the courser to the Question mark over there.

Silvia: Yeah, fine because we did not do this before.

Gregory: Go to the website ... there, it is always context sensitive where you are now ... or you can also just move on "functions" ...

Silvia: Context sensitive! ... Oh! Now I have just learned a new term! [laughs]

Gregory: Yeah we call it that in the IT industry ... and now you are already placed within the invoices and if you click on "functions" you are ...

Silvia: mhm

Gregory: ... you are back in the main menu ... this just takes a moment ..

Silvia: Ok.

Gregory: There, you now see all modules as it were.

Silvia: Ah! Yeah and there this was about these credit items.

Gregory: Exactly

Silvia: "Can be directly generated based on an invoice or can also be created independent of an invoice." "Can easily either be issued using an amount or it is also possibly to create it based on single positions. The Layout can be completely modified ... [reads on, very fast and murmeous] ... Exactly!

Gregory: And there you have to go to further information ... this one is just the teaser for all instants and purposes. ... And there you got the more detailed ...

Silvia: Ok, and here, this is about this credit items.

Here it becomes observable how different concepts, technologies, materials etc. come together, to demonstrate the heterogeneousness of this network of actors, be it Silvia's notebook discussed before, the learning material ordered and embodied in an online guidebook as a source for users operating the technology, and the human actors present.
Note that here, the software cannot be changed by the user. It is based around the user who tries to learn how to actually employ the technology. Here all three parts of this user sided adjustment process, of learning to use the technology, come together and it demonstrates how they interrelate. Silvia uses her notepad as a hybrid tool which is fast and easily modifiable because it based on pen and paper. She uses the already written down parts. She

starts this as observed before, with reading aloud parts of her notes to also better connect to the present developers. These notes now refer to the online help resource of the software system established and maintenance by the developer, with the idea of giving an ordered guidance resource for the users.

In the next step Gregory comes in as an onsite instructor and responses to her interest to become acquainted with the online help resource, to demonstrate its usage on the topic of gift certificates, which they are actually working on. It is noteworthy here that, this resource seems not to be self explanatory enough so that Silvia still inquires Gregory's assistance to give an short introduction in using this help source. Silvia now orders the different sources of assistance herself, be it her own notes, the developers on site as human instructors, or the online help source. Through the interconnection of this different sources she now can tap on to gain different information in cases of questions in regards of ambiguities, when operating the system. Thereby she does not only create one on one orderings between sources and possible problems but also uses the sources, to open other sources, when dealings with ambiguities in the operation. Because of that it becomes apparent that she does not only learn how to operate the system, neither does she only use external sources, but she creates through this mutual allotment and interconnection an individual support network.

6.2.5 Overcoming Resistances

The developer tries as the "inventor" of his technology to overcome resistances and enrol other actors. When enrolling users which are the clients of his company, it is therefore a point to use their interest and translate them through his own (see Latour's example. (Latour 1987, 108). In my case study the developer and CEO of the software company is, not surprisingly, interested to get as many new customers as possible which are willing to pay him for supplying them with his technology. He is therefore heavily interested that his technology spreads through time and space (as formulated by Latour (Latour 1987, 108). Which, to put it in another way, means that his goal is to enrol as many users as possible.

This might seem to be a quite stale statement, because in most cases, companies are interested to have as many paying customers for their products as possible. In contrast to that, I would like here to foreshadow the results of the next section during which I analyse the meeting between two developers, and how different their strategies and attitude towards the enrolment strategies of other actors appear. Indeed the CEO of this case study seems interested in acquiring as many paying clients, so users, as possible. This seems not to be the case for his counterpart, when his quite selective and strategy shines through. This happens even if both are located in, what appears to be, the same field of industry, trying to sell a similar technology with quite significant differences but also a lot of analogies.

6.2.6 Translation of interests

To overcome resistances, it is important to translate the interests of other actors. (In the categories of users as possible clients.) This is done by translating their interests, which are often, more or less formulated problems, in regards to their own enterprises towards the own interest of spreading the technology, so selling it. These problems are often certain management questions, in regards to clients administration of resources. This is done by presenting this technology as a "solution" for certain organisational situations.

There are also other tactics which are employed to overcome user resistances. In the following example, it is observable how, during the interaction, the developer and his programmer train the user on site to employ the program. Thereby the focus is on the teaching of actual operating techniques which are quite standardized. Effects like user introduced development plays in such situations only a quite limited role, and in addition the technology appears as quite “sturdy” and needs to be operated according to specific modes. There is, in addition, still the context (so to say the environment) of the software, which in this case needs also attention by the developer. So the adaption processes of the software are here on the side of the user and their specific environment of usage. The following example serves to illustrate this.

Interview sample code: Bookshop Interaction 05

Silvia: So... lets now go there to bill of cost. If I now find there receipts - Export then I select today... - Create Summary - Download - ok ... Now he has it within there. Then I have to click on it...

Gregory: We can change this for you, but this depends on your browser because ...

Silvia: Aha! ... and now I have to click it once ...

Gregory: Exactly.

Silvia: ... and then ... nothing appears and I have imagined that some similar problem did already appear ... it already has ... What would you do now? Click it again?

Fred: Let's look at it again ... down there ... is Excel still opened? Let's have a look if he opened it within it. Can you see this? If it is already open, he

does not open it again in the foreground! Because you have already opened it once in the Background.

Silvia: Ah! ... I see ... this is the reason! Quite simple indeed.

Silvia starts here with the point of usage she already knows. To underline her approach she describes aloud and in detail what she is actually doing. Gregory adjourns her, when he observed her and saw that there would be another, more comfortable way how to open the downloaded file and offers to change her browser setting.

Silvia continues with her action, till she reaches the point where she encounters the expected problem in operation. Fred, who also observed what Silvia was doing now and takes the mouse from her. Soon he finds out the reason why the downloaded file did not behave as she had expected it and tells her the reason.

What is noteworthy here, is that in both instances during which the developers assisted Silvia, it was not because of a problem directly connected to the software they sold her. So there was no problem in Silvia using the software to export the receipt. The actual problem occurred afterwards in her normal working environment, on her computer desktop, which is not part of the developers product. Of course it is in so far connected because their export mechanism uses an file format of the external windows software, and the developer is interested the eliminating resistances, disregarding if they exist through his own technology or not. Because of that, it occurred several times during this two hour interaction, that Gregory and Fred needed to assist Silvia with the usage of external standard windows software, even if this outside the scope of their agreed terms of support. They also expressed afterwards their discomfort about this situation because it costs them precious time. At the same time they also saw it as necessary to support their customers as best as they can. Even if they agreed that there are limits, especially if they have to attend problems falling already into the support scopes of other hard- and software companies.

Interpreting this, they still take this responsibilities as a service for their customer because they also know that through this actions, they still follow their strategy to help local adaption of their technology and the user, and so to translate the users interest into their own by reducing resistances. They also do it because they are aware of the perception of their client which is primarily interested in a working system, lacking the sensation of fine lines of products and support regulations. Silvia sees this through the interaction from a very different perspective because she draws no border between the common environment of her old IT system and her new software… she sees it as self

evident that they assist her and also expects this.

6.2.7 Imagining problems, deconstructing problems - exploring the configuration together.

Besides adapting and customizing the technology to the needs and the local context in regards of practices and technological infrastructure and actually assisting the user in learning to use it, and so to translate his interests and enrol him as a user, we can see another similar strategy by the developer. In this following example a certain problem of the user's practice appears and both try to solve it together and negotiating it through the technology.

The following sample is because of its length separated in single parts, with the goal to make my analysis easier understandable, in the context of this part of the interaction as whole. This should be considered in regards of the dynamic und fluidity of topics.

Interview sample code: Bookshop Interaction 06

Silvia: Do I have to ... the gift certificate ... thus .. somebody has in my shop ... I mean I offer gift certificates as you know ...

Gregory: Yeah, alright.

Silvia: Ten Euro gift certificates. You see ... If I sell them I just type [input] them ... in the normal case under gift certificates. But at that moment they are not accounted because he [the software/the system] has not received any value-added tax.

Gregory: Yeah ... yes...

Silvia: This means it is now a preliminary place holder in a manner of speaking or isn't it? If they later intend to pay with the gift certificate ... So they come here with the gift certificate and I have to countermand so it is deleted out of the system. So it will be offset the certificate. I than enter the actual price. Now the book costs for example 10,30 euro and I input "Books for children and young adults" 10,30 Euro and ... and I find than under "cash" the whole 10,30 euro ...

Silvia describes in the beginning of this sample how she treats gift coupons which she sells as a daily routine. She does this by shortly describing how she interacts with her cash point system, and at the same time, she also explains what she believes is happening in the background within the software. She does this in detail when she further spins the thought

out, when she expands her example about what she believes is happening within the IT system, when in the next step a customer wants to redeem the certificate in exchange for a purchase in her shop. Still the precedent reason for her, to bring the topic of gift certificates up in the first place, is that she is actually not sure about her practices in connection with her system. So if her actions are actually understandable by the machine and if connected to this, her perception of the inner workings of the software is correct. The inner operations of data processing of the software are not available for her and she is interested in inquiring an explanation from the developers. Notable here is that this is not a "black boxed" mechanism in the sense of an input/output situation. This is because Silvia is unsure if she operates the software correct and she is also unsure if there is even the expected output. So in contrast to the "black boxed" examples of machines in STS literature and the context in which it is used by Latour discussed during the state of the art chapter, here the inner knowledge of underlying processes within the information technology are necessary for Silvia to actually operate it.

Interview sample code: Bookshop Interaction 07

Gregory: Yeah.. yes we have made it actually like this... Also with Elfride [Silvia's external Accountant] ... that you do not do this via the point "gift certificates" but that you create an own category "gift certificates" when you actually sell the certificate for all intents and purposes ...

Silvia: ... Yeah .. thus a "goods button" product ...

Gregory: ... a "gift certificate" category from which you sell a certificate for 10 Euro. You than receive these 10 Euro cash but without value-added tax so set on zero percent.

Silvia: Yeah ok

Gregory: And if someone actually comes in to buy a product you just input "10 Euro gift certificate". In case of goods you can also input negative amounts for all intents and purposes.

Silvia: ... exactly ...

Gregory: Witch means that you make him a standard, common receipt with the actual goods in the first place and as a last position you add ...

Silvia:... the gift certificate ...

Gregory: ... the gift certificate ... 10 Euro ... and you select category "gift certificate" and then he [the software] subtracts the 10 Euro again.

Silvia: Yeah! I totally forgot that!

Gregory: ... And Elfride said back than, that this is totally fine and in accordance with the fiscal law and also the easiest way to handle this.

Here it is Gregory's term to reply. He does not confirm Silvia's former description of the operating practice she described. He reminds her of a previously discussed process, regarding the handling of gift certificates and related, needed software interaction. Doing this he describes in a similar manner to her previous description the correct operation, and in addition the inner logics of the calculation and accounting processes accompanying the steps of the operation. Further he also refers to an additional person, Elfride, the external accountant of Silvia. She was consulted when they developed this customization practice to ensure that, the actual modification of the software, and the process and practice they imagined, was in accordance to Austrian fiscal law. This short excerpt is revealing because of two reasons. First of all, it gives the observer a vivid example of how this interaction of learning and teaching proceeds, as the actual practice of overcoming resistances, and enrolling actors as users. So even if the network consisting of Silvia, her shop, her gift certificates and the technology is set up and explained, it needs further work of adaption, even if it is only retraining Silvia in this one process to make it work. Secondly it also offers a small narrative, of how this process came into being. That is that they designed this process together at a former point of time. There, many different interests and actors came together to form this "gift certificate processing" network consisting of Silvia's interest and resources, offering these certificates, and Gregory's ERP system, which did not support such a special concept in the first place. In addition, also the fiscal state, as an actor was revealed when just a working process was not enough, but also the compliance with the tax law situation needed to be assured. For this, another person, Elfride as an consultant was called in as an expert. This reveals in how, just a quite simple, partly technological process like this, consists and is shaped by so many different heterogeneous actors and their interests.

Interview sample code: Bookshop Interaction 08

Silvia: ... Exactly, I totally forgot that ... because I now just enter here ... I don't know... Minus 10 [she tries this out live and describes what she is doing while operating the system] and now he takes this like this ...

Gregory: Yeah, and if you scroll down there you should see now minus 10 ... Yeah, exactly.

Silvia: Yeah over there ... This seems to be the simple way.

In this following part, Silvia notes that she now remembers the discussion and the developed process. Seated at the cash point desk with the screen and input devices in front of her, she immediately tries a part of the process and confirms this also as an easier, more convenient solution. This prompt trail of this part of the operation serves as a confirmation of the before described.

Interview sample code: Bookshop Interaction 09

Gregory: Yeah this is indeed a relatively easy solution which we have found there. It becomes problematic if someone comes to buy something for example 8,20 Euro and you have to credit a gift certificate for 10 Euro. Because then, you have a receipt with a negative amount of minus 1.80 Euro or something.

Silvia: No! I don't do that. I only delete the certificate from the accounts if the certificate is completely redeemed .. because he then has ... or what do you mean by shopping for 8.20 and he want to cash in the certificate for 10 Euro?

I mean no, in that ... such a case I subtract the amount from his certificate and tell him: "on your gift certificate are 1.30 Euro left". Then he will return some time or another and the next time I redeem the rest completely.

Gregory: In the other case you would be left with a negative receipt ... But this would also be no problem as far as I understand it now.

Silvia: I see... No I don't do this in any way. Because I just reduce the amount, and then are just some Euros left on the certificate and the client will come again.

Gregory: Yes, I see.

Even if relatively short, Gregory attests here within the first sentence, that he and his members of staff found a relatively easy solution. It becomes therefore more understandable, also from other statements during the meeting and his tone, how he perceived the situation. From his point of view, Silvia's situation of being interested in handing out gift certificates is seen as a problem which can be solved using the software system which he and his team member has introduced. His interpretation of seeing the wanted usage of giving out gift

certificates serves thereby his strategy of framing the software product, as a solution to Silvia's problem.

Regarding more details of this active problematization, it could be also described otherwise. This is because Silvia was already handing out gift certificates long before she started using Gregory's software. On the contrary the actual problem is that, her practices of handing out this certificates were not compatible with the newly installed system.

Paradoxically, the actual solution which the developer praises, solves a problem which only arose due to the new ERP technology he introduced. This is of course only a small example, but it is one which touches the much larger topic of framing problems and solutions, and the interpretative flexibility of technologies in the sense of SCOT (Bijker and Pinch 1987). So even if we deal her with quite small "groups", like the developers on the one side and the users, Susan an her staff member on the other side, It becomes apparent that they might have quite different ideas about what the problems are and how the technology might solve it.

This becomes further apparent when seeing how in the wider ERP industry, the term "solution" is often used as a synonym for an ERP product, software, and especially for very industry specific products. Most of the time, it is not clearly stated which specific problem this solution solves, besides the implicit assumed indispensible need to employ a specific business software system.

Further it also leads back to the original concept of the translation of interests as a strategy to enrol actors as users. If this translation of interest consists of offering a solution serving the interests of the actor, using the term "solutions" for technologies can be seen as supportive for this strategy, even if it could turn out, that the solution may first of all cure problems, created by the new technology in the first place, together with introducing a range of new issues. Of course Silvia as a client and user of the ERP system pursues her own interests when she decided to acquire technology.

Further in the sample, Gregory elaborates his "solution" and points at a possible flaw which can arise in certain situations leading to the undesirable effect of Silvia having to issue invoices with a negative amount. Silvia immediately enfeebles this argument when she describes her counterstrategies. Noteworthy is thereby, that this may, at the first glance seem to be a classical workaround situation, in which certain technical restrictions of a given technology are circumvented by a strategy of the user to achieve a certain goal. On a second glance, and in the context of other comments regarding the gift certificate topic, I would argue against this interpretation.

Indeed Silvias strategy avoids the problem mentioned by Gregory but it seems not to be a deliberately developed strategy of Silvia to circumvent the restrictive "scripts" of the technology in the first place. More than that, she seemed to just continue her former practices in regards of dealing with only partially redeemed gift certificates. If Gregory did not bring up, what he perceived as a potential issue of his "solution", it is possible that Silvia would have never encountered any problem. Further it also demonstrates how the perception and framing of options, may differ in regards of the viewpoint between developer and user of a technology. It is also noticeable how quick and without delay, Silvia refuted Gregory's apprehension.

It opens therefore the question of how to identify actual work around in regards to the state of the art discussion in this thesis. To ask it in another way: When becomes a problem a problem, and if problems are framed, how are "solutions" framed and communicated?

Recap of course of action:

(Using the notions of scripts (Akrich 1992), and SCOT (Bijker and Pinch 1987) as discussed during the state of the art chapter.)

↓

Users Pre- new ERP technology Practice of gift certificate

[working practice]

↓

Introduction of ERP technology as a "solution" to specific business "problems".

[solving of other issues of resource management practices, but creating of a new issue through potential incompatibility in regards of established practices]

↓

solving of certain "problems" but creation of new issues because of incompatibility

↓

Modification of the "script" of the technology selling as an "easy solution" which could be in part a work-around [termed as "solving" but of the newly introduced issue]

↓

Thereby creating and framing a new problem of "negative invoice amounts" by the developer.

↓

Closure through rhetoric discussion/interpretative flexibility in discussion. [User elaborates in

discussion that developers perception of incompatible practices are indeed wrong.]

Figure 1: Course of action recap: "solutions" and "problems"

Seeing the situation as a whole, it might raise the question of the boundaries of workarounds, solutions and problems.

Interview sample code: Bookshop Interaction 10

Gregory: I mean you could possibly ... if you would like one day or another ... put serial numbers or something similar on your certificates. This would be possible with an particular module ... ähm ...

Silvia: I see... but this becomes more complicated than ....

Gregory: Yeah, it would be more complicated with such a ....

Silvia: Yeah, I know ... I just issue the certificates and if someone redeems them, I delete them from the accounts and If someone doesn't - Tough luck.

Gregory: Yeah, I mean maybe you could secretly put ultraviolet paint on one of the corners or something then you could also see ... I mean be aware that someone could copy your certificates or something ... I don't know how artistic you make them so that someone could ... or do you put your signature and you company seal on it or something?

Silvia: Yeah ... someone could not do this ... In the way I do it now, it would not be possible because there is my signature on it. I use these small cards over there [lifts a stack of business card size cards from behind the lower part of the counter]

Gregory: Ah, I see, I did not know how they look like ...

Silvia: Yeah but I also have preprinted - ready to issue .. but I don't have them with me today. I can show them to you next time.

In this ensuing sample Gregory tries to reopen the "solution" after their closure at which they just arrived, when he tries to expand Silvias practice of dealing with gift certificates when he shortly elaborates how she could improve, and extend her handling of the certificates and how an expansion module of his software could facilitate this. Silvia declines the idea because she is not interested in raising the complexity of her practices and Gregory agrees upon at first. He further elaborates that he sees the possibility of illegally duplicating the

certificates as a possible problem and, after Silvia made clear that she is not interested in a technical "solution" through the ERP software to this problem, mentioning a less complex practice. Again this is not a newly developed workaround in regards of the new system, but still an older practice she developed during her earlier workplace organization.

Silvia shortly describes how she handles her certificates in regards of preventing illegal duplication and clarifies that she does not perceive this situation as a problem at all. In both of the above samples Gregory's reaction to Silvia's deconstruction of the problems he framed, is one of gaining a deeper insight in the actual practices of his clients. It is further elaborated and commented by him repeatedly, how important such insights are because, this insights are, as discussed above, a source of knowledge for the actual design decisions.

Interview sample code: Bookshop Interaction 11

Gregory: Yeah, you would have to be able to see our software ... If you survey your certificate situation .. who did really redeem them in the end? Because many shop owners realise that many certificates were just lost or forgotten [laughs]

Silvia: Yeah...

Gregory: ... You know... if you gift them to someone over a friend and such situations ...

Silvia: How can I see this now? For example, how many certificates are still open or which have been already redeemed?

Gregory: At the moment this is not possible, because the ones which are already issued have not entered the books within the system or did you ...?

Silvia: Why is that? Because in "goods group" I already have "gift certificates"

Gregory: I See! Yeah...

Silvia: and based on that ... Actually I would be able to see it within the "good group" - "gift certificate"

The content of the topic changes now. In former samples the focus was on the material practices of carrying out different situations in regards of the handling of gift certificates and possible issues, which could arise between the system user, the behaviour of the customer and the technology itself. Now both, the developers and Silvia have cleared out any

questions in regard of this practices in discussion and a certain stability is reached. Gregory now expends the topic towards the interpretation of the gift certificate situation. He proposes that Silvia has now the potential feature available, to see through the information processing capabilities of her software, how many gift certificates she already has issued, and how many have been already redeemed. In addition, it shows the date and the amount of the individual entries which offer additional information. He alludes to that, it makes it possible to estimate roughly how many certificates might never be redeemed. This is of course a quite positive effect for any business handing out such certificates. Silvia immediately shows interest in this feature and asks how she could invoke such an report on her screen.

Curiously Gregory believes that this is not yet possible due to the before discussed practice but Silvia immediately adjourns him and states that she believes how it is already possible, demonstrating again her insights in regards of the combinations of her practices and the inner workings of the accounting logic.

Interview sample code: Bookshop Interaction 12

Gregory: Yeah, you could also ... It is called "goods accounting" in our software. Then it shows you all the book entries of goods and there you can also use a filter.

Silvia: "goods accounting" Ok! And where do I now ... ?

Gregory: If you scroll down ... You see all items which have one time or another... You can also export this to Excel or just go up there where we could .... I see, we can't initiate a search operation here...

Silvia: Because it would include all ...

Gregory: ... These are all entries. All movements which happened at this ...

Silvia: I see.

Fred: But you can look into "goods" if you look there ...

Gregory: Oh.. ok! Within the group "goods" itself we should also be able to see it!

Silvia: Under goods...

Fred: If you know look down ...

Silvia: I think we have it here know. I can locate it over here, if I just say ... ... certificate ...

Fred: Exactly .. with 9.90 .. I see, exactly 13 ... this is the easiest way.

Gregory: And if you go up there a little bit ... What is over there? ... I see, this means you have sold 13 and one has already been redeemed.

Silvia: Yeah.

Fred: No, one has been accounted on the open cash receipt.

Gregory: Ohh, ok! This is an open cash receipt! [points at screen]

Silvia: I see...

This last part of this topic focused interaction features two interesting changes. First of all, it shifts from a mere discussion of concepts, possible situations and short descriptions of practices to a much more hands on approach. The second major change is that Fred, one of Gregory's programmers who remained in the background before, now joins the conversation. In the beginning it starts with Gregory reacting to Silvia's inquiry to demonstrate to her how to access the report. She is now actively using the computer, following Gregory's instructions who stands beside her. This activity becomes also apparent in the structure of the conversation which is repeatedly interrupted while waiting till certain actions are executed. Further it soon turns out that finding, accessing and interpreting the available data, is not a straight forward action. On the contrary, it turns out that it is much more an active exploration of the available features of usage. This is also when Fred joins in, assisting Gregory and Silvia in interpreting the available data.

Interview sample code: Bookshop Interaction 13

Fred: Particularly, you would have to create two categories. One "Certificate Selling" then one time "Certificate redeemed" so you can see both. Because otherwise he can't make a difference between certificates you sold and a certificate which you have...

Silvia: Because of the subtraction! I see! Because I don't have here amounts of money but only the quantities.

Fred: Indeed!

Silvia: With an money amount it would be significantly easier but... ok ...I see that I have to create a group "redeemed".

Gregory: Yeah, "redeemed". Yes, than you would also be able to see at a glance how many are redeemed and how many you clear out.

Silvia: Yeah, ... so I can think about, if I need to know this ...

Fred: Yeah, ok

S: Gift Certificates .... [writes down the effect discussed but reads it at the same time only murmurous] So we now have also that point! Great!

Gregory: Yeah!

Finally Fred perceives a problem and offers a way how Silvia could solve it, now thorough creating different categories for her gift certificates. Through that act of categorization, it allows the software to process and report the information in a format that allows her, as a user, to perceive how many certificates she had issued and how many are already redeemed. In this situation I would argue, that it is indeed a workaround, even if it is a workaround introduced and recommended by one of the designers of the system, but for her it is still a not desirable solution which she communicates through voicing criticism.

Further Silvia also is not passively receiving a lecture or instructions. She also voices her interpretation of the situation on screen and also voices critique at the available presentation were she argues that she would prefer and presentation of amounts of money for an easier arrangement of the data.

This example demonstrates again, a translation process in which the interest of the user to solve the problem of processing of gift certificates is discussed. In the beginning, this example starts from the already discussed online reference.

6.2.8 Negotiation of colliding interests

Especially in the last example it becomes obvious that even software with a high grade of flexibility has its limits forcing users and developers to deal with problematization and its deconstruction, workarounds and the adoption of practices while translating interests. This clash of heterogeneous more or less fixed limits, interests and strategies might create new roles for designers when inscribing and dealing conflicting paths of innovation.

The high flexibility of the software technology and the possibility to customize features in regards of function, visuals and composition is one of the key selling arguments for the developers software. The other would be the concept that improvements through the

constant flow of insights, become available for all the users and improves their experiences. The developer gained, through ongoing interaction with its clients, their constant input of suggestions, experiences or plain bug tracking, a resource of knowledge which is reintroduced into the system. These have then the potential possibility to spread and influence other users.

In the field however, these strategies also face resistance of different kinds.

Interview sample code: Bookshop Interaction 14

Silvia: What I just wanted to talk about. I mean about this "jumping"

Fred: I first have to look it up myself, but you know it seems quite difficult if you already work with it ...

Silvia: Yeah, I mean I understand that ...

Fred: ... if you already work with it for a long time. I myself, I don't recognize it barley anymore.

Silvia: Yeah, as I told you what I recognized is, if one site ... If I do it myself, this "thing" which is always up there ... I mean the save button.

Fred: Yeah, ... I mean we could consider duplicating the button for the save function. One in the upper left corner of the report and the other one on right bottom of the page.

Gregory: This would be ... I mean if we only leave one button and switch the position ...for the users which already learned it and are accustomed to it ...

Silvia: I see, this on the other hand would then be ...

Gregory: ... It would be crap, if we would change that. But duplicating it would be a possibility because if we add something down there it would be non relevant for them, because if they don't scroll down they would not even see it.

Silvia: Yeah, it is really for me ... If you are down there, you work and change something and if I am done ... Of course if I just work on something on the upper page like inputting data, the left side button would be nearer ... But yeah these are such things ...

In this sample Silvia voices her criticism at the arrangement of the Save button on the screen. This button is, following the concept of consistent arrangement, always at the top left of the different report sites, functions, and windows of the screen menu. During her first practice weeks with the software, she experienced this arrangement of the button as counterintuitive, because it disturbs her workflow when editing long lists. Here her academic background in literature and language and her strong interest in "reading cultures" comes into play. In addition, the notion that during our stay she repeatedly voiced her opinion about the importance of incorporating such topics into daily work routines. Especially her opinion about the logical arrangement of documents and software tools on display screens. Here she refers to her view, about the outmost importance of starting to work from the upper left-hand side corner of the screen and finishing at the lower right corner. Now she experiences the placement of the save button, to save and close the open report, as a constant disruptive element. The developer now faces the problem, that if he adapts Silvia's proposal to relocate that button, he would probably face criticism from the many other users, which are now already used to the current setup. The architecture of the software is quite flexible and allows various degrees of customization and adaptation, but still it reaches its limits here when this change would inevitably change all other users experiences.

So in this small example the developer has to negotiate the colliding interests of users within his technology. Fortunately he imagines to just add a second save button, so that both preferences can be satisfied. This is of course only a marginal example but it still shows that even in such flexible technologies, limits of flexibility exist because of the resistance of the technology. In addition, also if the boundaries between users and designers begin to blur as Pollock proposed (Pollock, 2005) in regards of the flow of ideas into the technology, it might be that at the same time new exclusive tasks arise for the developers. In this case where the innovating ideas flow so strong from users, influencing through the cloud based nature of the technology other users, the designers new tasks could move stronger from the field of "inventor" of innovations, into the area of negotiation users interests, creating new boundaries and roles as gatekeepers of innovation. In addition the above situation of contradicting interests of clients, seen as a disturbance, lays opens the black box and demonstrates how practice of clients are inscribed into the technology, made available to all users, through the cloud concept. It is questions the assumption of a straight and always progressive development process in which this technology develops in a straight direction, improving from one step to the next. It turns out that this might not always be the case, because one users improvement could be worsening for others. In addition it also demonstrates the "instability" in regards of "closure" of this cloud/service concept through compelling software updates. Even if a certain user might be satisfied with the current state

of the system, he might be forced to adopted any changes even if they are degrading his experience.

6.2.9 Summary: User and developer

In this chapter I explored the relation between the developer and the user based on the observed interactions in a case of local adaptation of the technology. Besides the converge of different interests and related strategies of translation, both sides also demonstrated how these strategies are anchored in practices and the heterogeneity of other artefacts and the locality of the situation. Further it also demonstrated the in depth practices, of the flow of concepts and ideas between developer and user and it gave also insight into the interlocking perspectives of local practices of both parties. In the next chapter The topic of these different perspectives and translation of interest surrounding the shaping of the technology is furthermore resumed. Our developer will again interact and try to enrol yet an another actor through strategies consisting of translating interests through his technology. This time, it is not a user, but a potential partner which he would like to enrol into his network surrounding and consisting of his technology. This actor is envisioned in the role as a regional distribution and support partner. His main interest is still to spread his technology through "time and space" so to increase its reach and the number of paying client. In contrast to this example, he will thereby encounter major resistance, forcing him to change his strategy, abandoning his original goal.

6.3 Partner? Competitor? Peer? - Flexible boundaries and identities.

In this chapter I am going to analyze a very significant part of my field experience. This is because of two reasons. First of all, I see it is a good example to demonstrate the fluidity of roles and identities of actors in the ongoing practice of shaping technologies, which are in state of constant development like these ERP products. Secondly, it changed certain assumptions I had beforehand about categories of actors outside the traditional focus of the developer-customer relationship. How are specific roles like Partner, Competitor, Peer or User lived and defined in practice? Is there a need to replace these categories with much more flexible ideas, when developing likewise flexible technologies like these small scale ERP systems? How do certain actors try to enrol others into their vision of an innovative technology?

I am going to describe the different stages I experienced on site during an informal meeting between the developer of the ERP software of my case study and another local ERP software developer. For a better understanding regarding the analysis, I want to make clear here that the CEO of my case study company is called Gregory, which I accompanied that day for multiple meetings and that Christian is the owner of the small software company, we meet for the talk that day. I decided to change both names to provide anonymity as I did in the example in the previous section. Regarding the structure, I am going to favour the sequential course of events to provide a better understanding and overview how this interaction took place.

6.3.1 Prelude and background of the meeting.

On this cloudy autumn morning, Gregory picked me at the train station. Under time pressure, we decided to discuss all relevant information during the trip, to avoid being late for the first, of several meetings of this day. The drive took us about half an hour, and during this time I was briefed with background information and we discussed the appointment schedule of that day.

One major discussion topic of this briefing was, how little information about the developer we were to approach was available. He was described as a hardware and software vendor, leading a small one person company supporting small businesses, medium sized companies and private customers with a wide variety of IT services and products. What was also known at this point was, that he also had a so called "kind of ERP product" which he developed and distributed to his circle of clients, primarily gained through other ICT (Information and Communication Technolgy) related services. From the talk we had during the drive to Chris's

location, it was made clear by Gregory, that he expected Chris's technology to be of a quite small scale and limited in regards of functionality.

What soon became visible was, that Gregory framed Chris at this point as an attractive sales, distribution or support partner, with an already grown stock, and possible future customers, which would fit very well with Gregory's target audience. At this point, one of the main goals of Gregory's company was to establish a net of regional partners to reach a higher number of paying users. This made Chris, together with the expected technical expertise in the IT field an ideal potential partner within this region of Austria.

The unknown ERP software of Chris, was not seen as an obstacle or a potential competitive product. This was due to a certain lack of information about his software in general and founded in the received debased description which Gregory received when he arranged the meeting. More than that, due to the description received, Gregory stated the he hoped that Chris would abandon his own software "tinkering" project, after a presentation of his product and its features. He further hoped that Chris would recognize the possible positive outcomes of a sales and distribution partnership for Gregory's software.

Summarizing, I argue that from the start, Chris was framed by Gregory as a possible partner who could be acquired for sales, distribution and technical on site support of his products. He was in return not framed as an professional software developer but as an technician who was tinkering around with an inferior ERP product. Gregory envisioned that it would be possible to enrol Chris into his network of potential partner and to play a certain role in the distribution of his technology.

In addition, I would like to mention that the drive towards our destination was surprising, because It defied my expectation in regards of our target location. I expected the meeting to take place within the capital city of this region, or in an industrial or urban area around it. I was surprised when we needed half an hour in which we traversed through very rural areas in the countryside before we, after taking one or two wrong turns, finally reached a small municipality where we found the company of Chris. This was the first hint at the spatial and the informational infrastructure aspects of Chris's field of work and also the multiplicity of functions he performed in this area.

6.3.2 Becoming acquainted

The first part of the talk was dominated by an informal introduction of each other, including my presence as a student doing research for his thesis project. This was received quite well together with my inquiry to tape the talk. The voice recorder was placed openly on the desk

where we were seated. It was used during the presentation and I turned it off during several interruptions through third parties like visiting customers or telephone calls.

Major topic of this meeting was the idea to demonstrate each other the own products, starting with Gregory, which used his laptop as slide presentation device and giving him the possibility to show his technology in action. It is also notable that B already knew from a previous telephone talk, that Gregory 's intention was to acquire new partners for his software.

Before the start of Gregory's presentation, the talk was dominated by exchanging narratives of each other's history and questions about the others background. I have chosen the following example of their dialog, because it illustrates the intensity in regards of details in this stage of getting acquainted to each other.

Interview sample code: Developer Interaction 01

Chris: How many are you in your company?

Gregory: Depends on how you see it, 16 at our peak time, but then another time we were only six.

Chris: Do you guys only do this software/product?

Gregory: Not exclusively, but we want to focus on this product in the future, but at the moment this not just yet possible. We started only a short time ago to primarily concentrate on this product. Before that, we worked on many individual projects. They were also already cloud based.

Chris: ... so software development is your main topic?

Gregory: Yes, it always was our main topic, ... before that, I was working as a normal employee with [Personal information removed]

Chris: Do you do the coding by yourselves ?

Gregory: Yes, as programmer in the end, I have completed a Federal Secondary College of Engineering in computer science. Afterwards I joined before mentioned company, which later became also my first customer. Than my first own employee joined me. Eventually we thought, we don't want to make projects for others, we want to make our own software. So, the idea was born.

In this example of the talk we see how some questions are asked by Chris to make himself a picture of his interlocutor. Central points of interest are about the size of the company, about their core business and about their relation to customers, colleagues and employees.

Gregory answers the questions in detail. Doing so his narrative does not only describe his company or his product, but it is also a mixture of both, in relation to his own past. Elements like his education, former employers, the genesis of the concept for his product etc. intertwine in his answers, in this example and in similar situations. His identity is partially constructed by him as a CEO of a small company and software developer, whose story is strongly linked to that of his product and his business.

Further at this stage, their talk was not only based around the topic of each other's companies or products, but also concerned third parties which were not present. Especially the industry leader SAP and its products and price policies were discussed and heavily criticized from both sides. This led to a certain mutual agreement about their similar negative view of this competitor. Other examples included persons and relationships of local mutual acquaintances, friends and business partners. These two major topics, the identity of Gregory and the small talk about common topics helped to built the preliminary common ground and context at the beginning of the meeting

6.3.3 Gregory is presenting his product.

During the presentation further questions were raised by Chris. Most prominent here were questions about the experiences of Gregory and his product on the market.

Interview sample code: Developer Interaction 02

Gregory: The Administrator is already a usable account to access the system so when you need two accounts, you can use the business access for 50€ and ... with 80€ you have two unique users.

Chris: And how does this monthly charging work for yourselves? Do your customers receive this pricing model well?

Gregory: Yes, they do. It grows and grows.

Chris: We have had always the problem, that they do not want to pay per month. They would prefer one time payments.

Gregory: We have also experienced such positions.

Chris: I encountered this today by accident. I have talked to a colleague of mine exactly about this topic ... It is also always a problem.

Gregory. We have... Our clients can choose if they want a monthly payment model or if they want to fully acquire our system for all intents and purposes

Chris is interested in how far Gregory's monthly payment model for customers is accepted by the users. This time Gregory answers rather short and unspecific positive, that the payment model is accepted. Chris reacts in replying with his own experience about the issue and how his clients prefer one time payments.

Another example of a similar situation as described above can be seen in the following short dialog:

Interview sample code: Developer Interaction 03

Chris: Do your clients use it? Inventory management and such?

Gregory: Yes, but it varies...

Chris: Because we also have such a feature, but we don't use it in this way.

Here, Chris is interested in one of the features of Gregory's software, which he was just demonstrating. Chris is again interested if the users accepts and uses this feature and again the answer of Gregory is rather short and unspecific, and again Chris replies with his own experiences. The difference is this time, that his experience is not about his experienced relation of his client to his own product, but his own companies daily practice, not as a software developer but in his original field as hardware seller, who has experiences with stock-keeping. Also notable in this example is that this is one of the few cases in which Chris refers to the usage of his program in his practice as a group.

Another example of this is:

Interview sample code: Developer Interaction 04

Gregory: Yes,... yes we have a client... he really had often this problem... The company was liquidated in the meantime. They were in the IT service field. They always offered their services for the person who delivered the machines to them - in person - and when the invoices were forwarded, it turned out that it was necessary that these invoices needed to be named on a different person, the author of the damage, another company or quite

often the appropriate insurance agency. Sometimes even to the company which was the original seller of the machines, in warranty cases. This client needed us to manually rework every second invoice ... to be changed in the aftermath. Another possibility would have been that he cancels them and reissues them... this would have been very impractical.

Chris: Yeah... I also avoid this because you do not have a consecutive invoice number and you always have additional contra entries or credit notes.

Gregory: Yes this is indeed strange... yeah but in cases of tax auditing you just have to have... It has to be coherent... Quite simply... If it is not, you are going to have problems.

Chris: Yes of course. The important thing is, that what you have printed out and the data on the invoice, needs to be essentially the same...

In this sample Gregory tells Chris a war story (Orr 1996, 2 ff.) about one of his clients who had an abnormal high amount of subsequent corrections of bills in his company. It serves to tell the narrative of why a certain feature was implemented which allowed the correction by the users themselves, without the service assistance of the developer. In addition it also tells of potential legislative pitfalls which had to be circumvented during the development. This is an example of a war story, which is told from one developer to another to share certain insights in this dynamic filed. This dynamic can also be ascribed to the rather unsecure situation in regards of the relationship of law and tax policy and the development of business software systems. This topic will be discuss in more detail in the following section. Notable regarding the identities which are enacted during this interaction is foremost, that Chris reacts to the story from his experience and perspective as an ERP user in his IT retail business, in which he imagined himself unsatisfied with the alternative solution of bill correction through reversal entries.

So here, the at least twofold nature as user and developer of Chris shines through. During the talk, this dual role of Chris becomes more and more part of the identity that Gregory perceives of him while for Chris it appears as a quite natural state. The overall tone is clearly approving of Gregory's statements, expressed by Chris's nodding and short replies, while Gregory demonstrates different features, connected technical background information and various payment models of his software. While Gregory demonstrates his cloud based ERP product, Chris stays more reactive, just throwing in detailed questions now and then. He also

remains quite reserved regarding his own technology, which is in contrast to Gregory in the second part, when it is Chris's turn to present his software.

Due to the fact that, this was not the first time that I witnessed Gregory's product presentation, I noted that here, a more in depth presentation and discussion of technical details took place than in previously witnessed showings. This seems to be related to the reciprocal perception of Gregory and Chris as technical professionals in the ICT business and even more specific, as software developers. In addition that preconception of Gregory that Chris could be a possible sales support partner for his products, could also matter. For his role as an possible partner, Chris would need a deeper insight into the technical background mechanisms of the technology. Of course this considerations and framing of the possible partner can be of importance. Sharing technical details, inventions etc. with a potential partner is one thing, while sharing them with a considered rival or just an industry peer is something different. In the following, this becomes notable when Gregory's perception of Chris is newly defined.

6.3.4 Chris's turn

In the second part of the talk, the tables were turned. Now it was Chris's turn to demonstrate his product. The first noticeable difference was, that instead of a professionally prepared power point presentation for a representative product presentation, he just turned one of his display screens of his desk towards us, to demonstrate live the features of his technology, so we both could see them from our seats.

Chris's presentation started with a significant clarification, so to say an act of boundary drawing:

> *Interview sample code: Developer Interaction 05*
>
> ***Gregory: Maybe now you could demonstrate us a little bit of your technology.***
>
> ***(Pause)***
>
> ***Chris: Purely, from the sales and distribution perspective, I am not the right person for you. This is mainly because we have our own technology ... and because we want to sell it in the first place above all. In regards of concepts and ideas, we are quite similar. The build up is only slightly differently.***

Chris makes it clear from the beginning of his presentation, that he is indeed not interested in distributing or supporting Gregory's software. He frames Gregory's product as a competition

to his own software and makes it clear, that he sees little chance to become his partner. This is elaborated by his statement about shared similarities, which further bolsters the framing of competition.

This changed Gregory 's perception of Chris. From this point on, his entire concept of Chris's role is fundamentally altered and his ambition to recruit Chris as a partner for his product and enrol him into the network of his technology, has turned out to be quite unachievable. Of course, this statement further impacted the ongoing meeting. While for Gregory, it was till this point dominated by the idea of promoting his product and acquiring a partner, it is now replaced by an interest into a possible competitor, his product, his internal design processes, technical details etc.

Knowing what a potential competitor offers, is of course of major interest for the most market participants. In retrospective, it is questionable in how far Chris even considered Gregory to be a possible partner, or if he always considered him as a competitor in the first place, which he invited to present his product. What I indeed witnessed was, that before the first presentation started, both agreed to an mutual consecutive presentation of each other's software.

Now it was Chris's turn to present his product in action and to demonstrate the different features. From this point on, a repeating course of action was that Chris demonstrated a certain feature which was replied by Gregory, explaining how a similar function was available in his software. In the following I am going to discuss one of these examples in detail.

Interview sample code: Developer Interaction 06

Chris: Yes, now we have in principle... I mean we don't have to go through everything ... Within this we have my customers, I have here a variety of customers and if I click them I see the invoices. I see the amounts, the contribution margin in percentage, I see what the customer has bought, pre-tax and net and I can see always into the invoices... I only need to scroll very little... Here the same with delivery notes. In the case of this customer there are none. The status is described here. For example, this one is still open, I have not yet forwarded this invoice, it is still an open order which I can attend to now. Here I have for example a very primitive link to Google maps. This is very practical for me because people give me an address and through that feature, I can easily look up where I can find it if I deliver it in person. It is a very primitive feature but very convenient and I need it quite

often. Here I can also directly call the customer... [activates telephone switchboard through his software]

Gregory: Is this based on n-phone or?

Chris: No, this is just a home telephone, Voice-IP phone switchboard and...

Gregory: Ah, yes.

Chris: ... and it is just html what I send out on this IP address and it starts calling.

Gregory: I just know now the equipment. We also use the same.

Chris: I have one of these 3 LX telephone switchboards.

Gregory: I see, yes we also have such an interface in our software but... we haven't found any customer actually using it.

Chris: Yeah, this one is also not used by my clients. It is only used by me. This is one of the features which .... Where I said I need this.

Gregory: We programmed ours with a lot of time and effort, but till today we were not able to inspire any of our customers to really use it [laughs]

Chris: I also have such an 3CX which we could also sell in theory. I don't know if you know these. It's just a windows based voice ip telephone switchboard.

Gregory: Oh I see, yeah we have done nothing anymore into this direction.

Chris: Very primitive. I use it myself now but I have to say that I would not install it for any of my clients. Because if it does not work properly you will be called because of every bagatelle... or in this case, you are not called, because it does not work anymore. [laughs]

Gregory: We also have such a meta-interface through a partner so we can operate a wide range of telephone switchboard models.

Chris: Yeah, I see. You are very open in that regard.

In the beginning of this sample, Chris demonstrates his software and uses his live work database as an example, which means that he demonstrates the different functions of his software and how he uses them in the daily work practice of his own company. He also goes

into detail when demonstrating how he uses the different functions like marginal return calculation, order processing and even how he uses the external interfaces of his software like a telephone switchboard or a Google maps integration, to handle shipping addresses.

He performs this, with a strong focus on his personal usability which underlines his statement that this ERP software is designed with a dominant focus on his own needs, in the role of a hard- and software retailer. Further this dialogue sample also demonstrates how their different design philosophies lead to similar features. This can be observed when Gregory states that his product offers a similar feature for using telephone switchboards but that none of their customers is actually using it. Chris replies that his feature was only integrated for his own needs.

Both products offer therefore a very similar telephone switchboard feature but they were integrated for different reasons. For Gregory the integration of such a feature was driven by the idea that it would be an additional selling point, making his product more attractive for potential customers and because it is actually not used, he laments about the resources he invested developing it. This is contrasted by Chris who developed this feature only for his personal use as a retailer and states that he is not interested in offering it to his customers, in his role as software developer, because he shies the support cost and time effort that would come with such a move.

In the light of Akrich's framework of scripts and de-scription of technical objects (Akrich, 1992), it could be seen as a comparison of the different assumptions about their particular users. So both developers envisioned their respective users differently and materialized this expectation through inscription into these technologies. Gregory envisioned the users, or at least some of them and their environment, to embrace and recognize the advantage of this feature, but it indeed turned out that no users at all came forward to play the role that he and his staff of designers envisioned.

This is in contrast to Chris who envisioned effectively at least two kind of users. On the one hand, his clients and their individual context of usage, which he assessed as potentially incompatible, problematic and prone to interference. Which means to him an inconvenience, backsliding on him as being the one responsible for the technical support. On the other hand, he envisioned himself as user where he could assure compatibility with the inscription, defined by himself and his programmer. His solution for this situation was to restrict the telephone switchboard feature so he could assure the compliance with the script.

The underlying concept, that the designer appears as his own role model for the technologies he is working on, is an already observed phenomenon in technology studies.

Akrich termed this design practice I-methodology in which the designer relies on personal experiences and incorporates them into their technology (Akrich 1995). A study by Oudshoorn et al. also found this method and identified this concept in ICT design strategies, as an important constrain in technology development, if these technologies are aimed towards a wide diversity of users. (Oudshoorn et al. 2004). This concept as the designer is also closely related to the findings of Bardini and Horvath (Bardini and Horvath 1995) in which they suggested that inventors of a PC technology were also its first users and that the inventors conceptualised in their own image. (The intersections and differences of these concepts are discussed by Lindsay in front of the background of the TRS 80 technology (Lindsay 2003))

Despite that, one has to keep in mind that in difference to the I-methodology, the deliberate direction of Chris's development strategy is rooted in the idea of creating a technology for his own needs, and not for selling it to his clients:

Interview sample code: Developer Interaction 07

Chris: I do this business with notebooks and personal computers and similar goods. This is my core business I would say.

Gregory: Ah, I see...

Chris: We coded my software because I needed something for myself and the various other products of the market did not appeal to me. This is already the second software which I have ordered to be made for me. I myself do not code anything.

Gregory: Ah, ok yes....

Chris: In principle, I just tell him how I want it to be done ... so we build it up in a progressive manner the whole time. I have a coder who is very much into this kind of work. I just have one and he makes it just that way I want it and that's it.

According to this and other various statements during the meeting, the development of his software began due to necessity of an adequate ERP system, when he started his own small business. The selling of this technology, became only later a secondary effect, generating well embraced additional returns. Further, this is one of the few instances where Chris refers to his programmer. He already indicates the functional division of work in their software

development practice. Therein Chris defines the needed features, while his programmer is quite autonomously responsible for the technical implementation.

Another conspicuity in this regard is, that this programmer's identity is not discussed. This is in opposition to virtually all the other persons, companies, professionals etc. which came up during the talk. As mentioned earlier, discussing these mutual acquaintances and relations, especially of the local ICT business, served in the beginning, but also in later stages of the meeting to establish a common ground of the talk and the mutual construction of identities. This indicates that Chris consciously avoided disclosing the identity of his programmer.

Seen in the context of other statements which I encountered during my fieldwork, wherein the CEOs of two local IT companies saw the lack of well-trained programmers as a continuing problem of the Austrian ICT industry. Chris's dependency on his programmer and the accompanied regional risk of labour piracy, could be a reason for the resistance to discuss the identity of his development partner.

Also notable are certain expressions which are used. For example, Chris often uses the adjective "primitive" when referring to different features and functions of his software, with the meaning of simplicity of the technical implementation of such features. This is often accompanied with gestures demonstrating how responsive and easy to use his software is. Another observation here is also that, most of the time, Chris refers to the implementation or examples of usage of certain functions in his software to himself as actual user. In addition he even underlines that he implemented a feature or wanted a feature to be implemented. This is contrasted by Gregory who refers to his software functions and development mostly as a group effort.

In the following example this becomes visible:

Interview sample code: Developer Interaction 08

Chris: Here I can define range of debtor numbers, yes it is structured relatively simple, which means that I can write in front what I want and then I have included the year. So I can define it here and what I want to write behind it. - quite easy.

Gregory: Yes, we also have this features, it is just ... over the financial year, every financial year you can define it anew.

Chris: Yeah you can also do it with my software that way. I can define for every year if it repeats the definition or if it starts with a blank entry.... that is so...

Gregory: You have only one range of numbers , one accountancy range of numbers or do you have more than one?

Chris: No, just one accountancy range of numbers.

Gregory: Aha, it is the same in our software.

Chris: Yes, next is the time schedule feature, I don't really use it. We have already started with a synchronization feature. The schedules from [name of software], that is the name of our software, are already integrated into outlook. This means that it communicates through exchange also directly with our clients. I have to say that I am really happy about it. Now I have just a single customer database and if someone calls me on my smart phone, and I see a new number, I can directly add the number to the customer contact, cause it is important for me to know the identity of the calls.

Gregory: Ah, yes we have the same feature into both directions based on Exchange.

Chris: If I see for example a new order and ask myself, when is the deadline? Then I can see directly on all devices of my system when it is scheduled and it is synchronized with my Outlook.

Gregory: Yeah our software does the same, using Office 365 Exchange and from there it is shared through all end devices.

In addition, the above passage shows again the rough dynamic of the second part of the product presentation dialog. Therein Chris demonstrates a feature while Gregory replies that a similar function exists in his software. This is most of the time accompanied by details in how far they differ through a different technical implementation, with the overall tacit consensus of the functional similarity, despite different technical underlying processes. This at least seems to be the case for the bigger part of the presented features. In a few cases there was indeed no feature which could be seen as having an existing equivalent in the others software. These rarer cases were also often accompanied by short discussions about

the economic and usability rational of such features, so to say the question, if such features make any sense for the software. An example of this is provided in the following section.

6.3.5 Recognition of different design approaches.

In the following, I am going to discuss one of the last stages of the demonstration interaction. I regard this part of the meeting as quite significant, because it demonstrates before mentioned observations and in addition, it provides an example of how boundaries and differences of the diverging design concepts are negotiated. Due to the length of this extract, I am going to comment after certain parts of the interaction to provide a better overview.

Interview sample code: Developer Interaction 09

Chris: And this is the serial-invoice, I can define it there. The normal sale looks like this... What I don't do is that... I don't define articles beforehand to invoice them.... I do it live, so to say on the fly...

Gregory: Ah, I see...

Chris: If I go into this menu .. und I input the price here ... I have defined articles and if I assemble a personal computer I just call it a "case" on the invoice and it is automatically calculated on the invoice, based on the wholesale prices in my database. Well yeah, there is a lot of stuff in here...

Gregory: Thus in our system, we have something called "free goods" (Note: undefined wares) I mean, I don't use the same mask for the invoice as you do, I have to jump onto an own mask but we have the same thing divided in "free goods" and "free services"...

Again, Chris describes a feature, this time the serial invoice calculation and how he uses the function of his software, to build a stock database during live operation. Thereby Chris emphasis again how he operates his software, in his daily practice. Also Gregory replies to Chris's demonstration, pointing out what he sees as the analogue in his software, even if he points out the differences in regards of usability and different terms for this functions. For example when he states, that in his software, he needs to change the input mask first in contrast to Chris's demonstration.

Interview sample code: Developer Interaction 10

Chris: Yes, in principle I can just make an input here, I mean the numbers are only like they are listed in the offer, I can just make an input her and

then I can invoice it and redefine them because in this example they are only worth 15 but I want a profit margin of 35%. So I can go over there and say the new price with 35% looks strange, and I make it 20 so... If I do change it to 20 it recalculates my profit margin from 35% to 33% or I can in addition add a discount of 10% than it again changes my net price over here from 20 to 18 and so on... It is also possible to create a kind of kombi price - a set price so to say. I just mark the products, than a window appears, which I can also define and then I can say this number, this price looks weird. I just make it....

Gregory: straight ahead...

Chris: ...750. I can write this anywhere I want, and the software gives me exactly the percentages. Then I say: "generate" and he created a set price for the ensemble. I of course can still see all the percentages and single prices.

In this section, Chris describes two of his practices while he demonstrates them to me and Gregory as spectators. Doing this he gets very detailed about how he employs in practice the contribution margin calculation[2] feature of his software. This is followed by a detailed description of how he uses set prices and how he adjusts prices and margins to reach the desired numerical outcome. This detailed remarks and gestures of demonstration are part of his identity as a wholesaler where these detailed marginal calculations and the support of his software, through an optimized usability, are illustrated as quite essential for this activity.

Interview sample code: Developer Interaction 11

Gregory: This is called "intermediate total" in our software (laughs)

Chris: We have also an intermediate total. But our advantage is that the individual items are no longer displayed with individual prices to the customer.

Gregory: Ah... I see the difference.. No, we don't have this function.

Following the dynamics, Gregory replies again how his software offers what he sees as an analogue feature, but this time Chris emphasis the difference of both features followed by a realization by Gregory that it is indeed a unique characteristic of Chris's software.

[2] The contribution margin calculation is used to determine how much the selling price of each unit contribute to the coverage of the non-variable costs.

Interview sample code: Developer Interaction 12

Chris: This is because in my branch of trade, it is just aggravating... Because if you do list them individually, everyone starts comparing prices saying: Ah... this has that price and this item costs that much and so on. And I need somewhere my contribution margin, and so I just state: This machine costs you that much altogether. They reply just: Ok let's do it for that price or not. But the important point is that I still see in there the price calculation.

Here Chris again acts in his identity as a retailer when he talks about his practice of selling complete computer systems to customers, and how he uses his software to cover a detailed component price breakdown to conceal his contribution margin in face of the customer. While at the same time he is having full control and overview of the calculation by means of his software. Through that, it also illustrates how he uses his technology to enact control over his own company through the use of presenting calculation margins, which are only visible to him, while at the same time hiding them while making an offer. While enacting his identity through this practice he also refers to his branch of trade and the importance of such functions.

Interview sample code: Developer Interaction 13

Gregory: Aha... yes I see... these are such things which you have learned during your daily work routines.

Chris: Exactly and in principle I just say: I need this. I can also delete the positions again...

Gregory: What we have is, that for example on the right side next to the figures you can just input 20+20+20 and it makes 3 lines out of one input, but this is also a feature which we developed because actual users gave us that idea.

Gregory reacts to Chris's illustration which essentially described the development history of this specific feature of which no analogue could be found in Gregory's software. He also acknowledges the advantage of being the own role model for the specific development process of Chris's double role as software developer and user. This is confirmed by Chris. Further Gregory addresses a feature which is the product of his specific development process, because it was developed based on suggestions of a customer and he also emphasizes this fact in his statement. Therefore it appears as a kind of a counter on how

their own customer driven development also produces similar results in regard to business practices of his clients.

Interview sample code: Developer Interaction 14

Chris: Where did you put this?

Gregory: When you go to the right side, for example, you have an purchasing net price of 98.90 and then you use the + key than 20 + 20 then it easily duplicates the line and you have three rows with 98.20 + 20 + 20 beneath each other.

Chris: Ah.. I see and for what reason do your clients need this?

Gregory: We have some users with ... They have very similar goods to invoice, one after the other. Instead of duplicating or something it just generates three or five rows at the same time

Chris: I see, ok I have to admit that I was never in the need of such a feature, yes...

Chris replies with interest, with the underlying assumption that his software provides no similar function. Gregory demonstrates the feature, which allows a simplified manual input in case of not database based articles in when quick invoice processing is required, like for example cash sales in an retail shop. Chris is interested and inquires about the actual use case in practice. After this is answered, he replies that he had never been in a similar situation. Notable here is that, this last sentence also refers back to his design philosophy that his software is primarily developed for his needs and to cover situations he is confronted with. Therefore only such features would be developed.

Interview sample code: Developer Interaction 15

Gregory: Many gimmicks... Yeah.. the problem is, the way you showed this to me... I would not be able to come up with this idea for this mask. Someone must show you such a thing for a start. Yeah ... demonstrating it live is the best thing, video recordings or similar techniques are just not that effective.

Chris: Yeah, but we don't have any client company which uses every single feature. The most just use.. like 30 to 50% of the whole range of features.

It's impossible that one client uses all of the features. Except me of course, because I have ordered it to be built the way I wanted it to be.

Gregory: Yeah, it is similar in regards of customers.

Now Gregory refers back to the problem of developing for a customers and the problem of assessing which kind of features are useful for his clients. Described here is the problem that he sees himself and his team in a role of a developer, which of course can not anticipate the detailed working practices of potential customers before they even become his clients. He also underlines his assumption that the best way to gain this insights is through a field observation, while he sees other methods like video observation as inferior. This part ends with Chris referring that he is, through his concept of being his own role model, the only user of his software who uses all its features.

6.3.6 Aftermath and discussion

For Gregory, which I accompanied that day, the perception of Chris shifted through the course of the meeting. He started with the assumption of an possible distribution partner who would abandon his own product, which was at this time expected to be inferior, in favour of becoming a partner of Gregory. During the talk it became clear, that this would be an unachievable goal when Chris admitted that he framed him as a competitor. Further it became a dialog between two competitors which demonstrated each other their products and also tried to overtake, or at least compare their product with each other. Also the meeting became a talk between two peers in this industry field and was also strongly related to their different design concepts, experiences and related distributions and business models.

What is a rivalling product in the first place from the perspective of a market participant? The most straight forward answer in this case would be of course, another ERP system. But is this really so straight forward? I argue that in this case, it turned out to be much more complex and context sensitive, where through experiencing shifting identities, based on contradicting development- and distribution concepts, in regards to dependencies on other actors, like specific user groups, the clear boundaries of categories like partners, competitors or industry peers became blurred.

While in the first half Gregory framed Chris as an possible partner and adjusted his demonstration and answers to questions accordingly, his perception changed after Chris made unambiguously clear that he would never become a sales or distribution partner. This is because he framed their products in fact as a competition for each other. Now during Chris's demonstration, Gregory questioned in detail and received detailed answers, even in

regards of technical specialities. At the same time he argued the analogies of both products or discussed differences in relation to their reasons and development narratives. Through that, the mutual perception of competitors changed again when in course of their interaction, they carved out the different concepts underlying their technological artefact.

As what kind of competitor did Chris frame Gregory? In the second half, Chris did not try to hide details of his software, in the opposite, he was very open regarding the technical details and features and did not shy to answer Gregory's detailed questions. This would not support the picture of rivals. Based on the whole picture of the meeting, I would argue that their main difference is their long term distribution strategy. Both made clear that at the core, they offered technologies with a lot of similar features. The difference is that Gregory tried to expand the ERP development, which is his core business with the goal to reach the highest possible number of clients for his system. This is in contrary to Chris, who is only interested in continuing his development as an secondary business, not interested in big market shares, but only in his small number of selected clients, fitting his perception of a user which is compatible with the script embedded in his software. He has therefore little interest to conquer big market shares, but takes precautions to protect his market of personal clients through avoiding partnerships of third party competitors and covering his programmer from labour piracy. It is therefore a trace how design philosophies, like I methodology interact with the perception of users, the framing of markets and also the framing and identity of surrounding actors like competitors, industry peers, and through the interaction with them and their narratives like war stories, the reciprocal influence on the own shaping of technological artefacts.

Overall it becomes clear that Gregory's main strategy to enrol Chris as an distribution and support partner in what Gregory imagined as his technology and the heterogeneous, surrounding and infusing network failed. Chris's interest were too different and Gregory soon realised it and gave up on the idea. This becomes implicit in the mutual perception and flexibility of roles which, while why Gregory's enrolment strategy failed, also opened up the possibility to employ other strategies. Gregory changed his strategy. Instead of just drawing back after his enrolment failed, he tried to make the best out of the situation and to enrol Chris as an industry peer to exchange experience, design ideas and concepts. Chris became at least for the short period of our visit a resource of ideas, similar to a customer as described in the precedent section.

In the next main section of the analysis this question of resistance of actors and the adaption of interests becomes even more prevalent through Gregory's statements during interviews, but also through observations during other interactions and certain small narratives. These

are analysed in regards of Gregory's dealing with a quite different actor, which is the Austrian Fiscal State.

6.3.7 Addendum: Overview chart.

The following chart represents a short and not conclusive overview of both, Gregory's and Chris's different concepts not only in regards of the materiality and details of their individual technologies, but also in regards of distributions and design concepts. This chart serves to give the reader a better understanding and deepen the background of the interaction and related converge of differences. It was compiled based on the field notes I took during and after the interaction.

Not conclusive short conceptual overview of both concepts.	
Gregory's ERP	Chris's ERP
role model: clients / "Wertkunden" (Value Customers)	role model: own needs
framed as collaborative effort	framed as individual performance
core business	secondary business
cloud based (platform independent, apps, mobile access)	traditional local setup
one person / small companies	one person - medium sized companies
expansion plans, establishment of distribution and support network, development of sector specific solutions	internal utilization, distribution towards carefully selected clients: "Where it fits" - Connected to question of trust.
design: modern, polished, colourful	grey, functional, traditional
slower speed (page turning etc.)	fast, very responsive
changing team of programmers, staff members etc.	one programmer who implements wishes in detail
Risk of market success	Risk of being dependent on one programmer
in daily practice: personal relations for acquiring clients still very important	personal client relationship and trust relation as only form of distribution.

Figure 2: Concept overview based on field notes.

6.4 Fiscal State regulations and software development.

This chapter was inspired by one of the seminars during my studies, which dealt with the critical view on science, technology and law relations, especially on the topic of Regulation by Design. Within this chapter, I am going to discuss aspects of legal issues which I encountered during my fieldwork, focused around the inscriptions of judicial regulations into ERP software technologies. In detail I am interested in the relation between technological change and the consequence for the affected actors and in how far their own interests, policies and practices influence the development of software technologies. Following this, I am going to take a closer look at the influence of the law and regulations by the fiscal state on these designing processes and user practices of such systems, while contrasting it with the relevant literature.

6.4.1 Legacy of a changed materiality and the information society

This topic is closely linked with history of software based accountancy systems. In pre-modern times there was little need for standardized forms of accounting. Businesses were run by their owners on a day to day basis and there was no need for standardized accounting, due to a lack of tax regulations or external stockholders. This changed with the growing of businesses and through the increasing outside interest by the state, which was interested in the levy of taxes, requiring new forms of standardized accountancy. But apart from the state and his interest in taxes, other outside actors, like investors hoped for a protection of their investments through new forms of standardized and transparent financial reporting. (Porter 1995, 90 ff.)

One useful point to start with, is the question of the role of materiality when dealing with information technologies in regards of Fiscal State regulations. In the last twenty years many analogue technologies were replaced by digital ones which also had an impact on the working practices of people which had to work with said technologies on a daily basis. Often this is understood as a solely technical change, leaving principles regarding practices untouched. Possible examples are that, instead of typewriters, word processing personal computers are used, electronic bookkeeping software replaces hand written books or cabinets, and digital voice recorders replace analogue audio tapes. But with this change of the underlying technology and its related materiality, the relation between the different actors also change and are renegotiated.

According to James Boyle (Boyle 1996, ix ff.), this replacement is not as straight forward as it might seem at the first glance, when he argues that the information revolution is primarily understood as a technical revolution, especially in public accounts were the characteristic

quality of certain techno-futures often ignores changes in social relationships, wealth distributions and belief systems. In such public accounts only the gadgets seem to change.

This seems to be not only true for public accounts but it becomes also traceable in jurisdiction appearing as so called "law lag". This was mentioned during one of that talks we had with the meaning that new regulations lag behind the latest technological and scientific developments. The reason that was given was primarily because the development of new regulations in nation states is protracted due to the different stakeholders and complex juridical processes involved.

In relation to information technologies, this becomes especially interesting when certain practices like hand written books in the area of accounting are replaced by other forms, in this example, through digital information processing. If we look into Austrian Business Enterprise Law (UGB - Unternehmensgestzbuch) we find the basic regulations for bookkeeping in §190 (1). A loose translation of the first sentence reads:

> ***"The entrepreneur has to keep books and has to make his business related commercial operations and his financial situation visible within them, based on the principles of sound accounting practice." UGB §190 (1)*** [3]

Here the expression "book" is important and dates back to, when contemporary forms of software based accountancy were unknown. It is also a form of how matters of concern are inscribed into the materiality of a technology, very similar to other examples mentioned by Silbey and Cavicchi (Silbey and Cavicchi 2005, 556). They argue that, if we trace the source of certain expectations and meanings to some legal institution or practice the distance in regard of time and space or the origin is often quite far away. Because of that, circumstances of the invention might have been forgotten. In the above mentioned example I would argue the idea of books could be described by their notion of "legalfact" a special kind of fact where both legal and fact collapse in the object of the "book" and its materiality.

So the materiality of books seems to be deeply embedded into the idea of using them as a technology to keep financial business records. What are now examples for this special kind of materiality? Books, in contrast to other pre-digital office record keeping technologies, like for example file folders, drawers, boxes, stapled documents or just loose sheets, are bound. Through that, removing pages is very hard without leaving traces. In addition, it was only allowed to use permanent ink for writing the strict sequential entries. Things like empty rows

[3] Austrian code of commercial law: UGB § 190 (1) (Unternehmensgesetzbuch). Führung der Bücher. (loose English translation of first sentence)

and spaces needed to be crossed out and wrong entries could not be deleted but also remained traceable.

Through that, the normative aspects of books as a technology of accounting becomes evident. In the bounded book an ex post "tinkering with the books" was suppressed, which does of course not mean that there were no workarounds. When digital software replaced the hand written books in accounting, it was not just a replacement of the underlying gadgets but it changed the working practices through a new materiality of the underlying technology. The regulations lagged behind in aspects like sequential ordering and traceability of hand written books. This tractability could no longer be sustained while using less normative spreadsheet calculation or word processing.

Boyle (Boyle, James 1996, x ff.) describes such a situation quite well when he argues, that the future is made of fragments of the past. Because of that an information society will draw on images of information that were produced in a society where information and technology might have shared quite different meanings.

Because of laws, which are anchored in obsolete technologies and very different relationships of information, practice and materiality, certain tensions can arise between the law, the users and the designers of new technologies. In the case of software based bookkeeping, these old structures were adopted into the design of ERP and accountancy software. Because of that, one can still find book like structures (and related terms!) in the software architecture and user interfaces of ERP systems in general, and accountancy software in particular. Also subsequent changes of the entries are restricted by design, which is often worked around by users with the help of the software provider/designer who has access and rights to change the data repositories.

Returning to Akrich's concept of inscriptions (Akrich, 1992), this is an example how, on the one hand, fiscal regulations regarding restrictions are inscribed into the software by the state, but also how through the interaction between user and designer, such regulations are softened to increase usability in day-to-day accountancy practices. This can be seen as a form of resistance towards such policies. (An example for such restrictions is the immutability of created invoices which is also shortly discussed in the preceding section.) Fragments of the materiality of past technologies are therefore still traceable, and it is possible to observe changing realities rooted in past time practices.

6.4.2 Renegotiation of practices

Returning back to the actual practices I observed during the field visits, it was quite noteworthy in which ways the fiscal state as an actor in the design processes, influenced the dynamics of design decision and the initial strategies of the software developer. As discussed beforehand, the changing materiality of accounting technologies needs to be research to understand the motivations underling the actors using this technology.

The topic of cost reduction, not only but still also through the avoidance of taxes was an recurring topic during my field trips. The main sources were along the way chats but it also appeared as a side topic during the interviews or while observing other interactions. Altogether they often described instances which I could not directly observe but which were discussed in the form of the already discussed "war stories" (see Orr 1995).

In my fieldwork, these stories and accounts of tax avoidance could be broadly distinguished into two trajectories of how tax avoidance strategies flow into the design of the technology. While they also hinted towards the change of practices. I call these two broad categories customer introduced tax avoidance and user introduced tax avoidance. Before I start to discuss these accounts, it is useful to start with a short description on the idea of tax avoidance in itself. Tax avoidance means that companies or private persons reduce the burden of taxes by legal means, while tax evasion would be the reduction by illegal means.[4] This is important, while based on the following observations, I obtained the view that these definitions also become quite blurry through the changing practices described. Because of that, I decided to stick the term "avoidance". Further I decided to use "the user" for the actual user of the software, he employs it in his day to day businesses processes and is in the case of my study in an ongoing relation and interaction with the designers.

The Customer is his customer or business partner which does not directly influence the development of the technology, but his strategies of tax avoidance become also embedded in the technology design.

Interview sample code: Developer Interaction 16

B: Do your clients even is it? Stock of inventory report and such?

A: Yeah, but this is very individual.

B: Because we would also have this feature but we do not use it ...

[4] Oxford English Dictionary online definition. (http://www.oxforddictionaries.com/. Definition of tax avoidance in English. http://www.oxforddictionaries.com/definition/english/tax-avoidance?q=tax+avoidance (07-06-2014))

A: Yeah we have many where we fade it out. For example one of our Book stores owners does not use it. He is also not interested in using it ... [hesitates] because he would not be to sell items black anymore. This is the one reason and the other one is that he sells way more ... " specialized literature" ... then he would have on stock because, of his customers ... As a private person you can add receipts for "specialized literature" to make the amounts tax deductable in your income tax statement. Because of that, many customers want that a "specialized literature" receipt is issued from him. So on the receipt only "specialized literature" is noted as a good description. It does not say which book title but it just reads the "Category specialized literature" the tax inspector will normally not dig deeper... I mean ... as long as you don't exaggerate it! I mean a hand full of "specialized literature" books per annum. Everyone can accommodate that!

So for him this would be ...

B: Yeah, I see he is also flexible!

A: ... for him this would be unproductive if he would use this feature.

B: Yeah because he would otherwise account for it, based on the real situation...

A: Yes, exactly ...

B: ... of his stock ...

A: ... a more elaborated company would receive a monthly report including detailed statistics about storage location, good category... Because he would be interested in knowing as exactly as possible about his stock situation in regards of goods amounts value!

B: Of course!

A: And we can create for him a report in which he is actually able to see .. then he can follow the statistics, if the warehouse stock is increasing or stalling or if it sinking. He might have laying around many parts but maybe only small parts of little value but the amounts can add up quite a sum of money.

In this example we see the account about a bookstore owner which is the user of the system and he needed certain customizations of his software which also controlled his cash point, bill, invoice system to produce certain kinds of invoices. When I later discussed this account it became more understandable that the initial motivation in wanting this feature to be implemented here, was introduced by his customers interested in receiving invoices of a certain kind. These invoices were needed by the bookshop owners customers which wanted to avoid or to be more precise, evade taxes. They used these bills for books which were not tax deductable according to fiscal laws, to make them appear that way in their tax statement. The customizations which were made according to his practices allow him now to produce this requested bills which were now slightly misleading, or very general and imprecise good descriptions like „technical literature“ instead of the actual title of the book. Of course this would be at the first glace tax evasion and not tax avoidance according to the before mentioned definition of the term. But in tax audit practice, it is negotiated in how far these bills are delimited, so they are often just overlooked. This goes together with other accounts about the practices of tax audits, were I encountered narratives in which tax inspectors were portrayed as forced or ordered to be very critical and to find faults within the records during tax examinations. According to the narrative, this was done to levy back pays after the examinations. It was even seen in some accounts as necessary to deliberately build in small, skin deep errors into the records to avoid drawn-out and in depth examinations. I encountered this narrative on multiple occasions, not only during my field stays but also when I talked with an, from my case study independent professional accountant, which I asked about such practices.

Because of this practice of questionable precision of descriptions and the often expressed opinion that tax auditors have to find little faults anyway, it is only of little to no risk to use this kind of practice instead of paying the tax amount they had to pay anyways. There is no additional fine doing this, and in practice the customer can just save taxes as long as he does not exaggerate it. Because of that I would argue that what could be a case of tax evasion, in the strict sense of legislature by the books, becomes in the entangled lived practice of tax evaluation between fiscal state auditor, entrepreneur and his technical infrastructure a form of tax avoidance.

How does this now relate to the initial research question in regards of strategies of translation of interests and the shaping of technology? If we follow the trace further in this example, this practice of tax avoidance becomes embedded into the ERP technology. So practices, or just narratives and assumptions of and about actors, like tax auditors and customers of the users of technology also influence the designing decisions and concepts. They become also embedded within the script of the software. It is therefore a demonstration of how

heterogeneous actors come together and translate their single interests and how through that the material artefact is formed.

6.4.3 User introduced tax avoidance and cost reduction.

In this situation the user himself is interest to avoid taxes and to reduce costs which he hopes to accomplish through the usage of the ERP software. As already mentioned, some companies are quite small companies, and in some cases even sole proprietorship.

According to one businessman I have talked to, these small companies normally don't have access to certain tax avoidance strategies like international operating corporate groups, because of their rather small size. In addition certain available tax loopholes, like abroad car registration within nearby EU countries to avoid certain taxes are more and more closed down through new legislation and intensified fiscal examination.[5] While, because of their size, they normally don't have this possibility, one important strategy for them is tax avoidance through appreciated disciplining effect on their own work. So while they are often trained in their own disciplines, like medical practitioners, Tradesman, performers, etc. and lack deeper training and knowledge in business administration. For them using this technologies and its predetermined scripts and disciplining power is often appreciated.

During one interview one topic was what had changed after introducing these ERP systems. One example of a thematically reappearing answer was:

> *Interview sample code: Common Interviews/Talks 06:*
>
> ***"Now I have to keep my documents – so to say my books in order, it forces me to do this if I want to use it. I have to do the books, record the data, input the bills etc… "***

This normative effect of standardization and embedded scripts of this technology is in this case appreciated by the user. One of them compared it to a personal fitness trainer at a gym.

Through this more wanted disciplined effect, they avoid costs and as part of the costs taxes, through tighter and professionalized bookkeeping. Also through professional book keeping worst case scenarios, in which a lack of proper records could lead to dreaded tax estimations resulting in huge back pay sums can be averted. So in regards of record keeping, tighter business practices and the embedment of fiscal state regulations inscribed into the technology not only resistances appear but for some, this restrictive embodiment were reasons for using such a technology.

[5] An example of the problematic: http://diepresse.com/home/recht/rechtwirtschaft/753526/Fiskus-laesst-kaum-Autos-an-Steuerpflicht-vorbei (08.06.2014)

Also a very questionable practice which was described during a talk between the developer in my case study, with another developer about how this other developer handled a feature for time registration in his ERP software.

Interview sample code: Developer Interaction 17

B: ... I can configuration that. If someone checks in at 6:15 am, then only 6:30 am is registered. ... Well not in this case of a Bakery because here we have other times deposited, because before 5:00 am in the morning, it is a case of night employment depending on the collective treaty.

Important is what is registered on the time report statement which the employee sings. This is what counts! They encountered the problem that as long as the employee agrees to this procedure it is tolerated and if this is not suitable anymore ... They say we have to get up so early and have to earn 1:2 because and so on ... And then we have built in features, were it is possible to summate differences. This means that if one employee begins at 4:30 am and if he also checks in at 4:30 am, in that case the half hour is added to the time when he checks out.

A: I see, It is essentially same trick I mentioned before but a little different.

B: Yah this is of course not according to the law. But this is company policy. If the software offers this feature and if the employee sings the produced statement at the end of the month than this is also "what happened". Because you could not do this ... beginning half an hour earlier and being paid an whole hour ... Of course this would be the correct procedure...

B: In our case this would be 5 o'clock but this is depending on the collective treaty ...

This example demonstrates how valid legislation for labour time gets annulled with the help of this other developers system. So to avoid extra wage costs (and adjunctive taxes), the software offers the possibility to adjust the actual registered working times. So while the total amount of hours worked of the employee stays the same, it is moved into a time frame where he loses his right of extra compensation for night hours work. Of course this would also be possible without this technology, but through the digital auto facilitation of the software and time record system, the whole process of record manipulation is automated and the end product is made "a fact" through the single signature of the employee. The developer knows

that this is an illegal practice but he sees himself just as the provider of the tool while it is actually a decision of the client company, the user of this software and it's work hour policy.

Noteworthy, these practices as whole might have the potential to spread. In the case of the company which is object of my study, they are strongly user design driven so as discussed in previous sections, when one users wants a certain feature to be programmed and designed, it is offered afterwards to the other users. So this system has the potential of becoming a kind of broker of these practices. This could potentially also be true fro quite questionable practices.

6.4.4 Digital drivers logbook and traces of older material practices.

During the field trips talking to one of the designers in my case study company, we discussed the topic of “law lag” and the problems for design decisions. In this case it was discussed around the idea of a digital drivers logbook which is used to report distances, covered by company vehicles and which is an important accounting tool, providing critical information for tax reasons. In the interview the designer came up with the following statements:

> *Interview sample code: Common Interviews/Talks 07:*
>
> ***"...Society advances, and one can not anticipate that... there are subjects where "the law" is very responsive in its reactions but If I look at an subject like the digital drivers logbook, I see need for action for a long time... Such things exist since 10 or 15 years, maybe even 20 years... here the legislative authority could slowly start to invent a regulation..."***

He as software designer and also his clients were interested in a digital drivers logbook which is embedded into this ERP technology. Further it was also planned to be enhanced by the integration of a fully automated GPS (Global Positioning System) based recording system, which would make any hand written reports redundant. In this statement the designer laments the actual situation, where there is a gap in legislature, making the development of such a software problematic. In detail, due to the lack of normative materiality of the book form, detailed in law regulations, the usage of this technology would not be accepted by Austrian tax authorities, making only the usage of a hand written, bounded book a legally accepted option for record keeping.

The software designer's motivation is of course to reach a certain client group with his software. He explained to me that for companies where logbooks touch an important part of their core business, like road freight carriers or firms with huge road travel fleets, such new possibilities could open up an immense reduction of administrative effort. In addition, due to

the concept of the ERP systems, as data processing and illustration system it tries to be as holistic as possible in regards of information collection. According to the interviewee such a feature would be appreciated by his clients and it is framed in this context as a tool to reduce costs and a tool to improve their accounting practices.

6.4.5 An intentional gap?

The noteworthy point during the talk was the frustration of the designer with the situation of regulations which states how it should not be done instead of making concrete descriptions of how one could design according to the law.

> *Interview sample code: Common Interviews/Talks 08:*
>
> ***"... problematic are other features like our cash book or our drivers logbook, here the legislative regulations in Austria are very weak. There are often only recommendations, ordinances and statements of the financial authorities how it should NOT be done, which on top of that are often inconsistent. ... very funny, especially in the case of the drivers logbook. There, it is only defined that it should be like a handwritten book and what it should comprise. .... this is not a workable advice for software engineering."***

When I continued my informal talks with other software designers, I also heard the opinion that, what at the first glace seems like a classic "law lag" was framed as an intentional gap. He was therefore of the opinion, that Austrian tax-authorities leave certain aspects of the law vague, or even unregulated and ambiguous, with the intention to have more room in interpreting and executing the law. This could then be used in case of audits by financial authorities to increase back taxes.

This interpretation of the gap between law in the books and law in action shows similarities to the description of the case of pigs and positivism by Henry Hartog (Hartog 1985). He argues that some ask questions about the roles of legal norms regarding the social structure and wonder if the gap is not a systemic features of social order.

For users or people involved in design process of the used technologies, such uncertainties were framed as major obstacles. Of course, users could stick to the law by the book and do their records by hand, even if this would be in some cases highly antiquated and inefficient. The alternative would be to deviate from the law into new practices and customs which became available through digital technologies, knowing that they move into the risky terrain of legal uncertainty and even anticipating, that the tax authorities hope that they do so, so

they can use it as an instrument of arbitrariness in the case of tax inspections. In the previous section I discussed the details of how the two actors, developer on the one side, and the user on the other side interact. As described there in detail, the developer used quite different tactics of how to translate the interests of the user into his own interests and how he tries to enrol him into the rule of a paying user, which has at the same time the potential to be a resource of innovation through ideas derived from his daily business practices, which would be otherwise inaccessible for the developer. Now we have a third actor entering which gets involved, the fiscal state. The before observed tactic that a certain issue of the user is identified, problematized and than solved through negotiating it through the technology was here also the strategy. The interest of the user, having a easy to use, automatic logbook system for his company was therefore translated into the developers interest in spreading his technology through "time and space", and of course earning profit in doing so. But this failed because a third actor, the fiscal state was involved which had quite different interests. His interest was not essentially based on the idea of consciously preventing the development of certain new software functions, but the developer was not able to overcome this resistance and so to translate the states interest into his own.

Further in the interview, the designer also referred to the legal situation in the Germany as an desirable example:

> *Interview sample code: Common Interviews/Talks 09:*
>
> ***"In Germany we have exact legislative regulations about how electronic drivers logbook should look like and there is also the possibility for a certification of conformity, which means that I can call the financial authorities to take a look at my product and if they say it corresponds with the legal norms, it works ok and I, as an software manufacturer have the sound legal protection for my product and so my clients"***

This case of the problem of vagueness of law and its inscription into technologies becomes further complex in the context of different legislative systems. The ERP product of my case study is not only designed for the Austrian context but it is also designed to be marketed towards possible clients in Germany and Switzerland, regarding their local relevant laws and regulations. So the question is, in how far is this technology made flexible enough to fit this multiple legal environments at the same time?

According to the designers I have talked to, these regions are based on roughly the same relevant principles of business law as Austria, which is the original legislative context of the system and the home country of the developer. In addition the designers tactic is to fulfil the

most restrict regulations so to cover them all. In case of the drivers logbook the feature was developed in the end as planned, but it remained only a relevant option for the users in Germany.

In this certain case, the wired situation arises that the German tax authorities did their best to close the gap regarding software bookkeeping by publishing technological recommendations for accountancy software designers. Through that the intentional gap in Austrian law becomes even more obvious for the affected actors. In the relation between the producer of said technology and his clients, trust plays an important role. In this case many clients are quite small companies with only a limited number of members which lack professional juristically training. In such a setting the ERP product has the potential to enforce normative business structures, which helps them to professionalize their internal processes and administration. So, the designed structures of these technologies are a certain security in regards of questions of relevant legal reporting and even an argument for employing them as discussed before. Such gaps are therefore also seen by the developers as a question of credibility and even financial liability which burdens the relationship between the software producer and his client, especially in cases where financial looses could arise through questionable legal situations. It remains questionable how long such gaps can be left untouched in the future and in how far actors like supranational law agencies like the European Union influence practices of accountancy through standardization and regulation of financial law. For the designers and users of such accountancy technologies, it remains a difficult field where grey areas can lead to a range of legislative and organizational issues.

6.4.6 Summary Fiscal State

In this chapter I demonstrated how rules of accounting are still traceable back to their original ideas of books as accounting technology and that a change in the materiality of a technology also afflicts related practices. It becomes visible that, when one technology replaces another one it is more than a straightforward change of a medium. It affects social relationships, practices, ideas of credibility of information and legislative environments. Also it demonstrates that new technologies do not come into existence isolated from the past but are heavily influence by it. Through this historic merge of laws and objects like in the case of the law and the materiality of books as objects and technologies for bookkeeping. These ideas of materiality and the concepts which are strongly connected to it become therefore actors of their own which offer resistance when the developer of business software try to incorporate them in the development.

Further it is interesting to see that such existing "law lags" are framed as a possibility for authorities, to establish new practices by increasing their scope, through leaving open

unsecure spaces. Also users and developers renegotiate their relation through newly introduced technologies through new practices and strategies. Thereby new restrictions inscribed into and facilitated through technologies are sometimes embraced as normative guidelines and sometimes circumvented or resisted.

Regarding the strategy of the developer of my case study it became observable how the fiscal state as an actor can influences the design of technologies by creating grey areas in legislation and how he was not able to overcome this resistance. Instead the strategy was changed towards only offering a certain feature for clients abroad. This also demonstrates how far technologies are embedded in certain legal contexts and practices. In the following chapter the results of this analysis are summarized and discussed.

7 Conclusion

When I started this research project, my original focus was to gain a better understanding of the socio-cultural issues and mechanisms of user participation driven design, regarding small scale business software development. During the course of this project, the focus was extended to incorporate outside actors, taking a closer look at the role of associated competitors, and in particular, fiscal regulations and practices and their mutual influence on the design processes but also of the practices of these actors.

The main research question of this study was:

How does the developer in this case study employ strategies to translate interests of other actors in regards to his technology, and what do these strategies look like?

The first major interaction analysed during this study was the visitation of the developer of the ERP technology and one of his staff members, at the shop of a newly acquired client. During this interaction the details of this processes could be observed. The Developer employed a multitude of strategies to translate the interests of the user to enrol him as a client. This role of a client was based on the idea that the user does not only contribute to the development of the company and the technology financially by just buying the product. The client also seen as a resource, giving valuable input into the innovation and further development which is used as a praised resource by the developer. Doing this the developer is very much interested to overcome resistances which could possibly hinder this enrolment of the user in his role within his idea of this technology.

The developer tries to overcome these appearing resistances by supporting the local adaptation of the technology through adjusting the software to the users quite specific needs and wishes. These are in turn very much anchored in an already established heterogeneous environment consisting of practices between humans, already established technologies and other spatial conditions. In observed detail, this strategy played out as tutoring the user in handling the technology, adjusting and customization the technology itself and by discussing and negotiating possible problems and working out "solutions" together with the user.

Thereby it became visible that also the user translates his interest through the technology and that he tries to embed it into his specific environment, which also involved changing not only the technology in itself but also his existing practices and the environment itself. In the observed example it became apparent how the user used different strategies and mobilized different sources to not only adept the technology but also to create a heterogeneous support infrastructure tailored to her individual needs in operating the technology. The developer on

the other side also uses this interest and effort of the user and translates it, when he uses parts of his strategy, as a resource for further developing his technology.

Workarounds also were an occurring phenomenon even if they did not appear as anticipated forms but as strategies of dealing with technological limitations not only on the side of the user, but also from the developers perspective. These appeared as dependent on the individual practices and perspectives of the actors. This is connected to the negotiation of framing and solving of "problems" and "solutions" in cycles which are similar to the idea of interpretative flexibility and stabilisation through rhetoric closure (see SCOT (Bijker and Pinch 1987) of certain aspects of the technology.

These strategies to overcome resistances and enrol the user are here neatly listed in a row but as the observed interaction demonstrates, this is in practice a quite messy and blurry process in which these strategies not only strongly overlap but are in addition also deeply intervened with a heterogeneous number of actors.

In the second analysed interaction it becomes also observable how the developer tries to mobilise and enrol other actors, through which he tries to spread his technology through "time and space" (as formulated by Latour (Latour 1987, 108) which means in this case selling the technology to paying customers. To do this, he tries to establish a network around this technology and to acquire actors and enrol them into this network as support and distribution partners in different regions. Again, here he needs to translate interests and enrol them in into this role he imagines within this network surrounding his technology. In the observed example in my case study, I took a look at the details in how he does this in practice. He tried to do it by outlining the quality of his own product which manifested in a professional demonstration and presentation. Thereby he hoped to indirectly persuade his counterpart of the superiority of his own technology and to abandon the self developed product, to instead get enrolled in his support network. In this example the developer ultimately failed to do so, and was not able to overcome the resistance. His reaction was that his strategy changed. He did so by using this interaction as a resource for the development of his software and translating this resistance into a resource of knowledge for this development processes. The failed attempt still opened a new resource of ideas and concepts and therefore also has at least the potential to be a source, shaping this technology. In addition it became visible that the boundaries between developer, competitor and peer also become more blurred and were renegotiated. Further some insights in regards of the strategies of the counterpart regarding his design philosophies and interests could be observed.

The third major actor I explored through this thesis is the fiscal state, in the sense of the fiscal regulations and practices. I turned out that it has also the potential to influence design decisions, and influences through own interests the interaction between designer and users. In this example the developer was interested in further developing a certain feature for his technology to make his technology more attractive towards his potential client base. This strategy failed, because of the interest of the fiscal state which prevented him from selling this feature, through the creation of an unsecure legal foundation, based on own interests in related tax auditing practices. The new strategy was then changed and the feature was still developed, but it became only available for users abroad. Further other influences of the fiscal state on the practices relating the technology in complex interactions between users, developers, technologies and related practices could be observed. Based on this, the heterogeneity of influences, often quite indirect, and the role of materiality in these complex processes were uncovered with various examples. For example, also users react and develop new practices in the area of tax evasion which is based on the changed nature and changed practices of digital forms of bookkeeping. This happens in general and through the concept of user practice driven design in particular. It becomes apparent when through this new technology policies of tax examinations are renegotiated and practices become also embodied into the technology.

Overall the actor I followed deployed a multitude of strategies, in quiet heterogeneous environments. This confirmed the assumption that indeed these strategies co-exist and interact. (Law 1992, 7)

In doing so, the developer tried the translate the interest of different actors through his technology, or more to say his technology and the overall vision of it. In the examples of I observed, it turned out that not all resistance could be overcome, but that it was often necessary to circumvent certain colliding interests and also to envision a different role or strategy for some actors at all. This was also accompanied by new functions and reinterpretations of the own role. Is this technology shaped by all these actors and does it still stay the same as the "inventor" imagined? The other actors do indeed shape and are shaped by getting in contact with the technology so it is an collective effort in which the other actors might have even the bigger influence on the shaping of the artefact. (see Latour 1987)

In this case, it turned out that this "inventor" appeared to be not so much concerned if this technology would correlate to a certain predetermined vision. He imagined it from the beginning as quite flexible and consciously designed to be in an constant state of development and transformation as part of his overall strategy.

What can we learn from these insights in how in daily practice of technology development, the technology in question and practices of actors involved are shaped?

The line between user and developer becomes much more blurred and flexible, confirming Neil Pollock's finding, that it becomes very hard account a certain feature to a single actor(Pollock 2005). But even if the driving force of innovative ideas experienced a shift towards the users, or to be more precise, between the blurred seesaw interaction between the users and the developer, also new distinguishing tasks might emerge. These might seem exclusive, and might appear as potential role defining elements for the developers. An example was the observed role as gatekeeper / negotiator between conflicting interests of users. So instead of being the "source of innovative ideas", the developer could in certain processes also be defined through being a "judge" or "negotiator" between users. This is also related to the technology being reliant on the idea of the "cloud" and forced changes through updates.

In addition, this blurring between boundaries in the user developer relation also could be extended to other actors, which also influence the shaping of the technology in question. So there might be also a certain blurring between the perception of actors as competitors which could also act as potential partners, industry peers or even resources of innovative ideas depending on the developer’s strategy. Also it might be a further interest to take a look in how far new technologies and changed materiality influence boundaries and definitions in the delicate area between law by the books and law in practice.

At this point it might also be useful to revisit Akrich's concept of scripts (Akrich 1992). The description of technical objects is also very much centred on how ideas about users get inscribed into technologies by designers. In the observed example, the ideas about users get inscribed into the technology, but at the same time they generated through the constant interaction between developers and users. So, designers in this case study form their ideas about users, through the constant interaction with them. There is still the technical implementation which is defining for the designer, but resistances are, most of the time, verbally discussed, and through that overcome. In addition other actors, like the state or experiences gained through the interactions with industry peers, might also be inscribed. So the idea of scripts in technologies in that regard is very useful, but how these scripts are generated seems to be a process of quite complex and messy interactions.

I also would like to return to the appeal of Pollock, Williams and D'Adderio (Pollock and Williams and D'Adderio 2007) that the STS field should focus more on processes that allow technologies to work under generic conditions in addition to exploring actual localization processes. Based on the observed interaction I would argue that such a focus should not be

mutually exclusive. Indeed the opposite seems to be the case. In the observed case, it turned out that, while actually taking a look at such a process of localization and domestication of this ERP technology, insights could be gained in regards of how such a technology can become more generic to work within different environments.

So, while being on the site and performing this domestication towards the individual environment, together with the user, the developer learns how make his technology more flexible in regards of the context, increasing its mobility. This seems to happen through gaining experiences when performing such adaptation processes from which future users might profit, but also through features and ideas of user, which become embedded within the technology. These are added to the pool of different features thus increasing the chance that future users might already find fitting features. Through this, practices might also travel, and might be transformed, through the technology between users, when for example features individually created for one user and his context, becomes also available for others.

It is therefore not enough to look only at the strategies of a single “inventor” or developer when he tries to enrol actors and overcome resistances. This perspective is just a starting point which must not blind out the strategies of the other actors.

Through looking at the details within the interactions, the strategies of other actors and their relation to the materiality of arrangements becomes observable and better understandable.

This was especially prominent regarding the role how materiality matters in such interactions, be it a tool through which a user orders his strategy of adaptation between the various human and non-human actors, or how through changes in the materiality of technologies also related practices changed and relations between actor were renegotiated. In addition, also the spatial and temporal dimension of this materiality needs to be consider. This appeared especially in fragments and relation of earlier technologies and its replacements (see Boyle, James 1996, x ff.)

Such observations relate strongly to the idea in the field of STS which is summarized by Trevor J. Pinch and Richard Swedberg (Pinch and Swedberg 2008, 4) when they argue, that people and objects are always entangled and that the quality of this entanglement, which is material and symbolic, becomes more complex and important as technology develops.

Further, I argue that if we want to deepen our understanding of these entanglements, it might be necessary to focus on the thickness of interactions of the various actors involved in these processes, while they actually happen "in the wild". This assumption is based on reflections of my field experiences, in relation to the method I used. In hindsight, I believe that if I had taken another, for example historic, or indirect approach, I would have missed many details of the role of rather "insignificant" appearing material aspects. An example for this is the

notebook described in the first interaction analysed, and how quite central it was in this adjustment processes and strategies of the actors. So if these entanglements become more complex as technology develops, more detailed and direct perspectives might be necessary for understanding them.

This is also supported by the argument of David Hatherly et al. (Hatherly et al. 2008) when they state the importance of ethnographies when one is interested to study the interactions between such heterogeneous actors like accountants, managers, technologies and organisations. Further they also underline the role of technology, especially ERP technology in such environments. ERP technologies are thereby primarily seen as "technical barriers" which become "social constrains" in regards of solidifying restrictions, especially from the perspective of alteration of accounts and fraud. While I would agree, that this can be the case I would add, based on the results of this case study, that also the opposite is a possibility. Instead of creating social constrains also new opportunities are created by the users, as demonstrated by the quite complex renegotiations between users and fiscal law practice.

Based on that, I would like to finish my conclusion here, with a short prospect of possible future research questions, tying into the results of this study.

Due to the fact that this was a quite specific case of a rather untypical type of ERP system, especially in regards to its focus on small and micro sized companies, it would be interesting to explore the differences in regards to bigger and more "classic" ERP systems. Such a comparison from an STS perspective could give interesting insights into different approaches of development. In addition it might also open up new perspectives in regards of usage, flexibility and constrains of such technologies in relation to social relations within organisations and external entities like the state. This might be especially relevant due to the rising complexity because of if even more actors which become involved. I also believe that it would be interesting to further explore the relation between the state, and financial accounting technologies, to see if other forms of gaps in legislature, technological barriers and possibilities, and through that renegotiated practices and circumvention strategies of involved actors could be discovered.

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8.1 List of abbreviations

DACH	Deutschland, Austria, Confoederatio Helvetica (Germany, Austria, Switzerland)
ERP	Enterprise Resource Planning
et al.	et alii (and others)
f./ ff.	folio (following page/pages (or chapters etc.))
GPS	Global Positioning System
NGO	Non-Governmental Organization
STS	Science and Technology Studies
UGB	Unternehmensgesetzbuch (Austrian Corporate Code (Law))

8.2 Table of figures

9 Appendix

9.1 Abstract - English language

In the last decades Enterprise Resource Planning (ERP) systems became an integral part of the working life within many organizations. These systems are part of a complex, heterogeneous network consisting of technologies, humans with various interests, and practices, embedded in historically grown environments. The question that emerges is, how is such a technology developed, and how is it shaped through these various interests and influences. In return, it also opens the reverse question, asking how such a technology transforms grown structures and practices.
This research is thereby based on interviews and ethnographically observed interactions while following the developer of an ERP technology through his daily work routines.
Moving away from the starting point of this research, which was to gain a better understanding of the socio-cultural issues and practices of user driven design, it became soon clear, that these systems do not only emerge from the interaction between the designers and the specific users of such a technology.
Indeed various actors exist which influence the shaping of such a technology. In the course of this work, three such actors are analyzed and discussed in detail. The first focus lies on the interaction between the developer and the individual user of the software in the context of a user driven design philosophy. After that the interaction between the developer and another professional market participant is analyzed, while the third part is concerned with the tension between developer, user and the fiscal state.
Thereby it becomes observable how, through the introduction of a new technology, ideas of roles and boundaries between different actors can become more and more blurred. Further, strategies of the developer and opposing resistances could be identified, leading to adaptations and renegotiations which influenced the shaping of the technology and local practices.

9.2 Abstract - German language

In den letzten Jahrzehnten wurden ERP-Systeme (Enterprise-Resource-Planning) zu einem integralen Bestandteil des Arbeitslebens innerhalb vieler Organisationen. Diese Systeme sind dabei Teil eines komplexen, heterogenen Netzwerks, bestehend aus Technologien und Menschen mit diversen Interessen und Praktiken, eingebettet in einer historisch gewachsenen Umgebung. Die Frage, die sich dabei stellt ist, wie eine solche Technologie durch den Einfluss dieser Vielzahl an Interessen und Einflussfaktoren entwickelt und geformt wird. Im Weiteren darf dabei jedoch auch die Frage nach den Einflüssen durch die Einführung eines solchen Systems auf gewachsene Strukturen und Praktiken nicht vernachlässigt werden.

Im Verlauf dieser Forschung habe ich einen Entwickler eines solchen Systems in seinem Arbeitsalltag begleiten dürfen. Diese Arbeit basiert auf den dabei gemachten Interviews und ethnographischen Beobachtungen.

Der eigentliche Ausgangspunkt dieser Arbeit war, ein besseres Verständnis für die soziokulturellen Probleme und Praktiken im Bereich von Benutzer-getriebenen Designprozessen zu erhalten. Im Zuge dessen stellte sich jedoch bald heraus, dass ein solches System nicht nur aus der reinen Interaktion zwischen Designer und spezifischem Nutzer heraus entsteht. Tatsächlich existieren zahlreiche, verschiedenste Akteure welche Einfluss auf die Ausformung der Technologie nehmen. Das Verhältnis zu drei spezifische Akteuren wird dabei im Verlauf dieser Arbeit im Detail analysiert. Im Fokus steht zuerst das Verhältnis zwischen Nutzer und Entwickler, im Kontext einer Benutzer-getriebenen Design Philosophie. Darauf folgend geht es um die Interaktion zwischen dem Entwickler und einem anderen professionellen Marktteilnehmer. Der dritte Teil beschäftigt sich mit dem Spannungsfeld zwischen Entwickler, Nutzer und staatlicher Steuergesetzgebung.
Im Zuge dessen stellt sich heraus, dass durch die Einführung einer solchen Technologie die Grenzen zwischen Akteuren in Bezug auf Rollen und Aufgaben zusehends verschwimmen. Im Weiteren können verschiedene Strategien des Entwicklers und entgegengesetzter Widerstand identifiziert werden. Dies führt zu Adaptionen und Neuverhandlungen, welche auf die Formung von Technologie und lokalen Praktiken Einfluss nehmen.

9.3 Curriculum Vitae

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2010 - present	Master degree program: Science - Technology - Society, University of Vienna
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Work Experience

2013 - present	Ankerbrot AG (Ankerbrot plc.), Vienna, Junior Business Controller
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