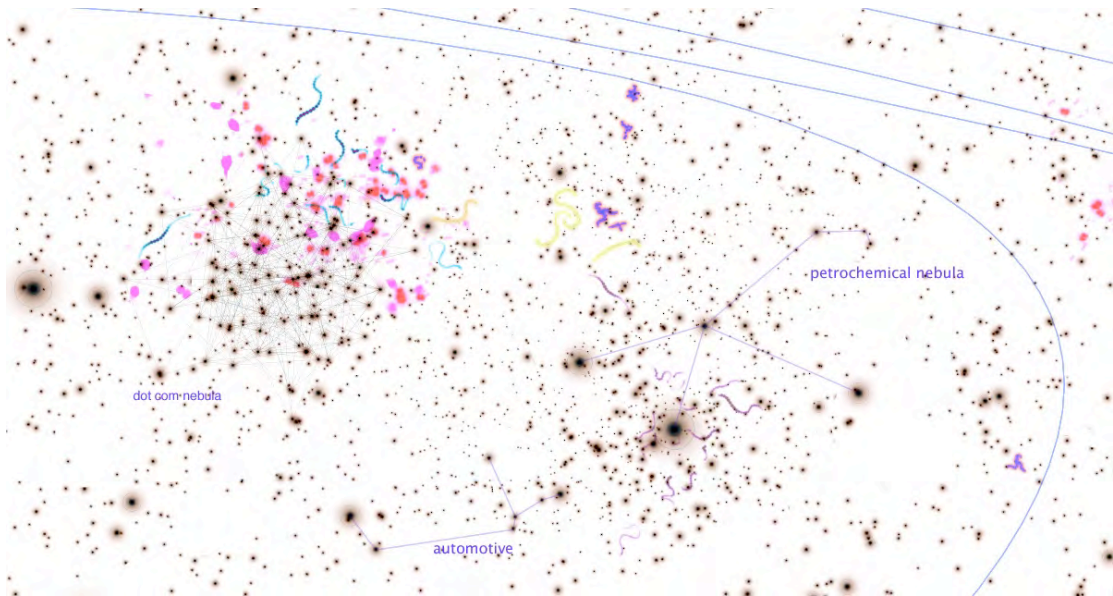


Investment Machines

An STS Study of a Decision Support System in a Retail Bank



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Ph.D. dissertation
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Preface

How do you approach the practice of banking from a Science and Technology Studies (STS) point of view? What is it that a financial advisor does as he processes my application for a loan, or when he tries to describe to me in what ways my mortgage is affected by current interest rates in the European Union? These were some of my initial questions to pursuing the work in this dissertation. As my knowledge of banking and financial practices grew, I realized that such an approach would be difficult to carry out, and the answers to such questions would be difficult to obtain. Instead, I approached the world of banking and finance in a different, related way as my study in ValueBank will show.¹ I looked for entryways, and was granted access to ValueBank, a full-service retail bank. After initial meetings with a division manager and two of his employees, I was given the freedom to act on my own discretion in company headquarters as well as in the branches. I signed an agreement of confidentiality, and was encouraged to discuss the extent and purpose of my investigations with the two employees who would later turn out to be my primary informants throughout the course of my fieldwork, and beyond. I identified an object of study, the Investment Guide, which is a decision support system developed in ValueBank for investment advisors.

To return to the first question I raised above: how do you approach banking from STS? The heterogeneous work of advisors, managers, and systems developers in ValueBank has been difficult for me to describe in a single account, because there are so many issues that are specifically related to financial expertise and knowledge. However, approaching work in financial settings was easier for me when I brought along tools from STS, because they helped me question some of the apparent ‘black boxes’ that make up the world of finance and banking. Some of the questions that I generated revolved around the many ways that banking is the practice of figuring, analyzing, accounting, representing, speculating, negotiating, trusting, automating, and valuing knowledge and expertise within a particular field. Such practices are by no means exclusive to banking, but the specific ways these practices have manifested

¹ ValueBank, and all names of participants, are pseudonyms.

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themselves in institutions and technologies in ValueBank most clearly are. And exactly the conditions for investigating how analyses, speculation, negotiation, and trust materializes in a decision support system in ValueBank – as well as in the many ways these technologies are being used – is the principal task for me in this dissertation.

The dissertation is structured in two parts: *Part 1 Approaching ValueBank* and *Part 2 Studying ValueBank*. In Part 1, I establish the theoretical and methodological grounds for carrying out my study of a decision support system in a retail bank. The first part acts as the basis for understanding what is going on in the process of *developing* and *implementing* new technologies in a specific market setting from an STS point of view. How are markets grasped and framed within STS? Chapter 1, *Opening the Black Boxes of Markets*, is an introduction to markets as an assemblage of heterogeneous elements that are kept together by the situated activities of humans and nonhumans. The title of the chapter refers to the now classic credo in STS of looking for dynamic relations that have been black boxed and stabilized in for instance hierarchies, institutions, and technologies for the purpose of maintaining control or authority. In chapter 2, *Exploring Multi-Sited Ontologies*, I reflect on entering into a financial organization such as ValueBank, and I reflect on how my participation has influenced the knowledge of the organization that has been generated throughout this project. This chapter provides the reader with an overview of the methodology of *sociotechnical ethnography*, an ethnographically inspired approach that I have developed during this project. Developing new methods of investigation has presented me with a list of challenges, of which some are new and closely related to this particular context, whereas others have been inherited from the approaches that have inspired my own. For example, how it is possible to investigate the work of people who turn out to be very susceptible to observations and interviews. And what are the consequences of carrying out a sociotechnical investigation, that is, to simultaneously study humans and the technologies they interact with.

Part 2 constitutes the empirical part. Here, I enter into the domain of the investment advisors to illustrate how the *use* of a decision support system changes the work of the advisors. Part 2 is not an exhaustive account of the work of bank clerks, nor is it a managerial description of the challenges that financial institutions are facing today.

Instead, my descriptions of the everyday life of investment advisors revolve around the emergence of a new actor, the *Investment Guide*, that has implications for their work, and for their conception of work. Chapter 3, *The Socio-Technology of Calculative Space*, is an investigation into the sociotechnical composition of a ValueBank branch. A tension between the local, situated action of individual investment advisors and general ambitions to standardize and homogenize financial expertise in ValueBank is articulated in a physical redesign of branches. The new design manifests itself in experimental work patterns that affect the relations between the different kinds of employees that populate a typical ValueBank branch. This condition is primarily caused by the presence of practically mandatory financial technologies that entangle advisors in complex networks of counselling, auditing, and monitoring. In chapter 4, *Constructing Sociotechnical Calculators*, the tension between individual advisors and standards of work is investigated further. Where chapter 3 was concerned with the organization of entire branches, this chapter closes in on the individual advisors and their interaction with decision support systems. My argument here is that the advisors are in part turned into human calculators, despite management's efforts to include them in even more complex sociotechnical networks of knowledge by means of the Investment Guide. The study at the micro level of advisors is thus contrasted to the findings produced in Chapter 3 by studying what I would term the organizational meso level constituted by branches. Chapter 5, *The Politics of Calculative Practices*, draws the empirical part of the dissertation to a close by discussing organizational politics in ValueBank in relation to the introduction of new decision support systems. I here claim that along with the ambitions to empower the advisors to perform their work even better, management is introducing an *investment machine* that replaces local knowledge and expertise by general models of work in ValueBank. This *investment machine* is my way of articulating the development of sociotechnical mechanisms that revolve around increasingly more complex technologies, while the impact of social factors is correspondingly ignored. However, in the context of STS, this does not simply reduce the importance of advisors as opposed to technologies in the practice of investment counselling in ValueBank. Instead, the conditions that the advisors are facing, cause changes for all actors, thus reconfiguring the networks of humans and technologies into multiple, dynamic *investment machines*.

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The dissertation ends in the section *Conclusions*, in which I present the main points of my empirical work in a condensed form. Here, I also return to my initial questions from the beginning of this introduction to relate these to the outcome of my investigations. Finally, I consider the theoretical and methodological implications of introducing and developing the notions of ‘sociotechnical ethnography’ and ‘investment machines’.

Introduction: Science Studies Meets Economy

This dissertation is a study of encounters between humans and technology in a particular organizational setting. As such, it is a typical study from a Science and Technology Studies (STS) point of view. The main objective of this study is to investigate changing relations between retail bank advisors and a decision support system, the *Investment Guide*, which is introduced into the practice of investment counselling (Arnoldi, 2004). The introduction of new technology is often related to certain expectations about achieving benefits for an organization or a workgroup, for instance by reducing costs or improving existing procedures. However, unexpected changes are rarely accounted for, because they are not easy to identify and articulate in advance. From an STS point of view, the introduction of technology is not accounted for by referring to expectations of future effects. Rather, attention is directed towards implications of any kind as well as to the relations between expectations and implications as they take place. In this dissertation, I study the changing relations between actors involved in investment counselling to explore the methodological potential of an STS approach to financial markets.

Two principal questions arise from the objective outlined above: 1) how do the investment advisors respond to transformations of their work practices by the introduction of the Investment Guide? 2) How are the organizational transformations that occur interpreted by the advisors, systems developers, and management?

The reason for asking these questions is rooted in my reaction to assumptions that seem to be widely accepted among members of management in ValueBank, as well as in the development team involved with the introduction of the Investment Guide. The questions surface in my dissertation as a result of studying work among advisors, developers, and project managers who have participated in the process of transforming investment counselling within a retail bank (See Chapter 2 for an outline of my empirical work).

Until recently, studies of markets and economy within STS have been rare, and retail banking is still a remarkably underdeveloped field compared to investment banking.² The reasons seem to be many, but difficulties of getting access are often mentioned as a major constraint. In my case, this obstacle was overcome by an agreement that benefited both sides. I was admitted to join the development process as an observer in exchange for providing these observations as input to the development team, which I will return to in Chapter 2. Financial markets are a burgeoning area of interest in STS because of a growing acknowledgment of the possible advantages of such studies within the markets themselves. As an example, the pricing mechanisms of options trading in financial markets cannot be distinguished from the abstract, theoretical models of pricing mechanisms in economics, which conjoins theory and practice, according to STS scholar Donald MacKenzie (2006, 25pp). MacKenzie argues that the coupling of ‘theoretical’ and ‘real’ markets establishes a convergence zone for both practitioners and theorists, in which further theoretical development and – not least – increased practical deployment meet. I see my study in ValueBank as an example of such coupling, in which I bring STS into the practice of advisors and systems development in ValueBank. The conceptual and methodological tools that I have developed in this study thus originate in engagement with practice. In this way, analytical assumptions and methodological techniques are being tested against the practice of advisors and markets.

A Sociotechnical Approach to Markets

In this dissertation, I adopt a sociotechnical approach to local, organizational action. For the purpose of developing a sociotechnical approach to markets, the study of new technologies is a good entry point for the following reasons:

Technologies can develop in different ways according to circumstances, the design of technical systems can reflect a variety of priorities, and “users” frequently reshape technical systems in important ways. Ultimately, the development and the design of technologies are political matters. (MacKenzie, op.cit, 26)

Technologies may seem unambiguous at first glance, but if you examine them more closely the clear lines of hardware and software dissolve into “priorities” and

² Throughout this dissertation, I will refer to studies in banks in several ways. For the purposes of clarification, I generally distinguish between two types of banks (and banking): investment banks and retail banks. Further explanation is provided in Chapter 2.

“political matters”, thus revealing their composite and transformative character. Within STS, technology is not limited to technical arrangements, mechanical pieces or systemic practices. Rather, technology is a general placeholder for cultural and social practices, constituted by humans and nonhumans in networks of interaction. Thus, technology is used as a description of networks of actors in a broader sense, as also described with terms such as ‘sociotechnical arrangements’ or ‘assemblages’ (Latour, 2005; Michael, 2003). This is one important issue that has been central to recent work of STS scholars such as Karin Knorr Cetina and Donald MacKenzie (Knorr Cetina & Preda, 2005; MacKenzie, 2006). In these studies, markets are deconstructed and reconstructed to illustrate what sociotechnical fabrics keep markets together from this particular point of view. One claim from the standpoint of these scholars is that investment banks and stock exchanges represent a ‘global microstructure’, in which technologies and humans mutually construct each other across space and time (Knorr Cetina and Bruegger, 2002a).

However, the important point in such a global microstructure is that the technologies that are present in such assemblages have neither precise definition nor a single characteristic. Instead, they are constantly and concurrently shaped by the practices they embody (Bijker & Law, 1992). Following this line of thought, the principal argument that I present in this dissertation is that it is impossible to study financial technologies without including both social and technical features of the practices that the technologies are part of. The work of building an understanding of the complexity of such sociotechnical arrangements is an evolving practice. Most prominent have been studies of stock exchanges and international investment banks, studies that seem to represent the prototypical approach to markets and economy from an STS point of view. Financial actors such as the *New York Stock Exchange*, the *Chicago Board of Trade*, or the hedge fund *Long-Term Capital Management* have proved themselves to be very important for the development of new fields of investigation in STS, providing rich examples and materiality to this area of research (Abolafia, 1998; MacKenzie, 2003b; MacKenzie & Millo, 2003). Within the confines of these economic assemblages, I see a new strand of knowledge materializing, actualized by the presence of multiple technologies, and the reliance on technological systems of control and communication. The interest in finance from STS is not unique, but compared to more traditional approaches from economics or sociology, for instance,

STS contributes to the study of markets by providing accounts that do not lay claim to one or even a set of driving forces in the development of finance. Rather, the strength in approaching finance from STS is the inherent attention to the heterogeneity that is constructed and reconstructed out of different elements in different cases.

In this dissertation, the boundaries between what constitutes technology and what does not, is thus not drawn a priori but reflect my engagement in studying the Investment Guide. My study approaches all the actors and activities that are involved in developing and introducing this decision support system into financial practice, for instance advisors, technologies, clients, manuals, and developers. The study of the Investment Guide is used methodologically as a way of bringing together actors that are kept apart in other accounts of markets and economy. My approach to the Investment Guide is an attempt to question assumptions and arguments that are often related to specific market conditions. Assumptions and arguments that reflect for instance clear distinctions between actors as stable entities, out of which further stabilizations are produced. I present management's attempts to stabilize the advisors as a homogeneous team of accountable and rational financial agents in Chapter 4, but only to show that this work of humans is disturbed by the introduction of a nonhuman actor, the decision support system.

For the reasons specified above, taking technology as a point of departure for the present study of an organization and its members does not reduce everything to purely technical matters; a claim that resonates with similar studies in other areas of STS (Jensen, 2005; Michael, 2000). I attempt to transgress the boundaries established between the technical and the social by showing that the term technology includes social action, and that sociality is consequently technological as well.

Studying Markets in STS

I introduce and develop the conceptual term 'investment machine' to characterize the Investment Guide as a stabilized, singularized instance of an existing multiplicity of practices. I regard the Investment Guide as an actor in a heterogeneous network, which analytically enables me to present very different implications of the development and use of a financial technology. In this study, social and cultural circumstances are regarded as important for financial activities. The sociocultural circumstances add to the general recognition of computers and technical infrastructure

as pivotal for the execution of financial transactions. As mentioned before, focusing solely on the end result – a financial transaction, for instance, or technology in any simple, utilitarian sense – is likely to give a rather determinist result: technology is crucial to success, hence more technology is needed to maintain or improve on future possibilities for business. This is a simplistic conclusion that may consequently result in replacing a multiplicity of appropriately customized solutions with a panacea that aligns all actors according to one, exclusive *modus operandi*. Reducing complexity to simple causal explanations misses out on important points that relate to practice.

Practices are rarely explicit, which means that reducing them to simple mechanisms delete or cover up the intricacies that are present under concrete, local circumstances. I believe that there is often a gap between the conception of the transformative abilities of new technologies and the actual consequences, which is never bridged by simple explanations. In my study, the Investment Guide is appointed a particular role as a clearly defined technological tool that makes the transformation from several heterogeneous practices to one, standard operating procedure possible. What misses from the transformation process are other implications that derive from this particular situation, but which are not identified as important in the same sense.

Analytically, the studies of markets from STS are multiple. They range from studies of financial institutions to studies of the construction of emerging technologies or other actors that are engaged in concrete market action. Examples are the development of the stock ticker (Preda, 2002b; 2006), the culture of Wall Street (Abolafia, 1998), or the institutionalization of new markets (Guala, 2001; LiPuma & Lee, 2005; MacKenzie & Millo, 2003). These studies all have in common an ambition to follow actors through networks of action (Latour, 1987). As such, following an actor is the art of recording a series of temporary stabilizations that enables one to describe the progression of a development process.³ When institutions, technologies, organizations, and people are well in place in established networks, there are a myriad of such stabilizations to choose from. When I look into the life of the stabilizations in ValueBank I find that the final solutions are never straightforward answers to simple

³ Latour also refers to this as the act of ‘freeze-framing black boxes’: “If you take any black box and make a freeze-frame of it, you may consider the system of alliances it knits together in two different ways: first, by looking at who it is designed to enrol; second; by considering what it is tied to so as to make the enrolment inescapable.” (1987, 138)

questions; they are merely temporarily stable instances in an evolving world of action. Every inscription entails negotiations, compromises, and agreements. Investigating the life of these inscriptions by following concrete actors exposes disagreements and negotiations on a local level that have been concealed retrospectively. Following the actors has provided me with an opportunity to observe change as it happens, and thereby to describe changes that may very well soon be forgotten. In my case, studying the Investment Guide is to examine the work of constructing a decision support system: who are the users, the developers, and the decision makers? Why is the system being developed? How? For whom? And my analysis goes further: what practices are incorporated in the design and development of the Investment Guide? Which ones are excluded? What are the implications? I use questions of this kind to investigate how the system has been shaped the way it is: which positions does it support? Which positions does it change and why? The Investment Guide takes on the role as a delegate for a range of actors whose work is being translated into computer code and interface design. The heterogeneous practices of branches and employees are extracted from their local context, cleaned and remade in the form of an *inscription device* or *instrument* (Latour, 1987, 65).⁴ And the instrument is then introduced as a device that is subject to customization without losing its generalizing character; it is an *immutable mobile* (Latour, op. cit., 227), something that “moves around, but also holds its shape”, physically as well as geographically (Law & Singleton, 2005, 335). In my investigation of the Investment Guide, I do not study the decision support system as an information system that stands alone. Rather, I see the decision support system as just one part of an *investment machine* because it is incorporated in financial practice, thus enabling a transformation of both the practices and the technology.

The studies of stock exchanges, investment banks, and hedge funds that I refer to in Chapter 1 embrace the detailed work of following a multitude of actors: computers, intranets, monitors, telephones, trading floors, and auctions, to mention only a few. But also, most of these studies are oriented towards the study of financial products: stocks, bonds, derivatives, options, futures, and currencies. As such, the objects of study have very often acted as mediators (Latour, 2005, 39) between the field of STS

⁴ Latour, refers to the term inscription device in the following way: “I will call an instrument (or **inscription device**) any set-up, no matter what its size, nature and cost, that provides a visual display of any sort in a scientific text” (1987, 68, original emphasis).

and other fields of knowledge. The interest in the impact of social studies of finance from economics, for instance, has often revolved around the financial products that have been analyzed, and not how these products are part of the networks of action that constitute the practice of finance (MacKenzie, 2006, 249-50). Similarly, in relation to my study, management and employees in ValueBank have been interested in the specific results that my study could provide, and not how the study was carried out. Most often, advisors, software developers, and managers I spoke to were surprised that I was a social scientist and not an economist. It is my opinion that a fundamental part of studying markets in STS involves a reflexive approach to the implications of the analytical and methodological background.

What makes a sociotechnical approach interesting to a study of financial markets and how does my case study contribute to the growing field of social studies of financial markets? First of all, I think that following the Investment Guide as it materializes directs attention to the continuously changing character of all actors involved and to their relations to each other. The Investment Guide, for instance, is easily identified as a technical arrangement specifically designed for investment advisors. At the same time, it also plays a central part in spurring dawning disagreements about how to handle internal competition among the company divisions at management level. Actors and inscriptions are parts of different networks, in which their extension and significance may differ. Further, they do not evolve according to an inherent logic or momentum.

Studying the Investment Guide and its way through the organization from a sociotechnical point of view has enabled me to observe how the implementation of a decision support system affects many parts of the organization and does so in several unexpected ways. During its still short life, the information system has received a lot of attention, and has been the centre of heated debate about issues that not only relate to investment counselling. I observed that areas remote from investment, such as the organization's communication strategies and the allocation of financial and human resources within the branch network and business divisions have also been influenced. Hence, I see systems such as the Investment Guide as organizational catalysts – vehicles for change – because they facilitate interaction between actors that were previously only rudimentarily related.

Hybrid Practices

Why is my study of the Investment Guide interesting to STS scholars? In the most general sense because it is a study of a community, a culture that experiences changes as technology-market *hybrids* are introduced (Latour, 1993, 30). This does not simply mean that better practices replace obsolete ones, or that disputes are solved once and for all by means of an unambiguous artefact. In a determinist way of thinking, transformations may carry temporary problems along with them, but these problems are solved once the new practices are incorporated into the existing ones or when they have replaced them. In such accounts the important *work of translation* (Latour, 1987) is excluded, and a lot of effort goes into keeping up unambiguous relations.

Negotiations, persuasion, pressure, and incitements are needed in order for transformations to take effect, but these processes are very often not part of the ‘official story’ (Hughes et al, 2002). Retrospectively, everything seems to have worked out according to the initial intentions, and problems that may have occurred during transformation were solved with the target on sight. Contrary to this, I think that the study at hand examines what happens when new information technology is introduced into established work cultures. Peoples’ expectations, guided by the belief that they are part of a more or less simple introduction of a new system, evoke a variety of issues. Power struggles that have long been settled are once again brought to life between employees, or between employees and management.

More specifically, my study brings in studies of markets in STS. Work practice in markets, whether financial markets or retail, revolve around technologies in almost all instances. In the last 20 years, reliance on models and technical systems in markets has steadily intensified (Knorr Cetina, 2003; MacKenzie, 2006). The individual trader or advisor as well as entire divisions, banks, and the suppliers supporting the market institutions, express that they expect financial technologies to be crucial for future competitive possibilities. I believe that a sociotechnical approach to such confidence in the promises of a narrow range of nonhuman actors is to examine further the reasons for this intense and overarching interest in more advanced tools and standardized technologies. In my opinion, these tools are introduced to manage increasingly more demanding working conditions, which are only constituent parts of the complex sociotechnical settings.

Why is an analysis of technical tools and the organizational management of trading interesting to others than system developers and financial professionals? The easy answer would be that what affects the markets and the economy, affects all of society. We are all part of a world economy, a global economy that encompasses aspects as diverse as employment, housing, education, health, politics, and the environment, to mention just a few. Even if you are not a day trader or a bank clerk, you are still a part of the economy and most probably ‘dealing in several markets’ – at least in the role of consumer or service provider. The more elaborate answer is that the economy is made up of actors that continually construct and reconstruct what ‘economy’ means (Callon, 1998; MacKenzie, 2006). Here, STS is relevant because of its inherent concern with the implications of putting new technologies into practice in specific cultural settings. A study of a decision support system benefits from an STS approach, because of the involvement of so many different actors: software developers, financial experts, management, bank clerks together with software, hardware, telephones, intranets, and many other technical devices. Seen from STS, all these elements are mutually constitutive, and a purely technical or management perspective is incapable of understanding the interrelatedness of the situation. For example, implementing an information system is not solely a technical accomplishment. It also includes human resource planning, and communication strategies have to be taken into consideration along with the integration of this project in a simultaneous stream of other similar projects that take place concurrently.

Structure of the Dissertation

The dissertation is structured in two parts following this introduction: *Part 1 Approaching ValueBank* and *Part 2 Studying ValueBank*.⁵ In Part 1, I establish the theoretical and methodological grounds for carrying out my study of a decision support system in a retail bank. The first part acts as the basis for understanding what is going on in the process of *developing* and *implementing* new technologies in a specific market setting from an STS point of view. How are markets grasped and framed within STS? Chapter 1, *Opening the Black Boxes of Markets*, is an introduction to markets as assemblages of heterogeneous elements that are kept together by the situated activities of humans and nonhumans. The title of the chapter

⁵ ValueBank, and all names of participants, are pseudonyms.

refers to the now classic credo in STS of looking for dynamic relations that have been black boxed and stabilized in for instance hierarchies, institutions, and technologies for the purpose of maintaining control or authority. In chapter 2, *Exploring Multi-Sited Ontologies*, I reflect on entering into a financial organization such as ValueBank. I also consider how my participation has influenced the knowledge of the organization that I have generated throughout this project. This chapter provides the reader with an overview of the methodology of *sociotechnical ethnography*, an ethnographically inspired approach that I have developed during this project. Developing new methods of investigation has presented me with a list of challenges, of which some are new and closely related to this particular context, whereas others have been inherited from the approaches that have inspired my own. For example, how is it possible to investigate the work of people who turn out to be very susceptible to observations and interviews? And what are the consequences of carrying out a sociotechnical investigation, that is, to simultaneously study humans and the technologies they interact with?

Part 2 constitutes the empirical part of my dissertation. Here, I enter into the domain of the investment advisors to illustrate how the *use* of decision support systems changes the work of the advisors. Part 2 is not an exhaustive account of the work of bank clerks, nor is it a managerial description of the challenges that financial institutions are facing today. Instead, my descriptions of the everyday life of investment advisors revolve around the emergence of a new actor, the *Investment Guide*, that has implications for their work, and for their conception of work. Chapter 3, *The Socio-Technology of Calculative Space*, is an investigation into the sociotechnical composition of a ValueBank branch. A tension between the local, situated action of individual investment advisors and general ambitions to standardize and homogenize financial expertise in ValueBank is articulated in a physical redesign of branches. This new design manifests itself in experimental work patterns that affect the relations between the different kinds of employees who populate a typical ValueBank branch. This condition is primarily caused by the presence of practically mandatory financial technologies that entangle advisors in complex networks of counselling, auditing, and monitoring. In chapter 4, *Constructing Sociotechnical Calculators*, the tension between individual advisors and standards of work is investigated further. Where chapter 3 was concerned with the organization of entire

branches, this chapter closes in on the individual advisors and their interaction with decision support systems. My argument in chapter 4 is that the advisors are in part turned into human calculators, despite management's efforts to include them in even more complex technological networks of knowledge by means of the Investment Guide. This microsociological study of advisors is thus contrasted to the findings produced in Chapter 3 by studying what I would term the organizational meso level constituted by branches. Chapter 5, *The Politics of Calculative Practices*, draws the empirical part of the dissertation to a close by discussing the organizational politics in ValueBank in relation to the introduction of new decision support systems. I here claim that along with the ambitions to empower the advisors to perform their work even better, management is unknowingly introducing an *investment machine* that replaces local knowledge and expertise by general models of work in ValueBank. This *investment machine* is my way of articulating the development of sociotechnical mechanisms that revolve around increasingly more complex technologies, while the impact of social factors is correspondingly ignored. However, in the context of STS, this does not simply reduce the importance of advisors as opposed to the role of technologies in investment counselling in ValueBank. Instead, the conditions that the advisors are facing, cause changes for all actors, thus reconfiguring the networks of humans and technologies into multiple, dynamic *investment machines*.

The dissertation ends in the section *Conclusions*, in which I present the main points of my empirical work. I return to my initial questions from the beginning of this introduction to relate these to the outcome of my investigations. Finally, I relate my conclusions to more general reflections on studies of financial markets and to the implications of carrying out a sociotechnical ethnography of an investment machine

Part 1: Approaching ValueBank

Introduction

In this dissertation, I approach the world of economy and markets with a Science and Technology Studies (STS) point of view. There are several objectives of the present study, but the overall ambition is to bring together two wide-ranging fields of knowledge, STS and economy, in order to investigate their similarities and some of their differences. It is safe to say that there are shared interests between the field of economy and the field of STS. This has been expressed in a wide range of the work produced in the last decades within STS (Callon, 1998b; Knorr Cetina & Preda, 2005; MacKenzie, 2003a).⁶ At the same time, it is also quite obvious that there are conflicting issues at stake between the two fields as well, for instance in terms of how to grasp the instability and heterogeneity of market action and actors. Both economy and STS are more accurately repository terms for a heterogeneous list of accounts of a diversity of subjects from history to engineering. And as such, these fields are only the point of departure for this dissertation.

Other similarly important inspirations for this dissertation come from organization and management studies (Barley & Kunda, 2001; Czarniawska, 1998, 2001; Hayes, 2001). Within these disciplines, the relations between instruments and practices have always been of great importance in understanding organizational developments. However, the technologies are often regarded as secondary to employees, management, or the organization, thus reducing technologies to tools, which are mastered and controlled. Especially within management studies, there is a tendency to align all actors according to a specific rationality as expressed in the term ‘homo economicus’ (Callon, 1998; MacKenzie, 2006). Homo economicus, *economic man*, is a term used to portrait an idealized actor that epitomizes individualized economic rationality and self-interest. Under all circumstances, Homo economicus acts to achieve his own predetermined goals based on the information that is available.

⁶ An extensive though not complete list of work on the borders of markets and STS would include Barry & Slater, 2002a; Berg, 1998; Beunza & Stark, 2004; Callon, 1999, 1998b; de Goede, 2005; Harper, 1998; Heilbron, 2005; Ingham, 1996; Knorr Cetina & Bruegger, 2002a; Knorr Cetina & Preda, 2001, 2005; Law & Singleton, 2005; LiPuma & Lee, 2005; MacKenzie, 2004b, 2005a, 2006; Maurer, 1995; Millo, Muniesa, Panourgias, & Scott, 2005; Preda, 2004; Rottenburg, Kalthoff, & Wagener, 2000; Strathern, 2005; Suchman, 2005.

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Rational, economic decisions here means the ability to make the best decision for oneself, thus disregarding the consequences for others. Criticism of Homo economicus from sociology and STS, for instance, has revolved around this individualization of decisions and interests. Economists, on the other hand, argue that Homo economicus is a reasonable approximation for behavior within market institutions, since the individualized nature of human action in such social settings encourages individualistic behavior. This leads me back to STS and to the work of examining what is implied in these conclusions: who are the actors and how are they related?

My ambition in this dissertation is to develop further this growing field of STS studies in markets by way of what I term a 'sociotechnical ethnography'. By introducing an approach as a sociotechnical ethnography, I borrow from both STS and economic sociology aims for a further integration of the social and the technical in conceptual and methodological terms. An ethnographic approach to the organizational conditions guiding current transformations of markets is combined with studies of sociotechnical networks and actors. In some ways my approach resembles elements found in ethnomethodology, whereas other parts derive from organizational studies, human computer interaction, and information systems development. What distinguishes sociotechnical ethnography from these other well-established approaches is the shifting attention to the many different actors in the networks that are described and investigated. This constantly changing focus is deliberate and serves to keep blending the categories of humans and nonhumans as well as individuals and groups.

The current study is thus inspired by approaches that have developed in both economic sociology and STS for at least a decade, but in a Danish context only to a limited extent so far (Arnoldi, 2004; Garud & Karnøe, 2003; Tryggestad, 2005). 'Social studies of finance' and 'the anthropology of markets' are two of the most elaborate notions of an interest in investigating market issues that have been used to characterize this approach (Callon, 1998b; Knorr Cetina & Preda, 2005; MacKenzie, 2006). Within these accounts, markets and the economy have been promoted as active, dynamic phenomena that are defined by actions and actors, rather than by abstract modelling or statistics and numbers. Markets are embedded in social relations, as the American sociologist Mark Granovetter phrases it (Granovetter,

1985). But markets are also characterized by the presence of vast amounts of complex technologies, which affect the actions of the individuals and organizations involved. And as such, markets have become an interesting object of study in economic sociology and STS. In the last three decades, STS as a discipline has developed from studies of interaction in scientific laboratories to a multitude of fields that all incorporate the use and acquisition of science and technology. This is not due to the action of STS alone, but most likely to the more general development of the world into a techno-scientific, global laboratory (Beck, 2000; Castells, 1996; Collier & Ong, 2005). Nevertheless, the development of technologically and scientifically advanced communities and states emphasizes the need for appropriate – and equally advanced – tools for understanding this development (Latour 2005).

One such area that has experienced an immense growth in the application of science and technology is the financial domain. From international institutions such as the IMF, the World Bank, and the OECD, over large international banks such as the HSBC Group, Deutsche Bank, and The Bank of Tokyo-Mitsubishi, and to regional and national banks such as ValueBank, the orientation towards applying new technologies to existing practices share similar characteristics. For most of the financial world, there is a great interest in the profitability of the decisions and initiatives being proposed, guiding attention towards the most profitable projects. The measures for this profitability is most often that which is conveniently calculable, that is products manufactured and sold, profits earned, or the size of the workforce. The ratio of the size of the workforce (staff hours) to the making of profit (hours earned) is very important for the competitiveness of financial institutions, and the growth in supporting technologies has only reinforced this tendency within the last decades (Hughes et al, 2002; Leyshon & Thrift, 1999). Efficiency is thus measured by how many people generate how much profit. Likewise with the amount of other assets, whether they are tangible objects such as buildings and machinery, or more abstract resources such as organizational knowledge and business expertise. All these resources are sought to be incorporated into the calculations of how to achieve the best possible result for the business as a whole. As the amount of intangible resources such as information systems and databases have gained further importance in the last decades, the traditional methods of accounting and ascribing value to a business' assets are facing their limitations. Cycles of development in business management

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procedures have left little to change in the traditional areas of business organization, but there are still ways to change another part of the organization.

This other side constitutes the ‘soft side’ of banking: the training of staff, the development of new forms of communication, and the introduction of more advanced tools that enable employees to perform their duties faster and better. These efforts are closely linked to information systems such as databases, intranet solutions, and also to auditing systems, manuals, procedures, and guides.

The study for this dissertation is carried out in a larger retail bank in Denmark, which I have given the pseudonym ValueBank. The present study is concerned with how the *Investment Guide*, a computer-based expert system is incorporated into a practice characterized by various actors who have developed their own distinct ways of solving tasks in relation to investment counselling. Following STS, I do not regard the Investment Guide as a simple tool for the employees to take in without consequences. Instead, it is an actor in itself, possessing potential advantages and disadvantages that are actualized as it enters the realm of the investment advisors. I present the Investment Guide as a pivotal part of an investment machine, a sociotechnical mechanism that joins for example advisors, clients, computers, project manager, databases, and financial products in reconfiguring the activity of investment counseling in ValueBank.

The two chapters that make up the first part of the dissertation are thus concerned with the way I have developed an approach to studying the implications of the introduction of an investment guide.

In Chapter 1, I engage in the work of establishing an understanding of financial markets. Notions of markets are numerous, which calls for further qualification of the term for it to be useful in the following study. In this study, I understand markets as dynamic places of action, defined by the interaction between the market participants that are present at any time. But to avoid reproducing a general notion of market mechanisms, for instance, work has to be done to illustrate the dynamic and contingent workings of any particular market at any given time. This is done by following Donald MacKenzie’s ambition to re-open the black boxes of markets (MacKenzie, 2005b). The intentions of opening black boxes of markets draws on the

general efforts in STS to investigate in detail the heterogeneous work that goes into stabilizing actors and institutions in their respective positions. Consequently, my account is only a fractional contribution to the many other possible contributions to the study of markets. This is a deliberate choice that recognizes the need for detailed, concrete interaction with the field of study as opposed to general accounts of an entire industry or world of business.

Chapter 2 goes into the methodology of studying financial technologies. This relates both to the concrete design of the present study, but also to the possible limitations of entering a financial domain that proves to be difficult to make sense of for an outsider, that is a non-economist. Ethnographic fieldwork in headquarters and branches has proved itself to be a useful way for me to make sense of the work that goes on in ValueBank. Also, readings of a diversity of materials, written or electronically available on ValueBank's intranet have been important in the ambition to develop what I term a 'sociotechnical ethnography', as mentioned above.

Chapter 1: Opening the Black Boxes of Markets

Introduction

The aim of this chapter is to introduce the central arguments that have shaped the process of writing this dissertation. The basic objective is therefore to present to the reader a range of theoretically based insights, and to sketch out how these – in some cases rather different – approaches share common interests in relation to the subject under study here. The approaches that are about to be introduced are all in one sense or another related to markets and technology. Initially, I considered a market approach as obvious since the current study was carried out in a retail bank. This not only reflected my limited knowledge of the object of study, but also the confines of my academic capabilities. My study could have been approached in a range of other ways, but during fieldwork I gradually came to understand that what I studied was not at all exclusively markets or the economy. It is as much a study of an organization, regardless of profession; it is a study of a culture populated by specialists and experts in their own world; and it is an investigation of the many transformative incidents that follow from implementing new technologies in an already established social setting. Despite these other possible paths to follow in a study such as this, I chose a market approach anyway. Not because an overarching authority is found in a markets and economy approach, but because this approach touches on many other aspects as well. I have gradually realized that within studies of markets and the economy, a range of other topics relevant to my study have been extensively investigated. Not necessarily as points of interest in themselves, but in relation to or derived from market matters. I will return to some of these topics in the following. And for the present study, the analytical resources are not tuned to finding a solution to a problem or to cover an field of knowledge. Rather, my approach is to supplement, to add to the multitude of descriptions that already exist in order to bring new insights to the knowledge of markets.

Financial markets are studied in a number of ways, from macroeconomics to microsociology, work that serve as the basis for my dissertation. The outset of this dissertation is multi-disciplinary, indicating that both macroeconomically and microsociologically informed approaches are considered fruitful, as are others in

between. As such, I have found discussions framed by both economics and sociology a motivation for the work that follows, but in very different ways. As an example, macroeconomics explains economic action as general economic factors such as national productivity or interest rates. Such an approach does not intend to provide the means for carrying out the work that I have done for this dissertation, but macroeconomics exemplify the large-scale economic mechanisms that influence the individual work of financial advisors. Microsociology, in contrast, aims at engaging with a particular, restricted part of the economic world in order to describe in detail the dynamics and relations that are produced by social action.

In this chapter, I present the theoretical and analytical tools that situate this dissertation within an STS and social studies of finance approach. First, I examine the ways that markets are framed within STS. In the next section, I demonstrate how such studies of work in markets bring new insights to the understanding of economic action. Also, I introduce to arguments for further engaging financial markets and STS for the benefit of reconfiguring both. Finally, I conclude by relating the main arguments to my own fieldwork in ValueBank.

1.1 A Market Framework

My motivation for writing this dissertation is found in the two following assumptions: First of all, the result of this dissertation is not strictly a study of economics or actors engaged in economic activity. By this I intend to emphasize that economics and economy is a *framework*, not an *ontology*. People or organizations that are part of markets are not included in a particular economic world per se. Rather, they are constantly working hard to stay a part of a cultural community whose conventions are referred to as economic or financial. Markets are in this way constructed, and the market participants help to keep the markets going – they co-construct the markets they are part of. These are the arguments from the French sociologist Michel Callon, who is one of the main inspirations for this study (Callon, 1998; Callon, Méadel et al, 2002; Callon & Rabeharisoa, 2003; Callon & Rabeharisoa, 2004). Following Callon's arguments, I have found it important to investigate further how these actors construct markets, and by which means. In this instance, I have studied how a specific market

initiative materializes in technologies, practices, and people in the shape of techno-economic networks.

The second assumption is that it is impossible to distinguish a priori between actors who are essential to the construction of markets, and actors who are less important. As an example, both price fluctuations and branch managers may be of interest for a study such as this, but we do not know if or how this is so in advance. Concurrently, no single actor is principal to others in advance. Rather, they are all participants in networks of action that together constitute markets. It may seem as if a single person, institution or technology is vital to the operations of a market. Most often, this indicates that an actor is strongly supported by other parts of the network and has been stabilized as an authority. Markets are constructed, and important persons and technologies are constructed in the same process. Hence, it is helpful to keep an open mind to the impact of relations that constitute markets, and the way relations are changing.

Setting off from the two assumptions above, the pivotal question of this chapter is therefore: how do you study markets within a framework of heterogeneous actors? This question includes several other topics. First of all: what is meant by markets? How is it possible to work with a term that apparently deals with a range of different actors and relations? What are the advantages and disadvantages of applying an interest in markets when studying emerging technologies in an organization, for instance? Secondly, how and why is this particular market approach important in the study of work practice among retail banking professionals? What are the possible benefits from following people around in their everyday work as they perform mundane tasks such as calendaring or working with spreadsheets on their computers? How do these activities relate to the world of global finance, currency rates, stock prices and interest rates? Thirdly, why study markets from other than an economic perspective? The study of money and markets is by no means a new discipline; on the contrary, it is one of the most elaborate fields of study that include many highly esteemed accounts of both historical and argumentative importance. With time, some of these accounts turn out to be particularly persistent, and present themselves today as almost generic and self-explanatory. However, in times of economic and political globalization, studies of markets have to reflect the changing conditions of the economic world.

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The objective of this dissertation is thus to develop an enriched account that interacts with the subject under study, in this case sociotechnical transformations in a specific division in a financial organization. This is how the study is framed, with the restraints that follow. The ambition is to further develop an understanding of sociotechnical action in markets, not to cover or replace existing accounts. This also indicates that my account reflects a Science and Technology Studies (STS) approach to markets and not an economical approach.

What constitutes markets is often black boxed, that is the local dynamics and changing relations of market actors are being reduced to general logics of exchange or to the mechanisms of supply and demand. One aim of this dissertation is to open black boxes of markets and, in fact, to argue for the continuous importance of opening such black boxes (MacKenzie, 2005). By closing the black boxes, and thereby reducing local, contingent practice to general laws of the market, questions relating to a particular practice are replaced by an abstract characterization. By opening the black boxes, and keeping them open, enables you to study markets as they constantly change, thus paying attention to the transformations that take place.

Pursuing the line of questions above, this chapter is structured in the following way. First, different more or less complementary views on markets are presented (Callon, 1998; Knorr Cetina, 2005; MacKenzie, 2006). These are studies from within an STS framework. The authors are concerned with developing further traditional, economically informed accounts, and to include cultural, social, communicative, and not least technological action as crucial to understanding the characteristics of markets. As such, Callon, Knorr Cetina and MacKenzie have come to represent a new field of work within STS and, consequently, within social studies of markets. The second part deals with some of the conceptual benefits from studying markets from an ethnographically inspired point of view. Here, emphasis is put on the need for thick descriptions of local action in contrast to more general accounts of a whole industry or organization (Geertz, 1973, see also Chapter 2 in this dissertation). The insights produced by thick descriptions often detect changes that take effect on a local level, but have more widespread consequences as well. By studying these changes in detail, actions are associated with particular situations and appear open to analysis. De

Goede (2005) refers to such an account as a *genealogy* (of finance), borrowing the phrase from Foucault. She writes:

A genealogy, in short, is a practice of criticism that is motivated by finding insecurities and uncertainties in that which is represented as stable, coherent, and self-perpetuating. The politics of freedom and “possible transformation,” according to Foucault, start with “following the lines of fragility in the present.” (ibid, 14)

Consequently, De Goede argues that “the history of finance is ambiguously located in religious symbolism, colonial conquest, sexual imaginations, gambling, superstition, and discourses of moral obligation” (ibid, 14). And, concurrently, the present market situations are very much a part of this history and its many constituent parts. De Goede’s objection to the representation of finance is put forward as a critique of the naturalization of the development in markets and finance. A way out of this naturalization is close encounters and thick descriptions of actual practices in concrete, existing markets. Encounters that re-open and keep open the black boxes.

Thirdly, a section is devoted to discussing the current interest in markets among scholars in sociology and STS. To many outsiders, markets and their inhabitants take the place of natives in an exotic culture, but more and more the boundaries between market participants and the actors outside these circles are blurred in studies of markets. There are several reasons for this, both in terms of academic territories and a newly discovered relevance for complementary studies of markets, economy, and technology. Once again, De Goede’s arguments about the history of finance are relevant. She argues that finance has been depoliticized, with serious consequences, an argument that has been promoted equally forceful within science studies and STS, for example (Latour, 1987). Finance and markets have become instrumental, and thus “has acquired a logic of calculability and an appearance of scientific objectivity that places its fundamental assumptions – such as its indicators of performance – beyond discussion and debate” (De Goede, 2005, 3). In terms of the genealogy mentioned above, there is a tension between a strict logic of calculation and the search for inconsistencies, which is De Goede’s point of departure. Likewise, this dissertation seeks to investigate both the apparent logics of calculation present in the organization and its constituent parts, and to look for the inconsistency, instability and insecurity that have been hidden by scientific objectivity.

Studies of markets within STS are dominated by studies of finance, i.e. the international trading of currencies, stocks, bonds, futures, and other financial commodities in international investment banks or stock exchanges. The interest in studying markets and finance is found in similarities between finance and studies of scientific practice as they have been carried out in STS. As such, markets have become the new laboratories for social scientists to study; places where cultural and social dynamics are examined both internally and in relation to the world surrounding them. Current studies of markets in STS focus on decomposing concrete markets, e.g. Wall Street banks or the Chicago Board Options Exchange (Guala, 2001; MacKenzie & Millo, 2003; Beunza & Stark, 2004). The studies carry a striking resemblance with many studies of laboratories and scientific communities that has provided STS with its present impetus in the past two decades (Latour, 1987; Bijker, Hughes et al, 1989; Pickering, 1992; Latour, 1996; Haraway, 1997). I will return to the linkages between science studies and markets at the end of the chapter as I recapitulate the main points of the previous sections according to my own study of the Investment Guide in ValueBank. But now I direct my attention towards the market.

1.2 Markets

When I visited ValueBank for the first time, I was struck by the image of efficiency that oozed from the people, office buildings, and the way work was being carried out. The following is an edited excerpt from my field notes taken on my first visit in the summer of 2003:⁷

I find myself at the newly redesigned headquarters together with two informants from the bank. They had picked me up outside the building and provided me with a key card and a code. I am introduced to the organization of the different departments, and we make a stop in the middle of a large office floor divided by a floating bridge. We are situated at a gallery overlooking the so-called 'trading area' on the floor below. Beneath me in a large, bright open office space approximately 50 traders, mostly

⁷ My first impressions of the trading area in ValueBank unmistakably resembles the reflections expressed in Bruegger (2000, 233): "For visitors coming to the dealing room for the first time, the multitude of computer screens, the young and mostly male employees and the high level of noise are some of the most striking characteristics".

men, are in place at their desks. There is a lot going on at the trading floor: people speaking on the phone or with each other, while others are looking at their computer monitors or working with their computers, others again in constant movement between the tables. Once in a while, one of the traders looks up from his position beneath me, but soon resumes with his work. I feel awkward watching the people underneath me because they do not seem to know that they are being watched. On the one side, I am fascinated by what I see; the apparent chaos, the busy activity of people, and the presence of computers, monitors, and many other technical devices I do not even know what is. On the other side, I am also very alienated by this practice; I do not know what to look for in order to get an impression of what is going on. How are the relations between what I see on the trading floor, and what I had set out to study in the first place, i.e. the decision support system developed for the investment advisors in the bank's branches and not for the experts below me?



Figure 1.1: Activity in Markets

Later on, I came to realize that the most obvious connection between the expert traders and the branch advisors was the market. But what does that mean? What is the market? In my case, the market was the activity that I observed beneath me on the trading floor. The market was the traders, their technical equipment, their behaviour,

and the communication between colleagues. And the market was also what I encountered in the branches later on, as my fieldwork evolved to studies of the local practices in branches as well (see Chapter 2). The account above of the initial fieldwork in ValueBank indicates several points of interest in relation to the study of markets. In the following, I sketch out these points as they concur with recent accounts of markets within economic sociology and STS. Before establishing a framework for investigating markets, a few distinctions have to be drawn. Callon discusses in length the relations between the terms ‘economy’ and ‘economics’ in order to reintroduce markets as a potential object of study in anthropology and sociology (Callon, 1998). According to him, the market is often (mistakenly) conceived of as practice, *economy*, embraced by objects and actions, and as a science about these objects called *economics* (ibid, 1). Callon’s objection to this argument is that such a perception of markets supports the view that *economics* is an academic discipline concerned with an object of study, the *economy*. But what is observed and experienced in practice is quite the opposite. Instead, markets are being transformed by theoretical models, and economic laws are reformulated under influence from real markets:

What we do have are separate stories, of economic thought, presented according to a purely disciplinarian logic, on the one hand, and of economic activities, carefully separated from economics, on the other. (Callon, 1998, 2)

Callon questions this separation of economy and economics and argues for studies of the intersection of abstract notions and practical questions of markets within an anthropological perspective. In this way, the many insights produced on the basis of economic analysis are put to the test in real markets. For Callon, studying markets is a matter of studying the coordination of activities that take place in markets, whether they are financial markets or marketplaces for strawberries, for instance (ibid, 20).

Situated Markets

First of all, markets are situated and contingent. This claim supports the increasing acknowledgment that what constitutes markets cannot be distinguished from the social action taking place in economic transactions. One of the most acclaimed accounts of social action in markets is found in the term “social embeddedness” as stated by the American sociologist Mark Granovetter in his influential paper “Economic Action and Social Structure” that was crafted at the dawn of

contemporary economic sociology (Granovetter, 1985). Granovetter's idea of social embeddedness in markets rests on a critique of the tendency to exclude any social impact on markets and economy, what he terms as the tendency to either over- or undersocialize conceptions of human action (ibid, 483). His main argument is that markets *are* social action, that the social is an intrinsic part of every economic transaction (ibid, 482). He thereby goes against a more common conviction embodied in *Homo economicus* that economy and markets are defined by rational choice and logically calculating actors, and in that way separate themselves from the spheres of the social. In conjunction with the arguments by Callon referred to above, Granovetter displays an interest in rendering market actors as non-situated and idealized in attempts to be able to account for their roles in the market transactions. Concurrently, (theoretically) idealized markets express an understanding of all actors as aligned according to the same market logic. Every actor in an idealized market has a self-interest in pursuing the same optimal, abstract goal in market transactions, which secures and sustains market forces. The idealized market – and perfect competition for that matter – is thus conditioned by the existence of clearly defined, stable market actors, who all act according to the same abstract market logic. The embeddedness argument as proposed by Granovetter and taken up by several others since then, stresses instead the role of concrete networks of interpersonal relations. Seen from this point of view, economic reasoning is based on an atomized theory of action, which regards social relations in markets as only frictional and disruptive, and, most importantly, not as central to market processes (Granovetter, 1985). Just as Callon intends to introduce anthropologically based studies of markets to remedy this shortcoming, Granovetter calls for the recognition of a sociological approach to markets. This is not just to acknowledge that sociology as a discipline is relevant in relation to studying markets and economics, but also because of the benefits of a more subtle understanding of social action within markets, an understanding which sociology provides.

Callon also acknowledges that it is Granovetter's ambition to argue for the advantages of applying social theory to market approaches, but has one major objection:

“Markets are not embedded in networks. In other words, it is not a question of *adding* social, interpersonal, or informal relations in order to understand their functioning” (Callon, 1999, 192). Here, Callon clearly distinguishes between the disciplines of socio-economics or economic sociology on the one side, and STS on the other,

exemplified by the respective use of the concept of networks. The more traditional sociological approaches to markets are based on a conception of structures already present, for instance in the shape of social relations as a social network. Granovetter's notion of embeddedness was an attempt to transgress these traditional concepts by suggesting that markets are not made up entirely by rational agents. However, he does not manage to escape the problem to which Callon points: that markets are more than socially embedded. To explain the activity in markets, Granovetter argues against an under-socialized and an over-socialized conception of markets as both unproductive, and suggests embeddedness as a way out of the dual reductionism of either over- or under-socialized markets. The under-socialized conception is based on markets as structures, for example cultural or political hierarchies and institutions. In such a market, actors operate according to the role they have been prescribed. The over-socialized conception of markets, on the other hand, is rooted in the social interaction of the actors involved, that is the social interaction between market participants dictates the outcome of every transaction. Callon claims that the use of embeddedness as an indicator of market action suffers under Granovetter's intentions of trying to replace a limited (economic) approach with a better and more elaborate (sociological) one. He continues:

Instead of adding connections (contingent contracts, trust, rules, culture) to explain the possibility of the co-ordination and the realism of the calculation, as in the various solutions proposed by economists, we need to start out from the proliferation of relations and ask how far the bracketing of these connections [...] must go to allow calculation and co-ordination through calculation. (Callon, 1999, 186)

In this sense, Granovetter's account of social embeddedness in economic action only partially escapes the somewhat utilitarian image of rational market participants that he tries to distance himself from. In my reading of Granovetter's arguments, this is caused by an ambition to include the social in the core of economic action, and thereby regard social action as intrinsic to the development of market activity. According to Callon, the notion of an idealized market is problematical, because it implies the existence of an abstract space in which aggregated demands and supplies encounter and cross one another, and through successive adjustment end up defining what is commonly called a 'market price', for instance. This abstract space has no coupling with the actions carried out by concrete actors in real market networks that are neither abstract nor purely social.

In relation to the present case, the market that traders and advisors in ValueBank interact with is not different from them, but part of their network of action. There is not an overall supporting structure that guides the actions on the market in one, specific direction at any time for the advisors. Rather, the markets that the advisors are part of are contingent, that is, they are built and supported by the actions and the structure of the activities that constitute market transactions. The history of the markets and the procedures for action are always only part of the picture, and is co-constitutive of the network of action carried out among traders and advisors.

All situations in which the market is invoked as a single, abstract principle misses, at some point or another, the explanatory key that will describe the aggregative effect. This aggregative effect is based on the situated and contingent conditions for market action. By avoiding a single explanation to markets, we also avoid establishing a notion of the market as something general or universal. The reason for not generalising the concept of the market is found in an interest in analysing concrete occasions in which ‘markets’ are performed. With a focus on singular market transactions the phenomena of aggregation and production of possible macro-regularities is not put aside; on the contrary, it facilitates their understanding and analysis. Every occasion reveals the situatedness and contingency of this exact market transaction: how the actors are engaged in the market, on what grounds, and with what results. Following Callon’s example, studying markets as unique events in every instance produces empirical knowledge that is useful for a better understanding of market forces, and that abandons the idea of an abstract market space. This empirical knowledge is not easily produced, because knowledge is delegated to or inscribed in a wide range of actors in techno-economic networks (Latour, 1987; Callon, 1992). Delegation and inscription of market knowledge indicates how knowledge of market opportunities does not belong to any single individual, for instance expert traders or management. Instead, knowledge is distributed among both humans and nonhumans and constructed and reconstructed as networks stabilize and destabilize. And this leads to the notion of networks as a way of studying markets and market knowledge.

Sociotechnical Markets

Secondly, markets are sociotechnical and collective networks. One way to conceive of this is by the notion of techno-economic networks. Networks are ambiguous entities, as STS accounts assert. They are unstable and dynamic; they are small or large, wide-

ranging or limited. They are constituted by a range of actors that are associated through action. In the account from my fieldwork mentioned earlier in this chapter, a sense of such networks is detected. In ValueBank, itself a network tied together by a formal organization, other networks surface. Trading on the trading floor is held together by employees, computers, telephones, monitors, and the interaction between these actors. Also people and institutions outside the premises of the physical space of action contribute to the forming of a network around trading: other employees in ValueBank, management, customers, students, maintenance personnel, and the like. Trading is in this sense a “techno-economic network of heterogeneous actors [...] who participate collectively in the conception, development, production and distribution or diffusion of procedures for producing goods and services” (Callon, 1992, 73).

Networks such as the one centered on the trading floor in ValueBank are not limited by formal affiliation in the form of employment or ownership, but rather by interest. Trading in ValueBank is in this sense constituted not by abstract economic concepts of supply and demand, but by the collective, sociotechnical work of traders and their technologies located in the company headquarters and in the branches of the bank. The use of computers and other information sources provide the traders with the required information to participate in “conceiving, developing, producing, and distributing or diffusing procedures for producing goods and services”, that is profit for ValueBank. At the same time, the network ascribes to the technologies the responsibility of acquiring the needed information constituted around the objective of “producing goods and services”.

Work in markets is collective and socio-technical, primarily because of an extensive engagement with technical equipment and procedures among traders and banking professionals in an experimental setup. In every market situation, a list of actors is active in the construction, support, or breakdown of these networks. The ways of cooperating are shifted from actor to actor, from humans to technologies (Latour, 1999). The network is constituted by these shifts, or translations, and as such, the translations are the key to studying the activity in the network, neither the structure nor the actors on their own (ibid, 310). In this vein, networks are relevant objects of study because of the relations that are articulated in networks, and not necessarily the entities themselves.

One of Latour’s most prominent examples of this is Pasteur, who is often referred to as the father of microbiology, not least by giving name to the process of

pasteurization (Latour, 1988). In Latour's account, Pasteur was never the interesting actor in the developments that led to pasteurization and bacteriology. Rather, it was the ways in which "Pasteur makes his microbes while the microbes 'make their Pasteur'" (Latour, 1999, 16). Neither Pasteur nor the microbes were the main characters in the materialization of microbiology from Latour's point of view. The changing relations between the actors and the translations of different interests into scientific practices, medical treatments, and political action is central. Pasteur did not control the discovery of microbes, he was concurrently made into a bacteriologist by the materiality of the microbes.

Performative Markets

Thirdly, markets are performative and world-building. The economy is not an independent object that economics observes and theorizes. Rather, the economy is performed by economic practices. To put this in another way, markets reflect how economic knowledge, traditions, and procedures are carried out *in action*. Donald MacKenzie demonstrates how the Black-Scholes-Merton formula for option pricing, retrospectively regarded as a superior mathematical equation, has transformed the world of finance (MacKenzie, 2003; MacKenzie & Millo, 2003). Up until the introduction of the formula, there were no equivalent relations between the field of theoretical economics and the market economy. But with the success of the Black-Scholes-Merton formula, a new world order within financial markets was created: "the equation started out as only a rough approximation, but then pricing patterns altered in a way that made it more true" (MacKenzie, 2003, 858). MacKenzie's arguments are that the equation tied together economic theorists and practitioners, which concurrently altered the actions of both. The economists realized that they would benefit from modelling practice as a supplement to reflecting on abstract economic knowledge, that is study markets and base their assumptions on statistics and pricing. The practitioners, on the other hand, realized that the hypothetical formulas proposed by scientists had resemblances with the world they were involved with themselves, which were the markets of option pricing. And because of this mutual interest in each other's work, pricing changed. By use of the Black-Scholes-Merton formula, the world of finance changed, according to MacKenzie: "That the world came to embrace the Black-Scholes equation was in part because the world was changing [...] and in part because the equation [...] changed the world" (op.cit, 851).

The mutual, ongoing configuration of markets and economics as illustrated by the Black-Scholes-Merton equation is symptomatic of the way in which markets are always only partially closed black boxes. As MacKenzie demonstrates, it is hard to account for the future of finance and markets. The Black-Scholes-Merton equation experienced an increasing success from its conception and up until 1987, but its importance has deteriorated since then (MacKenzie, 2003, 859).⁸ So it has not been a question of building a world of finance that relies on the most accurate and precise *stable* models and mechanisms. Rather we are witnessing a world in constant change, where even the most superior formula at some point may face its downfall due to other, but related circumstances. World-building is in MacKenzie's sense not a question of establishing permanent structures such as financial institutions, procedures and economic rules. On the contrary, world-building means the dynamic, transformative action of testing relations between fields that may not appear to be related in any sense, but turn out to co-evolve into new market configurations.

Sociologist Karin Knorr Cetina has carried out similar studies of world-building in global investment banks (Knorr Cetina & Bruegger, 2001; Knorr Cetina & Preda, 2001; Knorr Cetina & Bruegger, 2002; Knorr Cetina, 2005). In a paper written with a former trader, Urs Bruegger, Knorr Cetina argues that the markets they study “take the form of a large, globally distributed conversation” (Knorr Cetina & Bruegger, 2002, 914). Instead of pointing to the organizations or institutions that enable market transactions, these authors propose to take a closer look at the concrete actions of the participants in the trading of currencies between investments banks in the financial centres of the world London, Zurich, New York, and Tokyo. The purpose of their fieldwork is to study the interaction between traders as “global microstructures”. This term implies that investment banks and traders are all aligned towards the same object, i.e. the market of currencies. The market is constructed by the communication between traders as transactions are carried out. In other words, the market is performed by the interaction between traders: “Thus, the ongoing conversation provides the market with social liquidity, which serves the market's economic

⁸ As MacKenzie's account also shows, finance is a broad category that covers many markets and pricing methods. Historically, the Black-Scholes equation has mostly been applied to the market of option pricing, and it is in this sense that the importance of the equation has experienced a decline since 1987.

liquidity” (ibid, 914). But in the same structure of global interaction lay the ties between individuals within the banks: personal relations, often mediated by computers and monitors. In the global structure of the market you find different communities, for instance the geographically localized community constituted by work in a particular bank in Zurich. The traders go to work in the bank, meet with colleagues and establish both working relations and more informal personal relations with their colleagues, which all contribute to the building of a currency-trading world. In supplement to this world-building, the traders also have colleagues who are situated in other company offices around the world, with whom they communicate every day by telephone or computers. Both groups of colleagues contribute to maintaining a community organized around their profession and the market, as well as around the temporal circumstances of trading currencies.⁹ The temporal coordination has in this sense gained importance over the geographical by way of new technologies such as computers, the Internet, and company intranets spanning the globe. According to Knorr Cetina, the temporal coordination of work is important because of the character of currency trading, which brings us back to the quotation above. The market of currency trading has detached itself from the organizational boundaries defined by place and has entered into a global, temporal appearance in the form of conversation:

In this conversation, deal making, information exchange, and personal talk come together on one platform, with information exchanges and personal talk also filling gaps between economic transactions and supplying the background for deals that are made via electronic brokerage. (Knorr Cetina and Bruegger, 2002, 914)

Not only have the technologies of trading replaced the need for face-to-face interaction, it also facilitates the building of personal relationships between traders who may never meet each other in person, what is referred to as ‘intersubjectivity’. The authors want to emphasize that this world-building of currency traders’ market is not centered around the relations between two or more traders, but rather concentrates on the market as a *third object*, a shared resource for acquiring knowledge.¹⁰ They conclude:

⁹ “[D]ates and hours set for important economic announcements and for the release of periodically calculated economic indicators and data [...] structure and pace participants’ awareness and anticipation” (Knorr Cetina & Bruegger, 2002, 929).

¹⁰ The notion of a third object is borrowed from Schütz: “Since we are growing older together during the flight of the bird, and since I have evidence, in my own observations, that you were

[W]e submit that participants' [i.e. traders'] reciprocal observation of markets on screens – combined with temporal mechanisms – may constitute a basis for both a form of intersubjectivity and the integration of some global spheres. (ibid, 920)

The combination of a shared object of attention – the market – and the building of a standard communication infrastructure that downplays the geographical separation of traders in London, Zurich, New York, and Tokyo, are the two main reasons for the establishment of 'global microstructures' that Knorr Cetina refers to.

1.3 Working in Markets

Part of the fieldwork in ValueBank was set in the branches to supplement the studies carried out in headquarters.¹¹ The following account serves as an example of how working in a ValueBank investment team is like from an outsider's point of view:¹²

I was intrigued when a female investment advisor during an observation session suddenly said: "now my work day begins". It was 9.30 in the morning and I had observed her working since she entered the bank at around 8.30. For almost an hour, she had been doing research on stock quotes and customer portfolios, typing and editing the figures in a spreadsheet. She compared her findings with the advice from ValueBank's investment experts in an attempt to give the best advice possible to her customers. Even though I found this first hour of her day very much a part of a working day, she did not agree. To her, 'work' was talking to customers or trading securities and stocks, not researching or preparing for meetings and telephone conversations with customers. My informant would want her work to be anything but the research she had to do in order to be prepared to speak to her clients. For her, the most important part of work was producing recommendations to clients. It was not only a distinction in words; her actions indicated that as the work day began at 9.30, she took on her position as advisor, whereas until then she had been chatting comfortably with colleagues across the table and around the room. As her work day commenced, she crossed the threshold to a different practice. She was now completely

paying attention to the same event, I may say that we saw a bird in flight". Alfred Schütz, 1964, quoted in Knorr Cetina (op.cit, 922).

¹¹ See also Chapter 2 for an elaborate account of the empirical work for this dissertation.

¹² The transcript is based on fieldwork performed in Beta branch on the 25th of November 2003.

focused on communicating with her clients on the phone; her voice was calm and serious. It was as if she had virtually left the open office space where all employees were situated around their tables on the ground floor of the branch, and had entered her own, private office space where no other telephones were ringing, no other conversations were taken on.

From this preliminary account of an advisor's work in a of ValueBank branch, several issues call for further elaboration. In the following section, I will establish a framework for understanding the circumstances surrounding the work that investment advisors are carrying out in general, as exemplified in the paragraph above. Also, I will try to illustrate how the advisors themselves seem to define work as individual and personal. In contrast to the advisors' definition of work as individual you find the technical and organizational support provided for the advisors in their work, for example shared information sources on the company intranet or the physical design of the workplace. This support seems to be associated with another, quite different conception of work: work as collaborative and collective.

In the tension between individual and collaborative work, opposing images of work and organization are articulated. These images are of great importance for several reasons. First of all, understanding work is a way of making sense of professional associations opposed for instance to family obligations or leisure activities. Different roles are ascribed to work as a way of constructing identities, for instance the relations between managers and employees or between colleagues with different skills and competencies. Secondly, images of work reflect a degree of complexity and specialization assigned to an employee or an occupation. In the example above, it is clear that the investment advisor is working in a field that requires a certain amount of competence. She needs technical skills in relation to computers and software, she needs financial skills to maintain customer portfolios, and she has to exert communicative capabilities, both in relation to colleagues and to clients. The field of investment is neither trivial nor static, and requires a constant attention to the developments in several financial areas. Thirdly, images of work display the extensive coordination and cooperation between humans and nonhumans that is taking place, seemingly without major difficulties.

These points illustrate how working in markets appears to be an ambiguous practice. As several studies have shown, work in financial markets is characterized by a tension between

the individual and the collective objectives.¹³ One of the most apparent reasons for this is found in the ways salaries and incentives are often primarily based on the performance of the individual trader or advisor, with collective bonuses as a relatively modest supplement. This often conflicts with the organizational objectives of stimulating cooperation and learning among colleagues or departments. Knorr Cetina proposes to displace the current understandings of work in knowledge-based practices with a notion of *sociality* (Knorr Cetina, 1997; Knorr Cetina, 2001). In this particular concept of sociality lies the recognition of work and organizational relations as closely tied to objects of knowledge and expertise. This includes information technologies, laboratory equipment, or other sources of knowledge production such as books, maps, and prototypes (Knorr Cetina, 1997). To Knorr Cetina, these objects of knowledge and expertise play an active part in reordering the social relations between experts, and in this way the objects appear as altogether different from plain instruments or commodities (ibid, 23). Instead, they are actively reconfigured as the outcome of interaction with experts or knowledge workers.¹⁴ In fact, the objects very much play the most important part of the transformations that take place in knowledge-intensive work, or “expert contexts”, as Knorr Cetina phrases it: “In expert contexts, the binding role of knowledge objects may rest on their multiple instantiations; for example on their ability to circulate as test materials, visual displays, maps, prototypes, substances, etc” (ibid, 24). In one sense, this is new and an important characteristic of work in expert cultures. In another sense, such objectual relations have a long and elaborate history, but today we are experiencing a quantitative rise in these relations, which again calls for a better understanding of the transformative powers of the objects of knowledge in work practices. The abilities of objects to circulate in different instantiations increases the complexity that they add to the sociality of work.

In a study of a Wall Street trading room at the company International Securities, sociologists Daniel Beunza and David Stark state that calculative practices are distributed across persons and instruments (Beunza & Stark, 2004). Their studies have shown that work in the bank they examine is characterized by the interaction between a long list of actors, ranging from human experts to technical systems. For example, all human actors are actively encouraged to take

¹³ See Leyshon & Thrift (1999) for a overview of recent developments in British retail banking; see Abolafia (1998) for a study of the trading floor at the New York Stock Exchange; see Knorr Cetina & Bruegger (2002) for a study of traders in investment banks in Zurich, New York, London, and Tokyo.

¹⁴ See also Forsythe (2001) for a discussion of knowledge and knowledge workers.

advantage of every possibility of sharing knowledge and information for the benefit of the entire organization by engaging nonhuman actors. These initiatives are being carried out in several different ways, and subsequently Beunza and Stark investigate the transformations in at least three ways: 1) the authors study the spatial organization to observe the facilitation of sociality among the traders, 2) they study the specialization of work tasks along with the ecology of calculative and evaluative processes. Finally, 3) they examine the trading room as an assemblage of instrumentation, that is, as a laboratory for developing new ways of working and cooperating among experts and instruments.

The trading room is a place that has undergone many changes in the last twenty years, and this particularly due to major technical alterations. Beunza and Stark start out where many have done so before them: with the image of the trading room. The trading room epitomizes the popular idea of financial markets and investment activities.¹⁵ Here we have a highly specialized and confined market space, where ordinary social rules do not apply. Competition is the rule of the game, and achieving their objectives is key to the individuals who dominate the scene. For an outsider, it is hard to understand what is going on in the transactions that are being carried out. The traders – almost all men – carry distinctive uniforms and behave in culturally consistent ways. By way of arm-waving, shouting and other types of agitated signalling, trades for vast amounts of money are carried out within seconds. Apparently, the market conditions change all the time, which consequently requires a certain amount of cynicism and resoluteness in order for traders to be successful. But according to Beunza and Stark as well as Knorr Cetina (op.cit.), the boiler room image of the trading room is no longer an appropriate way to picture trading of today. The following elaborate quote gives a detailed and precise description of the setting at International Securities, as opposed to the image of the boiler room:

Entering the trading room is like entering the lobby of a luxury hotel. Instead of a low ceiling, the observer finds high ceilings and a huge open space occupying almost the entire twentieth floor of a skyscraper in Lower Manhattan filled with rows of desks, computers and traders. Instead of a roar, the observer hears a hushed buzz among the traders immersed in the flickering numbers on hundreds of flat-panel screens. Instead of an oppressive space, the observer finds generous corridors, elegant watercolors on the wall and a dramatic view of Manhattan. Instead of agitated employees, the observer finds relaxed traders in business-casual wear leisurely circulating about the trading room, coffee in hand. Instead of writhing arms and torsos, we see equations and formulae scribbled

¹⁵ Some of these popular images of Wall Street have been conjured up by novels such as *The Bonfire of the Vanities* (Tom Wolfe, 1987) and *American Psycho* (Bret Easton Ellis, 1991) or the motion pictures *Wall Street* (Oliver Stone, 1987) and *Trading Places* (John Landis, 1983).

Chapter 1: Opening the Black Boxes of Markets

hurriedly on a large white board located prominently near the center of the trading room. And instead of a fake fireplace, the room is populated by non-human ‘intelligent agents’, the computer programs executing automated trades, referred to by the traders themselves as ‘robots’. (Beunza & Stark, 2004, 378)

Office design and surroundings are only part of the transformations brought about. Beunza and Stark continue their descriptions by reporting on the effort of enforcing ‘low-monitor’ policies and sociability promotion (ibid, 378-79). Their studies indicate that the technologies of trading are a central part of work, and not just instruments in the hands of skilled users. Knorr Cetina’s notion of ‘sociality with objects’ reflects changes in the practices among knowledge workers, and Beunza and Stark provide this notion with further impetus by way of describing the office design and the tools of the trade at International Securities. The transformative benefits appear when work surroundings, that is an office space that facilitates cooperation, are merged with the need for communication and cooperation among traders and their technologies. In this way, the technologies of space and place, for instance a low-monitor policy, go into collaboration with the social norms that thrive in a trading room. The low-monitor policy is enforced to make sure that no single trader is able to hide between a computer screen and avoid contact with others. Instead, the visibility of all traders facilitates the communication between employees, as all appear present and cooperative. According to Beunza and Stark, each trading desk is a highly social place, despite the fact that most trades are carried out by individuals. Once again, this has to do with the sociality with objects. As trading has become more and more conditioned by an extensive use of technology, the financial instruments have become a part of the way traders socialize. As the authors conclude: “no tools, no trade” (ibid, 389). And this refers in particular to the interactional patterns that emerge from an increasing application of financial instruments in this particular knowledge practice. The abundance of computer programs, formulae, and communication technologies do not seem to neither enhance nor diminish the professional capabilities of the traders. On the contrary, they seem to have developed sophisticated ways to integrate their dependence on financial technologies into their practice in a balanced manner. One example is Stanley, a junior trader who is referred to as a ‘toolmaker as much as a trademaker’:

Everyday, one hour before the markets open, he arrives to the trading room to prepare his setup; part of that preparation is readying the screens. One by one, Stan opens each of his windows and places them in their customary place, ensures they have their own color and size and creates new active links as customers order new trades, and discuss possible technical issues with the computer programmers. (ibid, 391)

By meticulous preparation and calibration of his instruments, Stan delegates part of the calculation to his computer programs by automating the observations of market fluctuations

that he should have done himself. For this to work, Stan has to have an intimate knowledge of his instruments, and he has to invest trust in his sociality with objects. He has to be able to rely on the capabilities of his programs without having to monitor them constantly; he has to feel confident that his daily calibration is enough.

Cognitive Systems

The example with Stan serves the purpose of showing how interaction between traders and their financial instruments is a matter of mutual fine-tuning according to a recurrent schedule. Stan's work is defined by the interactions with the tools of the trade, but also by the interaction and collaboration with the other traders situated in International Securities. There are resemblances between Beunza and Stark's accounts of traders in Wall Street and the way work in a cockpit is carried out, as presented by cognitive psychologist Edwin Hutchins (Hutchins, 1995). Hutchins' description of the interaction between pilots and flight instruments is framed by a notion of 'cognitive systems' that involve both humans and technologies: "It is a constellation of structures, some of them internal to the human actors, some external, involved in the performance of some invariant task" (ibid, 281). He presents the cockpit as a "cockpit *system*" as opposed to just a cockpit. He thus distances his definition by expanding a confined space to both include human experts, technical instruments, and the organizational support that goes into operating a complex system, in this instance an airliner flying across the Atlantic. A cognitive system is inscribed with the experiences from previous flights, materialized in flight manuals, instrumentation, flight attendants, booklets, flight records, pilots, and ticket handling. "Boeing 747s do not fly, airlines fly", as Latour phrases it (1999, 193). Work in both markets and in airlines is in no sense defined by the existence of a single actor – human expert or technology – but rather by the composition of many actors of different kinds. Latour refers to this as a collective of humans and nonhumans, which emphasizes a break away from a dualism dividing subjects and objects. Subjects are not differentiated from objects if you study practice as it is performed in work situations such as in International Securities or ValueBank. Neither are the objects of this practice isolated from the humans who operate them; rather, we are all part of these collectives of both humans and nonhumans. Latour's point is that it makes no sense dividing humans and nonhumans for the sole purpose of invoking the exact same differences: humans are different from nonhumans because we distinguish between them. Rather, we ought to look for the trails that these collectives are leaving behind; look for the ways in which humans and nonhumans configure each other in the specific practices such as when traders buy and sell stocks and bonds in

tight coupling with computers, software, colleagues, and mathematical formulae. And with these recommendations from Latour, I enter into the next part of this chapter to discuss some of the challenges that appear in studies of markets from an STS point of view.

1.4 Studying Markets

Having established a framework for understanding what markets are and how the different actors mutually configure instances of market activity, I now turn to take a look at how these markets are studied. The purpose is to illustrate that the diversity in approaches to markets also lead to very different results that relate to for instance an organizational, cultural or communicative framework. Also, this can not be regarded as an exhaustive list of approaches to studying markets. The strength in the approaches that this project is motivated and influenced by, lies in the ability to see markets as more than abstract market forces or mere economic laws. Following Latour's proposal noted above, there is a need for regarding markets as dynamic events, and to study the translations, enrollments, and mobilization of actors in these events (Latour, op.cit, 194-5). How, for instance, is it that Wall Street has become the ultimate symbol of fast capitalism? One possible answer would be that Wall Street has had the most skilled traders, the most successful banks, the most advanced markets, and the best support from governments and legal systems. But this answer conceals some of the other possible reasons: that Wall Street has not always been – and not always will be, presumably – the center of the world's financial markets (as also mentioned in the section about the performativity of markets earlier in this chapter). That the success of Wall Street is conditioned by how success is measured and agreed upon among specific actors who have been delegated the authority to announce these “facts” about the world market (Preda, 2006).¹⁶ In this sense, studying markets is studying the concrete actions that take place in a particular sociotechnical setting. This involves the act of examining a range of actors who are not *a priori* defined as market actors, but who are mobilized and enrolled in the ongoing action they engage in. A few examples in the following help to enforce this argument. The ethnographer Richard Harper has done an elaborate study of work in the International Monetary Fund (IMF) (Harper, 1998). Harper's investigation is concerned with the “careers of documents” that are being produced and circulated within IMF (ibid, 2). In this way, he tries to uncover the working constitution of a large, distributed organization. By studying the

¹⁶ On Latour's use of the notion of facts see “The Slight Surprise of Action”, ch. 9 in Latour (1999).

documents that are produced by the different divisions in the IMF, Harper attempts to go beyond studying the work of people in IMF. By studying the life and career of documents, it is possible to point out several important issues in relation to studying complex, knowledge-intensive organizations. Within the IMF, the same document serves different purposes; it “embodies different kinds of courses of social action” (ibid, 4). The people writing reports or evaluations are creating the first step in the document’s career, but along the way many translations cause changes in the expected career path. This is brought about by the way documents also incorporate large parts of the organization that create them, and do not exist independently from the work setting and other organizational circumstances. In the IMF, Harper observes rigorous rules for creating documents such as staff reports that refer to particular missions. Whenever a mission is undertaken, a wide range of documents are continually produced, both to ensure that everything is properly documented in relation to the funds that are being allocated to a mission, but also to share the knowledge of every single mission for the benefit of designing and executing future missions.¹⁷ Several other issues are also brought forward by the study of documents in the IMF, for instance that documents necessarily imply the existence of technologies (ibid, 5). This relates both to the technical ways of creating and sharing documents, but also to how documents travel through the organization, and with what implications. Harper shows that documents are both relatively simple technical objects, for instance word processor documents, and social technologies, that is, objects that support internal procedures of work and knowledge sharing by establishing standards.

His investigation of document careers in the IMF exemplifies the strength of studying mundane practices, such as documentation, in large organizations. It is a modest approach in the sense that he does not attempt to describe an organization or a culture by revealing strong, social ties and general structures that such a collective presumably rests upon. Mundane in the efforts to actively question such general accounts and instead turn towards studying the more mundane stuff that tie organizations or communities together in a very concrete sense.

Another striking example of this approach is presented by the two human geographers Andrew Leyshon and Nigel Thrift, who have studied the geographies of money and finance for over a decade (Leyshon & Thrift, 1997, 1999). One of the aims of these authors is to

¹⁷ For the structure of these missions, see in particular chapter 8: “A mission to Arcadia” and chapter 9: “The use of a staff report”.

contribute to the debates of ‘the local’ and ‘the global’ by investigating the financial activity in the UK in general and in London’s financial district, the City, in particular. How does the account of relations between the local and the global approximate to Harper’s ethnographic study of document trails and careers in the IMF? First of all, Leyshon and Thrift are equally interested in the transformation of knowledge practices throughout organizations related to finance and money. They also identify a particular object or technology that plays a constituent part in these transformative processes. In a historical overview of the development of retail finance in the UK from mid-1980’s and ten years onward, Leyshon and Thrift claim that retail banks have seen a quantitative revolution (Leyshon & Thrift, 1999). This revolution is a result of a demand for more and more information about clients, but also a need for more and more sophisticated methods for doing business with these clients, for instance by ranking them according to credit-scoring procedures: “In the new system, nearly all retail finance is, therefore, about the construction and speedy processing of lists, and the subsequent application of criteria which produce lists of those who are financially capable and those who are incapable” (ibid, 442). Leyshon and Thrift identify lists as one of the primary reasons for the appearance of the quantitative revolution, but not as a fully-fledged procedure or object, on the contrary. The production of lists has been achieved “only through a prolonged period of experimentation in which problems and solutions had to be co-constructed” (ibid, 442). Both Harper’s and Leyshon and Thrift’s studies lay out an approach to organizational transformations within financial institutions that are conditioned by close encounters with practice. Studying markets in this way brings forth relations between organization, subjects, and objects that result in the construction of both knowledge objects such as lists and documents, and of organizational procedures for applying these objects in practice.

Proto-Instruments

In the last sense this type of studies has other implications as well. The knowledge-generated objects that documents and lists represent, act as parts of mechanisms that formalize what was formerly confined to other less obtainable areas of society. In this way, they serve as proto-instruments, i.e. as rudimentary means of bringing together actors who did not previously relate in any way (Callon & Rabeharisoa, 2003). The notion of proto-instruments

is another way of describing how widely shared technical objects act as *immutable mobiles*.¹⁸ The documents in the IMF are all unique because they have been created in a particular chain of events; at the same time, they are standard word processing documents that share the same conventional characteristics, and which makes it possible for them to transfer electronically or in printed form between different people and different organizations. Likewise, lists generated in retail banking share more than one purpose: they are created in a specific situation, for instance in a counselling session between advisor and client, but they also serve as data that feeds into a larger collection of knowledge about the entire client base of a particular bank, or the whole financial industry. Leyshon and Thrift argue that this development places software and databases as central to the practices of an entire industry. Following this argument, clients and the proto-instruments that they operate, enter into cooperation with the professional practices of advisors or economists, and in this way new collaborations emerge. Callon and Rabeharisoa term this a ‘mutual enrichment’, emphasizing that the cooperation and experimentation between experts and laymen support the production of expertise and knowledge (op. cit., 196). Leyshon and Thrift report that the cooperation between consumers and professionals has its limits, exemplified by research that shows a growing loyalty towards financial software at the expense of financial advisors (1999, 460). The quantitative revolution thus seems to have other effects than downright improvements in the organizational working of retail banks. In attempts to improve on the relations between clients and advisors by offering sophisticated models of calculation, clients see opportunities to save even more money and time by doing business themselves instead. The software that their advisors have introduced appear to serve other purposes than the ones intended by the banks. Clients are able to manage their own finances without the involvement of a personal advisor due to the level of expertise present in financial technologies:

Banks will not become obsolete, but their current business definition will – especially, the concept that a bank is an integrated business where multiple products are originated, packaged, sold and cross-sold through proprietary distribution channels. (Leyshon & Thrift, 1999, 460)

What this vision of the future world of retail banking requires in order to succeed on a larger scale is the construction of either an appropriate amount of interest in finance and markets, or a certain level of expertise among consumers. The studies of markets, lists, documents, and

¹⁸ “They are always mobile, that is, they allow new translations and articulations while keeping some types of relations intact. Hence they are called “immutable mobiles”, a term that focuses on the movement of displacement and the contradictory requirements of the task” (Latour, 1999, 306-7).

other proto-instruments that have been presented here, do not regard this as a central point of interest. In this study, however, I want to investigate further the relation between retail banks, financial technologies, consumers/clients, advisors, and financial knowledge and expertise.

1.5 Conclusion: Approaching ValueBank as a Market

Above I have conducted a review of several approaches to markets that have shaped my work with this dissertation. I conclude with a summary of the chapter in order to give an outline of my own approach and, hopefully, to illustrate how the many analytical resources enable me to produce a range of arguments that are brought to light by my study in ValueBank.

First of all, markets are networks of action, comprised of the actors that constitute the networks at any time. Such an understanding assigns to markets dynamic and unstable characteristics, and leaves room for a re-conceptualizing as a result of the interaction between the actors in the network. Also, markets are performative and world-building, in the sense that concrete action that constitutes the activity in the market, has an influence on the way markets are understood on a general level. Secondly, market actors are both humans and nonhumans, in my case advisors, traders, and their instruments. But the instruments are not just tools in the hand of competent and skilled experts. In the case of ValueBank, the tools and the advisors mutually affect each other and in doing so constantly define and re-define markets and market action.

Thirdly, studying markets is an ambiguous practice whose characteristics are often masked behind claims of truth or disciplinary authority, for inquiring about the standards of pricing mechanisms or economic models (MacKenzie, 2006). However, in recent years, several studies of markets within sociology, anthropology and STS has turned the attention towards politically engaged or value-based arguments in studies of markets. By studying particular sites, it is possible to articulate specific circumstances of what goes on in order to frame and construct specific markets, including power relations between managers and employees, and the emphasis of the ‘calculative’ parts of work at the cost of the ‘social’ parts. In my case, studying ValueBank has turned my attention towards the utilization of financial technologies in the efforts to further develop the professional practice of investment counseling within the organization.

How are all of these insights from sociology and STS put into practice in the following study? First of all, I build upon an understanding of the important part that the notion of the market plays in the life of financial professionals. I have exemplified this approach with

observations gathered during field work, in order to relate a more general notion of markets to the local conditions observed in ValueBank. Furthermore, I have suggested ways of directing attention towards previously understudied aspects of markets. The primary argument for appealing to more studies is that the field of finance and economy today has great influence on both individuals and society. At the same time, technologies now seem to have an impact on markets in ways that have to be incorporated into the study of these. Knorr Cetina's notion of 'objects of sociality' and Callon's term 'proto-instruments' both help to avoid regarding technologies as an appendix to social practice, without giving authority to simple, technological fixes. I also use Harper's idea of 'document careers' as a way of paying attention to the life of technologies as dynamic and transformative instead of determinist and irreversible. Together, these accounts have helped me to grasp the complex interaction between advisors and financial technologies in ValueBank.

Chapter 2: Exploring Multi-Sited Ontologies

Introduction

In *Studying Those Who Study Us*, American anthropologist Diana Forsythe discusses the obstacles and prospects of studying expert cultures. Her study is an investigation into the distributed work of engineers in artificial intelligence laboratories in California (Forsythe, 2001). Forsythe's study is an anthropologist's account of the interaction with a culture reflecting a specific set of conventions and rules that appear to be different from the world of a social scientist. For the anthropologist, engineers' ways of reasoning seem radically different, and in many ways constrained in specific ways as a result of their professional training. Forsythe makes this argument after interviewing engineers and computer scientist as they work on developing medical informatics software based on artificial intelligence. The engineers discard aspects of their work themselves because they do not regard it as work: "Work is doing things, not talking about doing them; talking about things is not doing work" (ibid, 26). This 'deletion of the social' (Star, 1991), that is the act of ignoring the negotiations and communication between colleagues and the interaction with the subjects they study, is bracketed out to simplify the process of acquiring knowledge that the engineers need in their work. In this sense, the differences between engineers and social scientists lie in how to frame work as a sense-making activity. To the engineers, it is a matter of simplifying a complex world, whereas Forsythe is trying to maintain complexity by describing the intricacies of work.

Forsythe's claims are not intended to be normative in an effort to undermine the professionalism of the experts of artificial intelligence; rather she is trying to point to the fact that we are all entangled in different kinds of reasoning, different worlds (op.cit, 52). By reducing notions of both work practice and the ways of acquiring knowledge about the world to something that can be modelled by artificial intelligence, important elements are being excluded. These deletions include the preceding work of the engineers to reach an agreement as to how to model the world: what is to be included and what is to be discarded.

Forsythe's general argument here reaches beyond engineers and computer scientists in artificial intelligence laboratories. The processes that I have studied in ValueBank

bear similar stamps in its search for clearer distinctions in situations where these are not necessarily there. Ambitions to generate broadly applicable data from equivocal information seem central to the process of developing a new decision support system in ValueBank, despite the simultaneous recognition of the advisors as mediators and spokespersons for the heterogeneity of clients.

In this chapter, I present my methodological approach to the study of the introduction of a new decision support system in ValueBank. Also, I introduce the particular organizational setting that this expert decision support system, the *Investment Guide*, has entered into. The chapter is structured in the following way: first, I present a brief description of the Investment Guide to situate my empirical work. In the subsequent sections, I then introduce to the methodological approaches that have served as a starting point for this dissertation. Finally, I present a detailed description of my own fieldwork in ValueBank.

2.1 The Investment Guide

In January 2004, ValueBank initiated a project entitled the “Investment Value Chain”. The aim of the project was to systematically integrate all practices in ValueBank that involve investment activities across the organization. The initiative involves business divisions and subdivisions such as *Domestic*, *Asset Management*, *Private Banking*, and *Markets* (see Figure 2.1)

The area of investment has been identified by management as one of the most promising parts of ValueBank’s business activities. Investing clients’ financial resources is considered a relatively risk-free activity for ValueBank, since the assets are already in ValueBank’s keeping in the form of private savings and pension funds. ValueBank is also already involved in managing these resources, and it seemed as a natural step to promote investment solutions as a way of maximizing profits in the efforts to tune the organization to the needs of clients.

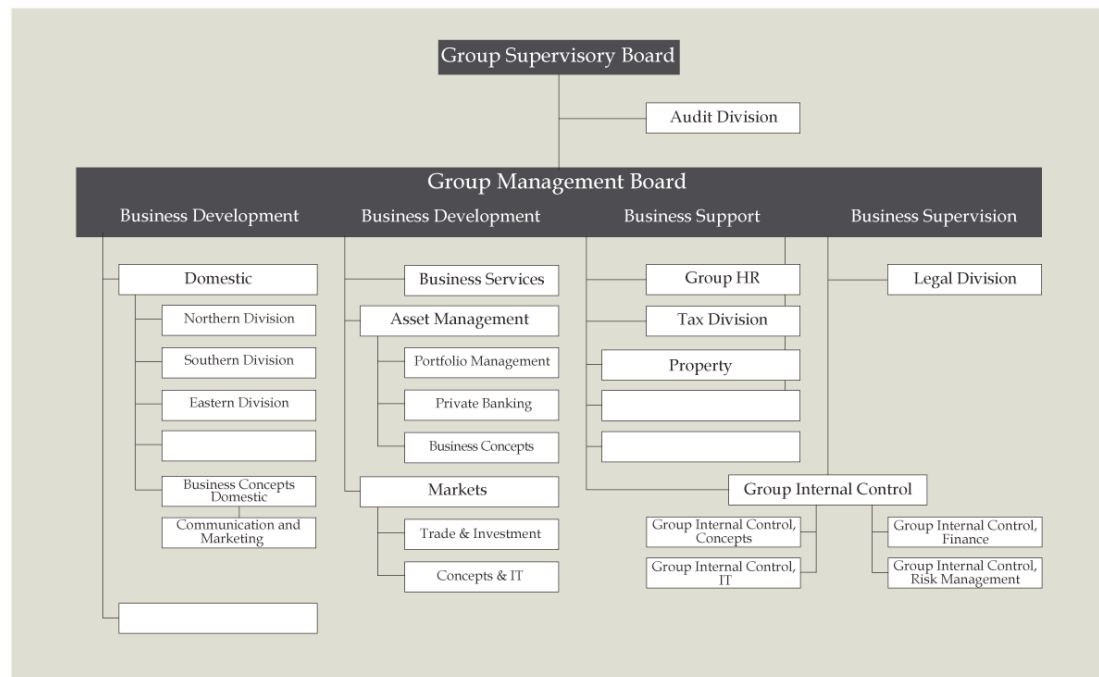


Figure 2.1 : the organization of ValueBank¹⁹

At the same time, investment expertise is present in ValueBank. At company headquarters, a large group of investment experts populate the “trading area” in company with an assemblage of advanced equipment such as computers, manuals, procedures and specialized software. In the Trading Area, this expert conglomerate manages ValueBank’s own reserves by speculating and investing in currencies, stocks, bonds, and other financial products. The activities and expertise are situated in the business divisions *Markets* and *Asset Management*.

However, a connection has been missing between the investment expertise that operate on company level in these different divisions, and the many private clients who are managed by advisors throughout the branch network (situated in the *Domestic* division). Early on, the advisors in the branches were identified as obligatory passage points (Latour, 1987) in the proliferation of the vision of the Investment Value Chain. The advisors are closely related to the many clients whose financial assets are the centre of attention in this business project. Many of the experienced advisors have spent years building trust between themselves and their

¹⁹ The blank boxes in the diagram indicate entities that are specific to ValueBank, but not important in the present case, for instance properties or associated companies that would reveal the identity of ValueBank. These have been removed to secure the anonymity of the organization.

clients, and now this trust is regarded as an organizational resource to be used in the promotion of the Investment Value Chain.

Prior to the ideas of the Investment Value Chain, a tool has been designed to accommodate to the specific interests of advisors and clients. This tool, the *Investment Guide*, is conceptualized as a means to enable the advisors to guide their clients, based on the expertise present in the Trading Area at headquarters. The Investment Guide is designed as a decision support system that incorporates data and information from sources across the organization. It thus joins the different forces distributed across ValueBank into a single information source and investment proposal provider for all advisors in ValueBank. In May 2002, advisors who manage client portfolios in ValueBank were encouraged to join a training seminar in the use of the Investment Guide for counselling. Information about this new initiative was phrased as a way of giving advisors “easy access to up-to-date information about how to produce financial proposals that are individually customized to meet the clients’ needs” (ValueBank intranet, accessed May 2nd 2002).²⁰

Prior to the introduction of the Investment Guide, client sessions were dominated by individually customized processes of investment counselling. The majority of employees in ValueBank are trained both externally and internally, and the internal training involves education on a trainee basis. This means that counseling practice in general is based on formal training from business schools and certified courses combined with imitating experienced advisors and role models on site. The internal reproduction of knowledge is considered valuable but sometimes insufficient to meet with increasing demands for certain kinds of expertise, for instance investment expertise. These general conditions are the main reason for developing the Investment Guide according to the project manager CG (personal conversation, December 5th, 2003).

In the following, I provide a description of the functionality of the Investment Guide, which will also provide the reader with a sense of the settings in which my empirical work has been carried out. The Investment Guide is an example of the pursuit of

²⁰ All interviews as well as written documents have been translated into English throughout this dissertation out of consistency.

standardization that lies implicit in the Investment Value Chain (Hughes et al. 2002, 249).

The Investment Plan

The Investment Guide is a computer-based guide designed to make known to the advisor the specific requirements of a client, the “client needs” (see Figure 2.2). By use of a model of consent between the client and the advisor, the advisor produces a *risk profile* on the basis of the clients’ financial situation. The model of consent derive from directing the client’s attention to the potential risks and benefits of an investment, thus producing a profile that fits into six different generic categories of investment risk: *Short-term*, *Income*, *Stable*, *Balanced*, *Dynamic*, *Growth*, and *Aggressive* (indicated by the six different pie charts in Figure 2.2 and the coloured dots in Figure 2.4).²¹ In the current example, the simulated client²² is placed within the profile *Income*, that is, an investor that wants a stable growth over a medium term (3-7 years) at the cost of higher but more risky return.

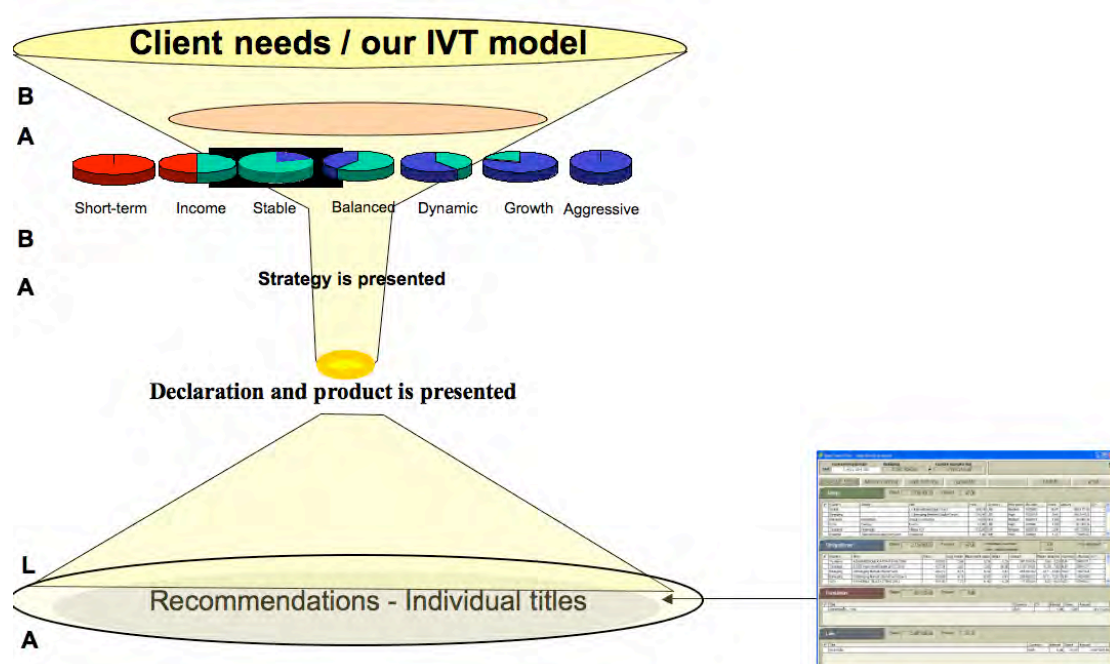


Figure 2.2: the model of consent and the six generic risk profiles

²¹ For ValueBank, the risk profiles also indicate how the client is graded in relation to the possible risks of lending money to them. See also Hughes, J. A. et al (2002, pp 257).

²² The present example draws on a presentation made by the Investment Guide project manager CG.

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In this context, risk is defined by four criteria (Figure 2.3): *basis of investment* (the amount of money and placement of the portfolio), *investment horizon* (duration of time of investment; here: medium term, 3-7 years), *attitude to risk* (for instance, is the client willing to accept fluctuations in prices during a period of time or is a steady growth more important than increased returns, or whether the investment is independent from the client's other assets in ValueBank; here: independent, moderate risk), and *strategy* (most often a matter of spreading out the risk between several assets in a portfolio, but more aggressive approaches such as *gearing*²³ are also possible in some cases; here: a portfolio strategy).

The screenshot shows a web interface titled "Create profile" for client 051268. It features a sidebar with a tree view of "Assets outside" including "Review requested", "Base currency", and various asset types like "Savings", "Stability", "Owner - occupied house", "Equity", "Investment property", "Equity", "Current investment", "Equity allocation", "Risk, equities", "Bond allocation", "Risk, bonds", and "Risk, currency". The main area contains a "Question" section with the text "Can I ask you a few questions on your personal finances?" and a "Reply" section with options "1. Yes" and "2. No". Below this is a "Description" section with the text "Move the cursor over the relevant subject." On the right, there are buttons for "Show profile overview", "Resume automatic process", and "More information" (which links to "Review assets held outside"). At the bottom, there are four dropdown menus for "Basis of investment", "Investment horizon" (set to "Medium term"), "Attitude to risk", and "Strategy".

Figure 2.3: The four criteria for generating the risk profile

These four risk criteria are being framed by a series of questions that enables the Investment Guide to present the advisor and the client with an *investment plan* (Figure 2.4). The questions are mostly standardized as they would appear in a questionnaire, but gradually, the questions are customized according to the six different profiles. Along with the questions, graphs and statistical data present the advisor and the client

²³ *Gearing* is the term for using borrowed investment capital (from the bank), expecting the profits to be higher than the interest paid on the loan. In this way, profit is made for both the investor and the bank.

Investment Machines

with information about the consequences and expectations of the current investment plan. The model investor here is told “Your level of risk is the lowest possible” and that the characteristics of the *Income* profile are a “very stable increase in growth” and a “high likelihood of a positive return”. The Investment Guide not only presents the client with a description of the financial consequences of this recommendation; the client is also assured that her choice reflects a certain attitude towards investment management – in this case that the client’s choice both reduces risk and secures a stable and most likely positive return at the same time.

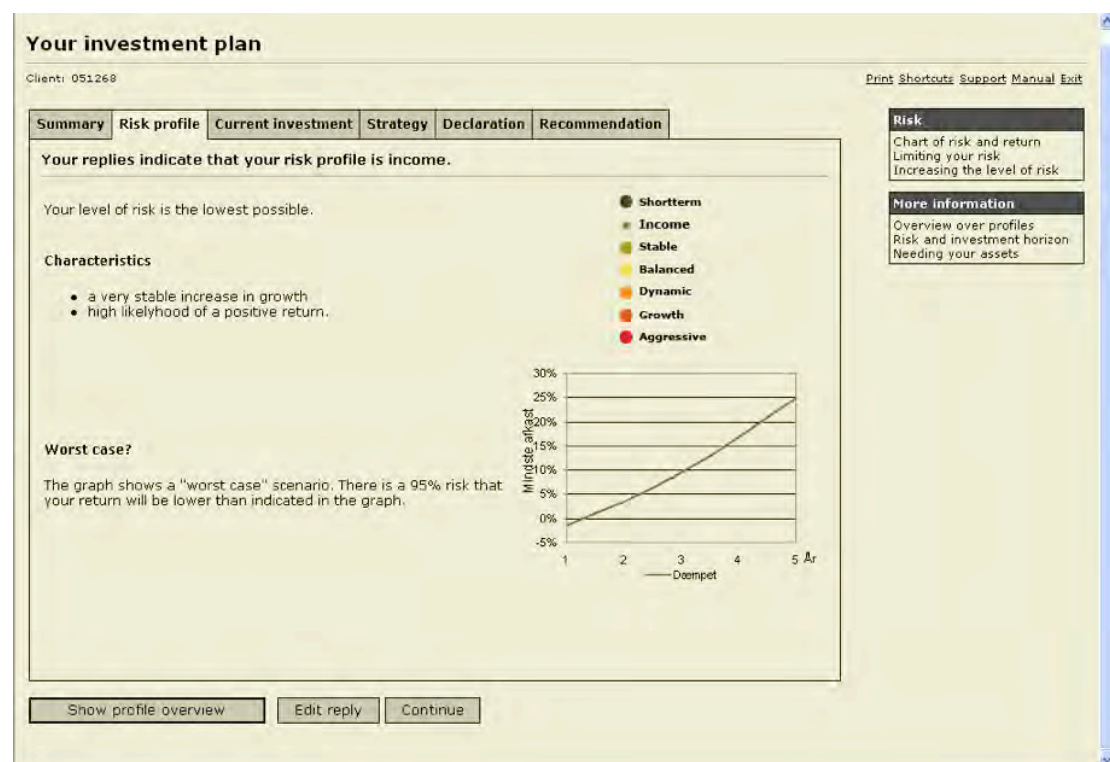


Figure 2.4: The Investment Plan

The investment plan covers the following topics, as also indicated by the tabs at the top of Figure 2.4: *Summary*, *Risk Profile*, *Current Investment*, *Strategy*, *Declaration*, and *Recommendation*. *Recommendation* is the final step of the proposal, which is produced by the advisor going through the questions in the Investment Guide with the client. These questions requires the client to consider the strategy of investment that she is going to follow, for example spreading the investment over several financial products (bonds, equities, securities, and cash) as well as across different markets (regions, countries, sectors, and currencies). The questions posed to clients are incorporated in a step-by-step guide that requires answers to all questions at one level

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(each tab is a level) before the advisor and the client are able to move on to the next; first, the risk profile is defined, after which this profile is used to narrow down the following questions in relation to the current investment. Then, the risk profile and information about the current investment are used to inquire about which investment strategy the client wants to pursue (Figure 2.5 and 2.6). This procedure is created to ensure that all information necessary for the generation of a recommendation has been provided for the Investment Guide.

The screenshot shows a web interface titled "Create profile". At the top left, it says "Client: 051268". At the top right, there are links: "Print", "Shortcuts", "Support", "Manual", and "Exit". Below the client ID, there are five dropdown menus: "Assets outside", "Basis of investment", "Investment horizon", "Attitude to risk", and "Strategy". The "Investment horizon" dropdown is currently open, showing options: "Horizon", "In 3-7 years", and "Medium term" (which is selected with a checkmark). To the right of these dropdowns are two buttons: "Show profile overview" and "Resume automatic process". Below these buttons, there is a "Question" section with the text "Your anticipated investment horizon?". Underneath the question is a "Reply" section with four numbered options: "1. I need my funds within the coming three years", "2. I need my funds within the next 3-7 years", "3. I need my funds within the next 7-10 years", and "4. I do not need my funds within the next 10 years". At the bottom of the form, there is a "Description" section with the text "Move the cursor over the relevant subject."

Figure 2.5: Question about attitude to risk

Subsequently, a declaration is produced, in which the client and the advisor confirm that the grounds for generating an investment proposal has been created in cooperation between the two parties. And, finally, recommendations for the actual composition of a client portfolio are presented to the advisor and the client by the Investment Guide for approval or revision (bottom right in Figure 2.2). The recommendation is typically a combination of stock, bonds and cash that reflects the scope and strategy of investment.

The questions that the Investment Guide instructs the advisor to present to the client are accompanied by answers as well – and in some cases even elaborate answers

(Figure 2.6). In this way, communication between the Investment Guide, the advisor and the client is easily adapted to a financial vocabulary and formalization afterwards. A session with a client is thus more a series of specific questions and answers than a regular everyday dialogue between an advisor and her client. The purpose of the sessions seems to be a matter of extracting the necessary information from the client, and subsequently to confirm that an agreement has been reached in relation to the investment plan that has been presented to the client on the basis of the answers.

The screenshot shows a web interface titled "Create profile" for a client with ID 051268. On the left, there are several dropdown menus: "Assets outside", "Basis of investment", "Investment horizon" (with "Medium term" selected), and "Attitude to risk". Below these is a "Strategy" section with a list: "Involvement", "Considerable involvement", "Requested strategy", "Portfolio strategy", "Risk preference", and "Equities". On the right, there are two buttons: "Show profile overview" and "Resume automatic process". The main content area displays a "Question" about the degree of involvement, followed by a "Reply" section with three numbered options. Below the reply is an "Elaborate on reply" section with a text input field and a list of bullet points describing the user's investment preferences.

Create profile
Client: 051268 [Print](#) [Shortcuts](#) [Support](#) [Manual](#) [Exit](#)

Assets outside

Basis of investment

Investment horizon
✓ Medium term

Attitude to risk

Strategy

Involvement
- Considerable involvement
- Requested strategy
- Portfolio strategy
- Risk preference
- Equities

Question
What degree of involvement do you want?

Reply
1. Considerable involvement
2. Moderate involvement
3. Only in the overall principles

Elaborate on reply
I want to be considerable involved in the investment decisions.

- I have a very firm attitude - to single equities and bonds, too.
- I would like to overweight/underweight certain countries, sectors or currencies.
- I would like to play an active part in monitoring/adjusting my portfolio based on my own ideas.

Figure 2.6: Question (and suggested answers) about investment strategy

2.2 Studying Objectual Practice

How is it possible to approach the investment advisors' work in ValueBank as it changes with the introduction of the Investment Guide, and at the same time avoid assigning too many transformative powers to the technological setup? The sociologist Karin Knorr Cetina refers to such research as the study of 'objectual practice' (Knorr Cetina, 2001). With a growth of information and a corresponding formalization of knowledge into material objects (computers, information systems, instruments, standards etc.), Knorr Cetina argues that relations between practice and the objects that support practice have become increasingly important to study and understand.

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The objects in knowledge work are “at the centre of a research process and in the process of being materially defined.” She continues:

Objects of knowledge are characteristically open, question-generating and complex. They are processes and projections rather than definitive things. Observation and inquiry reveals them by increasing rather than reducing their complexity. (ibid, 181)

The objects of study in my case are both material objects, in this instance the Investment Guide, and the knowledge processes and the assumptions about work that inform the materialization of these into practices commanded by a decision support system. Or in the words of the designers of the Investment Guide:

We wish to decode the patterns of action in the entire process of investment – a process where the Investment Guide is an essential component. (project recommendation abstract, internal report: 1)

Very often, studies of markets and economy take an interest in the materialization of financial expertise into complete objects, whether they are spreadsheets, formulas, or guidelines. But to Knorr Cetina, “the lack of completeness of being” is crucial, because it reveals the creative and constructive cooperation between experts and objects (op. cit., 182). And still, even complete objects are always either limited or incomplete in practice, and therefore similar to incomplete, imaginary, and partial objects. Stability and completeness, according to Knorr Cetina, are not the indicators of clear and finalized relations; they are articulating the work that goes into translating complexity into unambiguity.

In my study in ValueBank, this articulation from complexity and incompleteness to stable objects is often what takes place. A decision support system, the Investment Guide, is introduced to the advisors as a complete and material object but still, the advisors perform their work as if the Investment Guide had not been introduced. Rather, managers’ and developers’ attention shift from an interest in solving problems for the advisors in relation to their field of knowledge – investment counselling – to the problems that the Investment Guide as a supporting information system poses to the advisors’ practice. For the advisors these problems concern their assumptions about how the Investment Guide is able to help them in their practice. For the software developers and for management it is a question of how this new material object is able to assist the advisors in attaining the general level of knowledge and expertise that management expect from the advisors. To follow Knorr Cetina’s arguments, the Investment Guide does not necessarily represent advisors’

expectations; rather the expectations refer to an ideal or imagined object. The Investment Guide is thus the incomplete but material object that enters into relations with advisors, developers, customers, and management, and as such, the Investment Guide is gradually gaining its ‘completeness of being’ through practice. In relation to the transformations in work practice, the Investment Guide is compared to virtual, ideal knowledge objects designed on paper and in reports, but never materialized into a concrete object. Objectual practice is more than just a way of referring to how technology is an important part of practice; objectual practice is how objects are constitutive parts of practices, as incomplete and mouldable objects in relation to knowledge and knowledge work.²⁴

2.3 Ethnographic Objects

When does fieldwork begin, and when does it end? It has been difficult to determine in the present project, primarily because the investigations carried out have been very different in duration and scope. In a simple sense, the fieldwork for a dissertation like this never ends until the day the project is terminated, because many details and questions are sorted out in the last minute. But, pragmatically and in order to make a coherent account and present the findings, a certain moment in time indicates when investigating and questioning ends. In my case, this moment in time is easier to determine with hindsight than while the actions took place. In the present project, fieldwork has been a process of getting access to different parts of ValueBank’s organization, mostly one department in headquarters (called *Markets*) and a selected number of branches. In this way, it has been possible to follow the Investment Guide across the organization. The duration of my fieldwork has been determined by the actions that are involved with studying how the development, introduction, and use of the Investment Guide has transformed the work of advisors in ValueBank.

The above introductory question does not only reflect how this particular study is to be carried out methodologically. It also reflects an ambition to pay attention to the linkages between fieldwork and the objects of study, and how observations, interviews, and studies of documents and manuals have affected the design of my study. Bruno Latour writes:

²⁴ See also Latour, 1996 for a lesson in the study of material objects.

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Can we unravel the tortuous history of a state-of-the-art technology from beginning to end, as a lesson to the engineers, decision makers, and users whose daily lives, for better or for worse, depend on such technology? Can we make the human sciences capable of comprehending the machines they view as inhuman, and thus reconcile the educated public with bodies it deems foreign to the social realm? Finally, can we turn a technological object into the central character of a narrative, restoring to literature the vast territories it should never have given up – namely, science and technology? (Latour, 1996, vii)

My aim has been to unravel the history of a technical artefact in order to enrich the understanding of its impact among its creators and users. As with the study of *Aramis*, an automated train system that was never put into action, I too want to know if it is possible to turn a technical object into the main character of a narrative, in order to investigate relations between humans and technology, without assigning all initiative to neither humans nor technologies in advance. How is it possible to carry out investigations that do not overemphasize the actions of humans, since they are the ones you are able to speak to, when observations and other forms of studies fall short of the answers you are looking for? Latour provides us with a preliminary answer: “follow the actor” (Latour, 1987, 2005). By following the trail of actors, humans and nonhumans, you discover relations that are created, transformed, maintained, and broken down as actor-networks evolve. Within an actor-network approach, there is no division between humans and the technologies they interact with. Or, to be specific, the insights lie in identifying the actors and their associations in networks, not in defining the differences between them.

In the example of *Aramis*, the trail stretches across many different settings, and in many different forms, for instance test results, engineers, interviews, prototypes, posters, passengers, commission decisions, and press releases. The automated train system is part of a network that is also constituted by the engineers that have built the train, and by the potential passengers. The financial support, the legislative circumstances, and a city infrastructure that demands a new and improved transportation system; all these factors are part of the forging of *Aramis*:

The full difficulty of innovation becomes apparent when we recognize that it brings together, in one place, on a joint undertaking, a number of interested people, a good half of whom are prepared to jump ship, and an array of things, most of which are about to break down. These aren't two parallel series that could each be evaluated independently, but two mixed series [...] So if you don't want the transportation system to turn back into a beet field, you have to add to the task of interesting humans the task of interesting and attaching nonhumans. (Latour, 1996, 58)

But why such blending of categories? One could claim that it would be easier and more reasonable to clearly distinguish between humans and technology, and, at least, avoid mixing politics with the construction of technology. The purpose of developing a transportation system for Paris and its suburbs most likely seems like a question of mapping the technical requirements for such a system, and to accommodate to financial and juridical demands in the construction of the trains (Latour, op.cit, 49). In other words, the way to successfully building a transportation system such as *Aramis* is to regard it as any other large engineering project. Part of Latour's account is presented as these facts about the progress of the engineering project: is it possible to build a 'Personal Rapid Transit system' that operates by 'nonmaterial coupling' (ibid, 25)? These relatively simplified, but detailed accounts of technical specifications look very different when presented through the symmetrical lens of an actor-network approach, in which the human, the political, and the material requirements need to intermingle for the project to succeed. As such, the story of *Aramis* is a story about a technological vision, but at the same time it is an example of the benefits of not focusing exclusively on the technical aspects of development projects. And thus, we are brought back to the question of objectual practice and the formalization of knowledge into material objects such as the Investment Guide.

An Ethnographic Case

One thing that is easily adopted from the study of *Aramis* into investigating the design of other projects is the ambition to regard a development process as something else – and more – than a purely technical endeavour. Before presenting an account of my own fieldwork, I would like to elaborate on some of the arguments that have been put forward in the story of *Aramis*. The reason for describing the life of *Aramis* is that it presents an interesting *case*. Anthropologist Marilyn Strathern phrases it this way:

Ethnographic objects are phenomena made interesting, that is, rendered worthy of description (and I subsume analysis and theory under description). They have become that through being studied. (Strathern, 2005, 2)

Aramis is such an object of interest, and through description it is made interesting once again. This does not necessarily mean that it was not interesting prior to the descriptions; only that re-describing it has brought *Aramis* back to life, and once again has brought attention to the visions that precedes the disavowal of *Aramis*. The automated transportation system has been rendered worthy of study and

representation, and appears interesting in this sense. This is partly due to its qualities as a socio-technical project attracting investors and attention, and generating hopes for the future: a transportation system that would meet the requirements of individual travellers within a framework of public transportation. But equally so because *Aramis* appears in front of the investigator as an object of interest.²⁵ There is a reason for bringing the case of *Aramis* to a wider audience, which is also stated in the paragraph at the beginning of this section. *Aramis* is analyzed and described by a scientific account, that is by a meticulous investigation into different sources that all contribute to understanding how a now abandoned transportation system was envisaged, and how the vision of *Aramis* was continuously transformed by for instance engineers' plans, political visions, and material restraints. But the story of *Aramis* is also a narrative, a story made up from facts and made coherent by an author that has a specific interest in bringing forward his arguments.

This point is important in relation to the case study I am about to embark on. The status of the object of study in the case of ValueBank has proved to be difficult to predict beforehand because of an ambition to avoid reproducing already existing accounts. Strathern has the following reflection on such considerations in relation to her study of CGKP, a knowledge park in the UK:

Initially unclear as to what could be fashioned as an ethnographic object, I chose the route of indirection. I knew I did not want to approach the CGKP directly. That was partly because I did not want to reproduce the organisation of knowledge at the basis of its own sense of organisation. [...] I put it to myself that it was necessary to create a context – less than a context that would envelop or encompass the park, than a subject position from which to sally forth. (ibid, 85)

As a study of ethnographic objects, Strathern's study of CGKP resembles Latour's study of *Aramis*. Strathern lists a range of "tangible output" of the initiative, which includes reports, discussion papers, news item on the web, and press releases. But equally important is the organisation of the CGKP, framed by notions of knowledge and expertise:

You could never add up all the elements of the CKGP. Expertise is found lodged in bodies of diverse kinds [...] named variously as *faculties*, *departments*, *research centres*, *research groups*, *research programmes*, *units*, *institutes*, *schools*, *laboratories*, across some 17 *disciplines* and areas of *expertise*, including another university *campus*, while outreach to industry brings in other entities, such as *enterprise*, a regional *initiative*, and a transatlantic

²⁵ ““Interest” means simply what is placed “in between” some actor and its achievements. I do not suppose that interests are stable or that groups can be endowed with explicit goals.” (Latour, 1988)

company; there are in addition named *participants*, *partners* and *sponsors*, and more diffusely *consumers* and *the public*. ‘Organisation’ is itself represented in the core staff under a *director*, a *supervisory board* and an *executive board*. (ibid, 79, original emphasis)

This list of elements illustrates how a seemingly clearly defined object of study is distributed across both tangible objects such as reports and press releases, but also across university campuses, companies, and among consumers. And this list is one of the main reasons for Strathern’s considerations on how to approach her study of the CGKP. The ambition to study a particular object configuration is negotiated as the investigation advances, and the aim of the study may change due to this development. According to Strathern, this lies ingrained in the discipline of ethnography: “Ethnography depends on further specification of the context in which the description is generated” (ibid, 85).

Ethnographic investigations of the sociotechnical practices in ValueBank thus benefits from constructing a narrative that ultimately generates interest in pursuing the questions that have been generated by the investigation. The questions are generated on the basis of descriptions of the context of the practices, that is in involvement with the work of the actors present in ValueBank. Strathern’s reflections on a “route of indirection” recognizes how an ethnography of sociotechnical actor-networks is not easy work. But it also illustrates that interesting and insightful issues can be discovered by questioning established procedures, institutions and practices.

2.4 Field Work

The purpose of doing an ethnography of objects is thus to develop an understanding of the context in which the object under study plays a central part. At the same time, it is an exercise in applying scholarly training to a study of a field of expertise that may transform as you study it. In this study of advisors in ValueBank, it has been a challenge to keep these two objectives together within the framework of fieldwork. I have been impelled to get acquainted with the world of finance, which is not an easy task for someone trained in another discipline. This involved reading books and journals on finance, browsing through handbooks to become familiar with the retail banking lingo, and getting accustomed to the work of a retail bank advisor. I have had my methodology tested against the world of investment advisors, economists, customers, and all the nonhuman actors that I have engaged with during my

fieldwork. In one sense, these relations and entities have contributed to my work of trying to solve an organizational puzzle – and, not least, to chose among a list of possible puzzles to solve (Silverman, 2000). From the outset, my curiosity was awakened by an apparent paradox that I found in ValueBank: no matter whom I spoke to or where I looked, I was told that there were no major problems with the introduction of new technologies. When asked about the character of problems, the (very quick) answer was that the technologies were in need of minor adjustments, but nothing serious. I was convinced that there was something of interest, but I was not yet sure why and how this was to be investigated further. In other words, my research strategy was not entirely clear, even though I had defined a set of tools to use for the work to come. The question was how to follow up on the preliminary suspicion that had guided my questions so far.

Initially, I made an informal agreement with one of the division managers in ValueBank. The agreement was that I was allowed access to large parts of the organization in order to study the implementation of an information system in the investment division *Markets*.²⁶ At the time that the agreement was settled, it was still unclear whether a specific project would be the case for my study, but soon this “route of indirection” materialized into an investigation of the Investment Guide. This was both due to considerations of time and of the scope of the investigations I was allowed to perform. In retrospect, the Investment Guide turned out to be an ideal case for further study because it involved the investment division as well as all the branches of ValueBank, which corresponded well with the overall aim of my project proposal.

Empirical Data

I have carried out fieldwork in different settings at different stages of the project. First of all, I have spent a considerable amount of time during the four months from August to November 2003 at ValueBank’s headquarters studying the *development* of the Investment Guide. At headquarters, I have been granted access to staff meetings and

²⁶ My fieldwork is based on a formal, standardized agreement to ensure that confidential information is not passed on without the knowledge of ValueBank. In practice, I have not experienced any restrictions in relation to the publication of findings or methods of investigation.

more informal, day-to-day meetings among smaller or larger groups of employees, all related to the development and support of the Investment Guide. These meetings include software developers, project team managers, and support staff of different kinds. The work with the Investment Guide has been running concurrently with other projects, and the team members have not been assigned to the Investment Guide on a full time scale. This has made the study of the project difficult, as it was not always clear when the team was working with the Investment Guide, and when they were working on other projects. Still, at the time of my fieldwork, special attention was paid to the Investment Guide as this system was appointed to serve as a model for future initiatives for the investment division in relation to developing new decision support systems. As mentioned earlier, the Investment Guide was appointed to serve as a working model for the development and conceptualization of an *Investment Value Chain*. Also, the time spent at headquarters studying work in general added to my overall understanding of work in retail banking.

My studies in headquarters were mainly approximately 30 hours of participatory observations of work with the Investment Guide over the four months from August to November 2003, supported by 10 semi-structured interviews evenly spread out during the period. I have also relied on the knowledge of the organization and the people there that has gradually been built by the visits from August 2003 through to November 2005. At many times, informal chats on the telephone have provided me with insights that have clarified questions, just as lunch breaks and coffee breaks have uncovered some of the informal sides of ValueBank and has made my presence less alien to the employees in ValueBank.

Most important have been two project managers, of which one is the manager of the Investment Guide project. They have been my primary informants during the entire project and have served as my everyday contacts as well as helped me navigate through the organization. During the entire period from August 2003 to November 2005 I have ‘shadowed’ the two project managers (Hughes et al, 2002), observing and recording their everyday activities related to the work of the Investment Guide, for instance meetings, presentations to users and management, but also the communication by letters and e-mail to branch managers, investments advisors and the regional service centres that support the branches. I have also conducted interviews with them together and individually on several occasions during the duration of the fieldwork, both structured interviews according to interview guides

and more informally in conversation and by telephone and e-mail. Some of these interviews have been transcribed for further analysis, others have served as support for the overall development of my fieldwork.

Secondly, I have been engaged in a study of the *use* of the Investment Guide and other information systems in six different branches of ValueBank during a period of five weeks in November and December 2003. This study was presented to the branch managers and employees as workplace studies in the branches, an initiative that had not been carried out in ValueBank prior to our arrival.²⁷ The workplace studies in the branches consisted of observations of work at the employees' desks for sessions of 30 minutes up to two hours, followed by semi-structured interviews based on findings from the observations. This work amounts to approximately 100 hours of observations and 10 hours of interviews during the five weeks. Interviews were mostly semi-structured and informal conversations customized to fit into the present work schedules of the employees.

As a supplement to the observations and interviews, a set of cases was appointed to some of the employees in order to simulate interaction with clients. This was done in situations where no naturally occurring sessions with clients were scheduled at the time of our visit to the branches. The studies in the branches were carried out in cooperation with my primary informants, the two project managers mentioned above. They were appointed to the task by the head of the investment division *Markets* as part of the efforts to improve on existing software developing procedures by initiating the *Investment Value Chain* as mentioned above. This part of the fieldwork took place in different locations, and there was a lot of travel time. In trains and cars, I had the opportunity to question my two informants on both a professional and on a personal level about their attitudes towards the implementation process. This led to many answers that would have been difficult to obtain by interviewing advisors or software developers, even though my informants were of course biased by their positions as project managers in the organization. Nevertheless, they have provided me with valuable background information about the history and current situation of the whole

²⁷ On the extensive field of workplace studies, see Barley & Kunda, 2001; Forsythe, 2001; Harper, 1998; Hassard, 2000; Hasselström, 2003; Heath, Jirotko, Luff, & Hindmarsh, 1993; Heath, Knoblauch, & Luff, 2000; Legge, 1999; Leigh Star & Strauss, 1999; Orr, 1998; Suchman, 1995.

of ValueBank, which is useful when getting acquainted with employees I did not know beforehand.

Carrying out the investigation together with my informants served a twin purpose. They provided me with the authority of someone who had been appointed by headquarters to carry out a study of their workplace. I provided my informants with the necessary “scientifically informed” approach to introducing new procedures for developing information systems in ValueBank.²⁸

Thirdly, I have carried out other types of fieldwork that most often did not include the study of humans. Prior to my visits at headquarters and in the branches, I prepared by studying documents related to the development of the Investment Guide, for instance project proposals and evaluations. Accessing ValueBank’s intranet, their website, and looking through the many newsletters, investment recommendations, financial analyses, and prospectuses that make up the financial world of ValueBank’s advisors and their clients as well, also helped me in getting to know work in ValueBank. Newspaper sections on business, television news, and websites dedicated to private investors, fiction novels and motion pictures have also contributed to the building of knowledge in relation to investment and finance. Some of these sources are not directly related to my study, but have nevertheless contributed to the overall knowledge of the field of finance and markets, and in that way they have been an important part of my fieldwork.

Contextualizing Field Work

How are the investigations that I have carried out related to the general purpose of my project? From the outset, it was my ambition to study sociotechnical networks in relation to the interaction between investment advisors, financial technologies, and clients as compared to a similar study of the relations between advisors and management or between investment experts and software developers. This is a relevant distinction because there seems to be a different approach among the

²⁸ At arrival in every branch, we arranged a meeting for all employees and managers involved to introduce to the study we were about to carry out. I was often introduced as the “young scholar from the university, who was there to ensure that everything was done properly”. By way of these introductions, I was introduced as an outsider, whereby my two internal informants established themselves as familiar with the general reservation towards strangers among the employees.

employees to any interaction that involves customers. Today, retail banking is dominated by a marketing discourse that forces advisors to focus on the financial needs of customers to a much larger degree than before (Leyshon & Thrift, 1999). Because customers are seen as rational agents who express certain needs in relation to their financial situation (as expressed by ValueBank's ambitions to be 'compliant with the customers' needs'), retail banks are obliged to respect these needs, and to market an array of sophisticated products that are able to satisfy customers' needs, Leyshon and Thrift argue. The marketing discourse in retail banking has become an ordering concept, and thereby marketing and selling financial products have become the most important activity of advisors and other salespeople in the banks.²⁹ The term 'ordering concept' thus refers to the ways in which retail banking as an industry is gradually relying more and more on their abilities to attract new customers. In previous years, banking was a business characterized by a clear separation from other parts of business and industry – banks were banks and nothing more. Today, there is increasing competition from related areas of business, from for instance insurance companies, department stores, and grocery stores. These companies offer the same products as the banks do – such as credit accounts and credit cards – and at the same time these businesses benefit from being established as already familiar to potential customers. Grocery stores and department stores have been able to integrate financial services in their range of products without major problems, thus taking advantage of the existing cash flow in their business. Banks, on the contrary, have been forced to reorganize their business to be able to compete with the new agents in the market. They are forced to develop marketing strategies that present retail banking as something different from grocery stores, which has caused changes in business strategies, as argued above.

In this sense and from a consumer's point of view, retail banking is today closely integrated with all other kinds of consumption. Because choosing between a bank and a retail store as the manager of your accounts is now an option, banks have had to consider their role in the market for private finances. Developing a marketing strategy

²⁹ In addition to the advisors in the regular branches of ValueBank, there are two other types of salespersons: employees in the Private Banking division, and salespeople who work as consultants for a group of branches, defined by location. The latter group are experienced advisors or salesmen whose interests are getting hold of new customers, private and business, while Private Banking in part is like a regular branch, but is dealing with emigrants and wealthy people who have special needs, for instance.

for displaying your special competencies is one part of this reorganization, which seems to have been relatively successful.³⁰ But how are good financial results on a general, organizational level transferred to the particular client or business transaction? In other words, how are the business strategies of ValueBank *translated* (Latour, 1987) within the organization with the same success as they have been to the outside, that is, to potential clients and competitors? This question has played a pivotal role in my study of ValueBank, as has guided my fieldwork. It has led to the study of the Investment Guide, because this decision support system is being developed and promoted as a tool that provides the advisors with better knowledge about investment counselling, and serves as a communicative tool between advisors and clients at the same time. In terms of the ordering concept mentioned above, the Investment Guide holds the potential to enter the stage as a central actor in a new client-based order in ValueBank, which also explains the many interests expressed towards the development and introduction of the Investment Guide within ValueBank.

2.5 Entering the Field of Study

On more than one occasion, I have questioned my approach to the study of the Investment Guide. From the beginning, my ambition was to uncover certain circumstances in relation to a development and implementation process that I considered to have been ‘deleted’ (Star, 1991). I was looking to uncover secrets about the organizational coping with the Investment Guide. In this way, the Investment Guide is thus being promoted as an object of study, and, concurrently, ValueBank is being put forward as a venue of investigation for other scholars than economists and on topics other than economics. Within Science and Technology Studies (STS), traditional sites of investigation have been the laboratory or industries involving the use of advanced technologies (Bijker, Hughes, & Pinch, 1989; Edwards, 1996; Haraway, 1997; Latour, 1987; Pickering, 1992). The general ambition for these accounts has been to focus on “core issues and their controversies, and the instrumentation and interpretation or experiments” (Callon & Rabeharisoa, 2003,

³⁰ In the last ten years or so, ValueBank and its two main competing banks have presented superior accounts year after year, resulting in a growing number of employees and increased stock prices for the banks’ shares.

193). Such studies have been met with criticism based on the argument that studies of laboratories are predominantly internal to science, and therefore of no or little relevance for others than scientists and science studies scholars. However, in recent years the sites of study have expanded, including markets and the economy (Abolafia, 1998; Barry & Slater, 2002a; Callon, 1998b; Knorr Cetina & Preda, 2005; MacKenzie, 2003a, 2003b; Maurer, 1995). Even though the venue has changed, it is still the controversies, instrumentation, interpretation and experiments that are stimulating this expansion of research sites.

In particular the financial markets have attracted much interest and has proved to be an area with a range of core issues that have caught the attention of scholars who are deeply rooted in STS. Retail banking, on the other hand, still seems to be a rather uncharted territory within STS studies, even though many apparent similarities between finance and retail banking exist. Financial markets are often referred to as global or international, whereas retail banking most often is related to a specific country or region. The other major difference is that retail banking is directly related to individual customers, whereas the financial markets of currencies or stocks most often turn around large corporations or states and governments. Due to these circumstances, financial markets have come to represent notions of globalization and economies of scale, whereas retail banking is often related the opposite, that is, to local conditions such as specific legislative circumstances and consumer-related issues.³¹ However, such a distinction between retail banking and finance does not legitimize ethnographic studies of finance alone. Both retail markets and financial markets share common features which are close relations to products and services, and a mutual qualification together with clients, consumers or other partners (Callon & Rabeharisoa, 2003).

The term ‘qualification’ is central to this point because it indicates the paradoxical relation between products and services as both stable, static entities, and as processual and dynamic.³² Callon’s point is that products enter into a work of ‘qualification’ as the value of products is always measured by (at least) the buyer and the seller. He exemplifies this with the picture of a car:

³¹ See for instance Garsten & De Montoya, 2004; Holmes & Marcus, 2005; Knorr Cetina, 2005; MacKenzie, 2004a; Ong & Collier, 2005; Sassen, 2005.

³² For an elaboration of the notion of qualification, see Barry & Slater, 2002a, 2002b; Callon, 1998b; Callon, Méadel, & Rabeharisoa, 2002; Callon & Muniesa, 2002; Callon & Rabeharisoa, 2003; Fine, 2003; Miller, 2002.

As an economic good a car is an object, a thing with a well-defined shape, which is used to meet specific needs and which has an established value in a market context. But it is more than that. It is also an object that has a life, a career. Seen from the angle of its conception and then production, it starts off by existing in the form of a set of specifications, then a model, then a prototype, then a series of assembled elements and, finally, a car in a catalogue that is ordered from a dealer and has characteristics which can be described relatively objectively and with a certain degree of consensus. Once it is in the hands of its driver the car continues moving, not only on roads but also, later, for maintenance purposes to workshops, then to second-hand dealers. At times it becomes again an object on paper, which takes it place alongside other cars in the guide to second-hand car prices in specialized magazines. (ibid, 198)

Callon's thus demonstrates how a product such as a car is not always the same thing, but is rather defined by the current engagement with its surroundings. These networks (automobile designers, factories, car dealers, consumers) coordinate or qualify the characteristics of the car: with designers and producers it is qualified as a prototype or a model, with the car dealer as a sales object, and with consumers it may be qualified simply as a means of transportation. But at the same time, these states of qualification are never stable. When a car is sold back to used car dealers or returned for maintenance, it is again qualified (or re-qualified) as a result of entering new networks. Now, the producers and dealers are relating to a used car, as also the owner regards the car as something that may contain defects due to wear and tear. Once again, the actors involved have to reach an agreement on the character of the car. If the owner wants to sell his used car and buy a new one, he would be interested in getting the highest price obtainable, whereas the used car dealer would want to pay the minimum amount. The former would emphasize the benefits and advantages of the car, and the latter would focus on the disadvantages. In other words, they relate to the same product but to different objects because they are differently situated in networks of coordination:

That is why we prefer talking of qualities and of a (continuous) process of qualification-requalification, for they are simply two sides to the same coin. All quality is obtained at the end of a process of qualification, and all qualification aims to establish a constellation of characteristics, stabilized at least for a while, which are attached to the product and transform it temporarily into a tradable good in the market. (ibid, 199)

The need for stabilization is closely linked to the dynamics of economic markets in general, because it enables the comparability between (momentarily) stable products. The car is temporarily comparable with other cars that have entered the same networks of qualification. By characteristics such as age and mileage it is possible to compare cars, and thereby rate them against each other and against the general market

for cars. But as the cars are once again on the roads, their qualities have changed and they will have to be requalified in order to be comparable once again.

An ambition of the current study has been to actively include the field under study, including investment advisors and development team managers, for instance. This has been done to secure the positive – or at least constructive – participation of the people involved in my fieldwork. It would be impossible to engage in what I have done without the consent and cooperation from the employees and managers in ValueBank. First of all in relation to rights of access; retail banking is a private business with the benefits and disadvantages that follow. As mentioned earlier, I have had to sign an agreement of confidentiality that protects important information from being passed on to people outside ValueBank. This is first and foremost a formal, precautionary principle, which is placed on all outsiders before they enter into any kind of association with employees or the organization as a whole. At the same time such an agreement assigns primary authority to ValueBank at the expense of the investigator or visitor, in case of doubt. In this sense, the agreement of confidentiality defines and reproduces ValueBank in a certain way, an image that is stabilized by the consent from outside partners such as myself. It is hard to tell whether this has had an influence on the investigations that have been carried out, but I assume that limitations may have occurred in some sense or another.³³ By signing the agreement, I have accepted restrictions that may have been put on my work, but this does not necessarily devalue the outcome of the investigations. The agreement of confidentiality is part of the reality that is played out in ValueBank; a reality that changes and transforms under the influence of the parties involved. Instead of regarding studies of markets as a matter of representation (of truth or reality, for instance), it is a work of intervention (Callon & Rabeharisoa, 2003, 193). This ‘logic

³³ The only time I was confronted with prohibitions of any kind was at my first visit at company headquarters (see the excerpt in Chapter 1). I was about to take a series of snapshots with my camera to support my field notes. When I asked if I was allowed to take pictures of the trading room and its surroundings, there was a moment of confusion between my two informants. One of them then said that they would have to ask their company legal advisor and that it was better for me to wait. My informants were both looking around to see if anyone had noticed that I was standing there, ready with my camera in hand. I remember that at the time, I was confused about their sudden insecurity, but later on I was told that this was a matter that was not yet settled, as the buildings had recently been reorganized and refurbished.

of intervention' implies that all actors are offered the opportunity to participate in the way relations are defined, or qualified, to use the term from above, thus preventing a moral or political authority to represent all entities in one way according to their fixed principles of democracy or public participation. In the present case with ValueBank this is exemplified by the way my fieldwork changed due to practical circumstances. Initially, the purpose of studying the investment advisors was to uncover difficulties that they were facing in their daily practice in the branches. As such, the study was designed as observations of the interaction between advisors and clients. However, as the investigations progressed, it was obvious that the initial study was designed on assumptions about the work of advisors that did not correspond with practice. Instead, we engaged in participant observations and interviews that were related to the actual work of the advisors, regardless of whether they were working on investment cases or other related work. This stimulated conversations with the advisors on topics that were not necessarily directly related to investment and the Investment Guide, at least not in the eyes of the advisors. What was gained from this change in approach was that we managed to establish relations with several advisors built on trust instead of authority, that is, the advisors did not agree to participate because they were told to, but because they developed an interest in the possible outcome of our investigation. With the notion of qualification as framed by Callon, my fieldwork has been requalified by the interaction with the advisors in ValueBank. The different parties in my study have not had the same interest in the work of qualifying the Investment Guide as a stable object. The advisors seemed to express their concern as to where this new counselling procedure was taking them and their clients, whereas the project team managers were eager to black box the Investment Guide and characterize it as a stable part of work practice. For my own part, the many different approaches to the Investment Guide that I observed throughout ValueBank have supported my own understanding of the Investment Guide as a multiple socio-technical object.

2.6 Conclusion: Reflections

In this chapter, I have described the empirical settings for this project as well as the methodological resources for carrying out my studies. Choosing ValueBank as the locus of my investigations and ethnography and STS as my resources reflect a judgment of what types of studies would bring insights about financial practices and

technologies to the fore. In other words, this approach to contemporary financial practice attempts to highlight elements of society today that I have considered to be influential – not only within the financial world, but also in society in general. The financial world serves as an excellent model of the expert cultures and communities on which an increasing part of modern life relies. For that reason, developing methodological and conceptual resources for studying such cultures in detail has widespread benefits.

It is also evident that there have been challenges to this study as well. Getting access to ValueBank in the first place proved to be more than a formality, which I would claim to illustrate the heterogeneity of the organization. As I have indicated in my descriptions of establishing contact with my informants, being admitted access and being accepted are two different issues in ValueBank. I quickly and easily managed to become invisible at headquarters, whereas my presence in the branches was always followed by much interest and attention. However differing the employees in ValueBank's branches were, I was more so. The more complex the organization was, the easier it was to blend in and escape unnecessary attention. At headquarters, visitors were frequent and there was a heterogeneous composition of employees, whereas in most branches the organization was much more straightforward and transparent. The locations and methods of analysis chosen for this project are not absolute nor finite; instead they illustrate a point also worth mentioning: the dynamics and heterogeneity of such sociotechnical field of expertise involves many actors that work to constantly define and re-define the activities they are part of. This condition thus requires approaches that are able to reflect the changing circumstances that appear, as well as keeping reflexive distance to the objects of study for the purpose of generating new results and knowledge.

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Nothing comes without its worlds, so trying to know these worlds is crucial. (Haraway, 1997, 37)

Introduction

The ambition for the first part of this dissertation was to establish the theoretical and methodological basis for approaching financial markets in general and ValueBank in particular, within a Science and Technology Studies perspective. As the foundation for carrying out my study in ValueBank is now in place, I turn to the locus of my fieldwork, the investment division in ValueBank.

As this project has evolved, one theme has proved itself to be constantly relevant despite the changes that inevitably occur as my investigations have progressed: the notion of *calculation*. Calculation has been a central theme for social studies of markets in the last decade, not at least owing to the debates within sociology and STS that have followed Callon's account of calculation (Callon, 1998b; Knorr Cetina & Preda, 2005; MacKenzie, 2003a).³⁴ In the remaining chapters of this dissertation, calculation serves the role as both a tool of explanation and as a tool of experimentation for my account of ValueBank. A tool of explanation because calculation here serves as my way of joining a multiplicity of observations, readings, and conclusions in one flexible notion. At the same time, I recognize the experimental – and somewhat risky – character of bringing forth calculation as a way of aligning assumptions, conclusions, and facts in a single word. Here, this is not done to reduce the complexity of practice, but to strengthen a line of arguments.

This indicates the important point that calculation as it is applied here is not a ready-made notion that prescribes what to include in an account of market activity, and what to discard of. In relation to ValueBank, it would seem obvious to regard calculation as an integrated part of business and organizational culture, because the object of study

³⁴ The debate following Callon's work on calculation is still developing in several directions, see for instance Barry & Slater, 2002a, 2002b; Callon, 1992, 1999, 1998b; Callon, Méadel, & Rabeharisoa, 2002; Callon & Muniesa, 2002; Fine, 2003; Hasselström, 2003; Kalthoff, 2005; Knorr Cetina & Preda, 2005; MacKenzie, 2003a; MacKenzie & Millo, 2003; Miller, 2002; Preda, 2002a; Vollmer, 2003; Zaloom, 2003, 2005. Also, an issue of *Economy & Society* (31.2, 2002) has been devoted to the work of Callon.

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is a retail bank. And no doubt it is, but not in the sense of calculating profits or expenses that is generally associated with retail banking and financial services. Thus, calculation is not a name for an abstract practice of calculating numbers or other value separate from the social or technical context. Neither is the term referring to economy and markets alone. Calculation is a way of embracing the concrete actions that are carried out in any market-like setting. It includes all actors that are involved in this action, human and nonhuman (see also Chapter 2 for an account of Callon's use of the term). The actors involved are constituent parts of the practice of calculation. They are not simply subject to a concept that exists independently from the networks that incorporate it, nor do they take definite form prior to the appearance of networks of action. In other words, neither the notion of calculative actions nor the calculative agents prescribe the other in the networks that temporarily materialize (Callon, 1998b). Throughout the three following chapters, I present three different approaches to calculation that illustrate the plurality of this concept in relation to the Investment Guide in ValueBank: 1) the construction of calculative space, 2) the production of human calculators, and 3) the politics of calculative practices.

In chapter 3, I present the notion of 'calculative space' as a way of framing the ways in which investment advisors in ValueBank engage with the Investment Guide by way of calculation. The design of the branches in ValueBank has undergone a transformation, which has influenced the organization of work as well, from branch and workgroup level down to the individual employee. The transformations express management's efforts to exploring ways of improving their business. By redesigning workstations and facilitating cooperation across branches and divisions by the introduction of new information technologies, management tries to inscribe certain conceptions of work in their employees' workspace. The primary object of study, the Investment Guide, represents one such way of improving the conditions for the investment advisors, and the design of office space represents another. On the surface, both initiatives are instrumental and material, but as I will show they have social significance as well.

In chapter 4, I propose the term 'sociotechnical calculators' to label the transformative powers of introducing the Investment Guide for investment counselling in ValueBank. The transformation of work practice is being distributed among humans

and nonhumans in ways that challenge the existing organizational hierarchies and roles, and the borders between human action and machinic action are continually tested by the introduction of new financial technologies. These new technologies are growing more and more sophisticated because they incorporate information widely available in ValueBank and beyond, as well as they mimic or mirror expertise present among the experts of ValueBank. The terms ‘human calculators’ or ‘human computers’ indicates a revival of instrumentally governed action among workers that resembles that of assembly lines or mass production factories.³⁵ This image is contrasted with the possibilities for today’s knowledge workers who enjoy personally customized work in almost every sense, often enabled by ICTs.

In chapter 5, I discuss the implications of applying calculative practices on the organization of investment advisors, clients, and branches. I specifically direct my attention towards consequences of management’s intervention in the practices of advisors in the form of “objectifying resources” such as an Investment Guide (Haraway, 1997). I argue that management is promoting the Investment Guide as a way of securing politically motivated objectives for ValueBank in general, and for the investment division and its advisors in particular. These objectives are translated into calculative systems, and thereby put into practice as objective and loyal to the overall goals of ValueBank, as compared to the situated and contextual entanglements that advisors are exposed to. In this specific way, financial technologies and financial advisors are opposed to each other. Management reifies technology as objective and true to the overall business objectives, whereas the advisors are suspected of being caught up in local circumstances that obstruct their capacities to acts as otherwise loyal employees. This may seem as an extreme argument that only serves to polarize humans against technology. However, the Investment Guide has actually stimulated what was only tendentious before: that the investment advisors – and other employees as well – have experienced increased attention towards the ‘tools of the trade’ as compared to personal support and information directed at the individual employee. Hence, there is a growth in the objectifying resources as mentioned above, whereas the situated, contextual aspects of investment counselling have been downplayed. The

³⁵ For a discussion of the term ‘human computer’, see chapter 1 in Campbell-Kelly & Aspray, 1996.

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complexity and dissonance in the many accounts from my field work is gathered in the notion of an ‘investment machine’, which I will present in conclusion.

Chapter 3: The Socio-Technology of Calculative Space

Introduction

This chapter is the first in the empirical part of the dissertation. In this and in the following two chapters, I draw on fieldwork to investigate how major parts of the spatial and technological aspects of work practice for the investment advisors in ValueBank has been transformed. These transformations have been initiated as part of a larger, organization-wide project, in attempts to prepare the organization and its employees for future competitive challenges, as mentioned in Chapter 2. This chapter revolves around notions of office space and financial technologies as catalysts for developing standards of cooperation, coordination, and expertise in the investment division of ValueBank. Here, I present work in ValueBank as confined in different spaces that frame the activities of employees within a certain logic or reasoning.

3.1 The Clearinghouse

I set out with a historical example from Victorian Britain to illustrate how already established procedures of work are closely interwoven with ideals that are projected into future initiatives. A clearinghouse is a ‘centre of calculation’ (Latour, 1987, 232ff) that collects for instance money or information and redistributes it between the members of a particular establishment. During the 18th and 19th century, several clearinghouses were founded to support the coordination of a growing amount of transactions between economic actors that were divided by geography or time. The best examples of these business partnerships are railways and banks, mainly because these industries are historically characterized by an enormous increase in the amount of transactions needed for continued operation (Campbell-Kelly, 1994; Jevons, 1876; Millo, Muniesa, Panourgias, & Scott, 2005). The following quote illustrates the interplay between space and money in 1876:

Several important extensions of the clearing work have been made in the last twenty-five years. After the rise of the London Joint Stock Banks, subsequent to 1833, they were for a long time refused admittance to the Clearing House; but in June 1854, they were at last allowed to join the association. The Bank of England long remained entirely outside of the confederation, but more recently it has become a member, so far as regards the presentation of claims upon other banks. The West End banks of London are still beyond its sphere, partly, perhaps, because their distance stands in the way of the working of the

system. They are thus in the position of provincial banks, and can clear through city agents like provincial banks. (Jevons, 1876)

The passage demonstrates how notions of space – here instantiated by the location of certain banks relative to others – were essential for them to be included in one of the first distributed calculative practices in the financial industry in the UK, the clearinghouses. At that time, the measurable distance between banks and branches was crucial to the possibilities of joining the clearinghouses and thereby taking advantage of the establishment of a network structure, as the quote also makes clear: “their distance stands in the way of the working of the system”. Many of the written accounts about the workings of banks at the end of the 19th century revolve around the work of standardization and coordination of financial activities, for example between the city banks and the provincial banks.

The clearinghouses introduced the first steps towards standards of interaction between competing businesses that were geographically dispersed: if a customer enters a branch of the Bank of Liverpool, carrying a check issued by the Bank of Manchester, how is the transaction processed, so that the customer can receive his money? In the 19th century Britain, clearinghouses made possible for different competing organizations to enter into formal associations with each other in a way that secured the interchange of checks issued in any of the members’ banks, and thus customers could benefit from these institutionalized agreements. The clearing mechanism balanced unstable relations between independent banks, and consequently contributed greatly to the forming of financial exchange standards.

Today, we are almost certain to be able to cash a check in every bank around the world, regardless of the origin of the check, and as such, the clearing mechanism is still active and operational.³⁶ However, what remains of the Victorian clearinghouse today is only a mechanism of exchange and control. The clearinghouses of finance and railways were established as a solution to a lack of centralized control, as the amounts of information reached a level no single institution could manage on their own. As such, the clearing mechanism is a mechanism of recording transactions between market actors, and then subsequently calculating the financial positions between them, that is, settling the accounts between the actors. Clearing of accounts serves as a neutral settlement procedure, and general consent among the market

³⁶ For an elaborate example of a similarly working railway clearinghouse, see Campbell-Kelly, 1994.

participants confirms and validates the rules of clearing due to the authority that is ascribed to this mechanism. In order for clearing to succeed, there has to be an agreement to the validity of the procedures among the participants, and trust in the clearinghouse as an institution. As trust and validation has been established, the network of participant partners grows stronger by the numbers, and thus further strengthens its position: it becomes a centre of calculation.

3.2 Building Market Space

The reason for starting out with a historical example in this chapter is that tracing the mechanisms of clearinghouses helps to illustrate the conditions of banking prior to the introduction of technologies as we know them today, that is, the application of computers, online services, software, and many others for financial services. Today, banking does not seem to be able to survive without the existence of these advanced technologies as ‘mediating agents’ (Preda, 2006: 753). Still, there are aspects of banking that originate in a past where the existence of computers was actually met with suspicion and resistance. At the time of Victorian Britain, computers were seen as erroneous, time-consuming, and a bad investment for the company (Campbell-Kelly 1994). Instead, it made sense to expand the workforce to manage the growing amount of transactions – and thereby clearings – that many banks faced in the early 19th century. Reliability and efficiency were virtues ascribed to humans in opposition to the characteristics of machines (Campbell-Kelly, 1994). Today, the circumstances are almost the opposite: in order to stay in competition, staff is reduced by new technologically based solutions such as rationalizing tools for management or self-service banking options for clients. It is likely to assume that both the Victorian ideals for developing sociotechnical banking procedures as exemplified by the clearinghouse, and today’s modern financial management are examples of cost-cutting strategies that derive from certain, contingent understandings of the promises of financial technologies as opposed to the costs of maintaining and educating the workforce. As such, it makes sense to look into the past to understand the present. Yet, this argument is also based on an anachronistic idea of banking in the 19th century. As mentioned above, there was much resistance towards the introduction of computers and other rationalizing tools, simply because they were neither time-consuming nor rationalizing in the terms of that time. Instead, the employees

experienced tedious, labour-intensive processes of entering information and altering operative procedures into new form, which again required changes in their work practices that did not seem necessary (Millo, Muniesa, Panourgias, & Scott, 2005). Instead of a smooth, efficient calculating machine, financial technologies in Victorian Britain were amalgams of machinery from other areas of business, a skilled financial workforce, and entrepreneurs who hoped for further profits and new technologies. For the same reason, introducing computers into banking was neither done over night nor met with great enthusiasm. The changes reflected in the forming of clearinghouses illustrate that the sociotechnical configurations that took place had implications for all parts of business, and was more than just new tools and procedures for the workers and management. I will return to this issue under the heading of *investment machines* in Chapter 5.

As I will return to in relation to my own field work, it is still relevant today to look at the constantly changing configurations of actors that appear in the development of new financial technologies and work practices. In retrospect, the development in banking consists of an uneven list of changes brought about by any of the actors. By this I do not intend to present nor promote an evolutionary, chronological description of banking and finance. On the contrary, I wish to point to moments that have taken place at a certain time in history, to point to how technological and organizational progress is often reconstructed to fit a current picture of things, thus reducing concrete actions by any single actor to a general developmental trajectory.³⁷ The history of the clearinghouses could have been different, and the development from manual work to computerized work has not been natural or irreversible. Instead, it displays the political and organizational efforts that have been put into the realization of a vision of the future of banking.

The proximity of branches or entire banks is no longer an issue for modern, financial enterprises in the way it was in Victorian Britain. The advent and growth of

³⁷ As an example of such presumptuousness I quote the current, online dictionary Wikipedia on the subject 'clearing (finance)': "In banking and finance, clearing denotes all activities from the time a transaction is made until it is finally settled (see settlement). Some of the activities in clearing are reporting/monitoring, risk margining, netting of trades to single positions, tax handling, and failure handling. *Clearing only involves electronic transactions.*" <http://en.wikipedia.org>, accessed April 7th, 2006, my emphasis. It is obvious that the notion of clearing today differs from the practice of Victorian clearing.

technologies of coordination and communication help bridge the gaps that appear between distributed parts of an organization. In this sense the technologies play an important part in bringing organizations closer together, even though these may be spread across countries or continents. The world of finance is in this way characterized as a global market, in which products and information about these markets are globally available (Knorr Cetina, 2005; Knorr Cetina & Bruegger, 2002b). The activities in ValueBank illustrates that it is an organization related to markets that operate under such global conditions. Internally, changing conditions in banking has caused changes, most visibly in the redesign of branches and headquarters. Besides a range of domestic branches that constitute the major part of the organization, special branches have been established around the world to accommodate to an increasing demand for retail banks to enter the global financial markets as well (for instance in Gibraltar, Switzerland, France, and Poland). As mentioned in Chapter 2, ValueBank has initiated an *Investment Value Chain* that seeks to join together the expertise of investment activities across the entire organization. This initiative also reflects the ambition to expand the reach of ValueBank's services, and concurrently to align the activities of the domestic branches with the ones overseas.

Marketing Space

In ValueBank as in many other banks, the branches stand as vanguards for the entire organization, displaying an image of how business procedures ought to be carried out from the point of view of management. Modern banking is as much a marketing business as it is a financial business, which makes the attention to branch design easier to understand (Leyshon & Thrift, 1999). The branches are used as displays for potential and existing customers, and therefore the branches are designed to promote ValueBank and its products in specific ways. Additionally, efforts to promote financial products and services within a marketing context entail a certain amount of experimentation. The branches thus constitute an experimental, calculative space characterized by features that appear novel or even contrary to the traditional ways in which a retail bank is organized.

One of these untraditional features is the team table, to which I return in a moment. Others include new incentives established to attract existing or potential clients. In every branch of ValueBank, a small space equipped with a television set and some

toys has been assigned to children. In this way, families are regarded as more than just customers as they enter ValueBank. This is similar to other areas of retail business, for instance McDonald's restaurants or shopping malls. Another experimental feature is a space designed as a small café, with an automatic coffee maker and an assortment of brochures promoting ValueBank's products. The purpose of designing a family space and a café space in the branches is to enrol and mobilize actors (Latour, 1987, 1999) in the calculative space of ValueBank.³⁸ Managing personal finances in ValueBank is thus presented to customers as an activity that resembles other consumer related activities such as shopping. By incorporating marketing into the calculative space of ValueBank, both advisors and clients are transformed; in addition to their respective roles as financial expert and novice, advisors now take on the role of salesmen, whereas the clients take on the role of consumers. Financial counselling in a marketing discourse is changed into a matter of promoting and purchasing commercial products, and thus ValueBank's ambitions to offer serious counselling based on explicit financial expertise is confronted with the mechanisms of supply and demand that dominate other retail markets. In the following example, advisors expressed considerations as to whether they were financial advisors or salespersons. In other words, they are confused about being both in marketing and a financial space at the same time:

I was conducting interviews among the advisors in selected branches in ValueBank. The financial year was reaching an end, and the advisors had been encouraged by management to remember a deadline for placing clients' resources in pension funds (for tax purposes). The deadline intensified the activity of motivating clients to consider allocating additional resources to their pension funds, or to invest these assets themselves assisted by their financial advisor. Around the branches, I observed that many of the advisors almost simultaneously were performing the same tasks of contacting their clients and offering them advice on their pension funds. More than once, advisors told me that they were uncomfortable with the situation; they felt that they were 'pushing' products to their clients on a level that exceeded the usual

³⁸ Of course, there were unexpected downsides to the services that ValueBank provided for their clients. In one branch I visited, several of the employees described to me how they were sometimes overflowing with teenagers from a nearby school, who often passed through the branch, primarily due to the features of the coffee maker which was also capable of making hot chocolate.

common respect for privacy and independent counselling. “I feel that we’re being forced to sell these products as if it was a promotion campaign”, one interviewee phrased it. Another advisor said: “I’m afraid that this is going to damage the relationship with my clients. How can they trust me to be thinking in their best interest if all my colleagues are doing the exact same thing without knowing their specific financial needs?”

Both advisors in the above example express concern as to the motives for ‘pushing’ products to the clients. Because of the financial benefits for both ValueBank and the clients, there were good reasons for promoting the pension funds at the time: for the clients, there are tax benefits for this kind of product, and for ValueBank, business is generated and profits grow. Why the reservation among the advisors, then? First of all, they are confused about their role in this: are they merely selling products to clients, or are they giving them qualified expert advice? And the confusion grows deeper because in the past years, the advisors have been introduced to a set of values that almost dictates independent, individual counselling of each client as a way of positioning ValueBank as different to competitors. Why are they now encouraged to deviate from the course that has been laid out for them with so much effort?

Physical and Discursive Space

Management has aimed to build a market space that conveys certain values, which are agreed upon throughout the organization. The redesign of branches has been approached in accordance with a meticulous plan for every detail, which is reflected in the arrangement of workstations, lighting and in other parts of the branches. But how are the management strategies manifested in the branches? First of all, the existing seating arrangements for employees have been discarded of in favour of an entirely new organization of the workplace, an organization of which elements have been taken up by ValueBank’s competitors since then. Each advisor has been categorized according to his or her team relation, and placed together with colleagues who all serve business clients, or handle mortgage, pension, or investment tasks. As a result, the branches now consist of large, circular team tables populated with subgroups of up to eight advisors who are deliberately placed together as teams

instead of being assigned to their own private desks.³⁹ This is done to support the cooperation and communication among colleagues who are most likely to share the same kind of problems in their work.⁴⁰ As a supplement, each team table is decorated with coloured lamps suspended from the ceiling, each colour indicating the special competence of the team table: private clients by blue, green, or yellow lamps, business clients by purple or orange lamps, internal support by grey or red lamps, and investment by orange lamps (serving both private and business clients). The affiliation to subgroups is thereby explicated by several physical objects. The creation of team tables have turned out to both facilitate a levelling of authority and status internally in ValueBank, and to emphasize the difference between the tables. As the employees are now placed together in accordance with their special skills, attention is drawn towards a diversification of work. Employees are no longer just employees in ValueBank or in a specific branch; they are also employees with certain competencies and, consequently, a certain status relative to their colleagues. Another example based on observations of a supporter team's table illustrates this argument.⁴¹

The supporters in the Beta branch that I am studying have been appointed their own team table to help each other with the tasks at hand, and to learn from each other cooperatively. The supporters' table is placed at the back of the branch, whereas a table for the investment team is placed in the middle of the room, in close proximity to the manager and immediately visible for all employees in the branch. During my fieldwork there, I have learned that the investment team at O is particularly successful and is promoted as an example for many of the branches as well as for individual employees (interview with Beta branch manager KA). KA uses the

³⁹ Thrift refers to teamwork as a management technology and a way to bring bodies into organizational alignment. Furthermore, he argues that teamwork is often presented as the main way to produce creativity (2001, 420).

⁴⁰ Beunza & Stark report on similar efforts to promote the building of social space in addition to the financial space in *International Securities* (2004, 387). See also Bruegger, 2000 for a similar study of traders in a Zurich bank.

⁴¹ Supporters work as assistants to the other employees, i.e. advisors, managers and consultants. The supporters are often responsible for taking care of work that does not require any certified financial skills, for instance answering and redirecting telephone calls and writing letters, among many other 'invisible' work tasks. At first, there are no visible signs that could indicate differences in status among the employees, e.g. in the way they are dressed. The only clear indication of status is which table they are placed at.

investment team as an example of the success of the entire branch, which he further substantiates by explaining to me that the branch has produced outstanding sales figures relative to other branches. KA has specifically asked for a branch redesign that would promote his successful investment team, and thus the team is placed next to his office. Furthermore, he had later on ordered an additional redesign of his own office, because he did not want to be the only one in the branch situated in a closed office secluded from the open office space of his employees.⁴² Instead, his office is partially turned into a conference room where he meets with important clients, and with a firsthand look at the busy work of his successful investment team.⁴³

In terms of the notion of calculative space, my observations in the Beta branch point to two, interrelated issues of hierarchical structures and of ‘ideal advisors’.⁴⁴ The physical rearrangement of Beta branch indicates that importance is put on certain types of work in ValueBank at the cost of other types. Thus, the branches have been turned into *a calculative space that incorporates specific ideals of work*. The investment team in Beta branch is placed at the centre of the calculative space, assigning special importance and significance to the tasks performed by the team. The investment team has managed to meet the criteria of success in their function, and as a result they have been promoted to a prestigious location in the branch. They are now placed in a central position, close to the authority and power of the manager, and the team serves as perfect examples for everyone to follow.⁴⁵

The image of the ideal advisor is the other issue that I bring to light through the account of fieldwork. Through the design of a calculative space, the manager KA is able to communicate his expectations to employees in a nonverbal, yet very

⁴² The manager KA presented this as his contribution to encouraging a non-hierarchical organization of his branch. Still, he imposed another hierarchy on the branch by centering the success of the branch turnover on the performativity of the investment team, thus promoting a single group of employees over their supporters, for instance.

⁴³ This fieldwork was carried out during a three-days session in November 2003, which included participant observations and interviews with representatives from the investment and supporter teams, as well as with the branch manager. See also Chapter 2 for a description of the fieldwork.

⁴⁴ See also MacKenzie (2003) in relation to ‘ideal market’ conditions.

⁴⁵ In some sense, the importance of close proximity for the manager of branch O revives the argument brought forward in the quote in my account of the Victorian clearinghouse earlier in this chapter. The technologies of today may have outlasted the need for general closeness of people, but apparently not the need for social proximity to role models.

influential and comprehensible way. KA's image of the ideal employee is embodied in the members of his investment team, and this ideal is then reflected in the sociotechnical organization of the branch. Every employee thus has the opportunity to read the design of the branch as a signifier of a certain hierarchical arrangement. The closer the employees are to the manager, the more important they are in the efforts to succeed as a business. Just as the calculative space of the Beta branch is sociotechnical, it is also discursive and conditioned by certain shared conceptions and beliefs about what working in ValueBank implies. By referring to office space as discursive, I here reflect on the articulation work that goes into developing and sustaining economic practices in ValueBank among its employees and associates, as well as framing the actions and identities of the employees as (calculative) financial experts (Leigh Star & Strauss, 1999; Suchman, 1995).⁴⁶ Lucy Suchman, for example, claims that representing work in systems design often ends up producing stereotypical representations of practice suitable for rationalization and automation, even though the original objective may have been to depict heterogeneous processes of work (op. cit., 60). In the case of ValueBank, KA runs a risk of reducing the identities of his employees to what he has set as an ideal for the branch. The supporters find themselves in a situation conditioned by both a discursively and sociotechnically constructed ideal, based on how the advisors in the investment team work. It is an ideal that does not fit the description of the supporters' jobs at any time, regardless of their actual contribution to constructing and maintaining the calculative space of the Beta branch.

Centres of Calculation

In the process of redesigning the Beta branch, the supporters' work has been made invisible both in a spatial and discursive sense. The supporter team has been placed at

⁴⁶ In a study of e-mail archives, Brown et al. borrow from Heidegger in understanding how language and materiality are closely connected in networks of 'equipmental totality': "Language points out, it opens up a way of speaking about objects and equipment. But at the same time this act of pointing or calculating has material effects. When the price of gold shifts, for example, this has practical consequences for how gold is figured in the interrelated networks of finance and national banking." (Brown, Middleton, & Lightfoot, 2001). The authors want to avoid drawing a line between the discursive and the material; likewise, office space in branch O is both material and discursive. This is manifested in the way the 'equipmental totality' of the branch concurs with the discursive ideals of work, and vice versa.

the back of the branch opposite the entrance, out of sight of the manager and the investment team. This seemed reasonable to me at first, because I assumed that the work of the supporters required withdrawal from the constant buzz of the branch, and also because the supporters were the only employees who had no contact with clients who entered the branch. However, during the period of my fieldwork, I noticed that the supporters' table was often central to much of the work in the branch. Advisors from the other team tables in the branch frequently approached the supporters for assistance, for instance when a loan was approved of, and the final letter of recommendation had to be written. Consequently, the advisors walked from their seats through the branch and down to the back-end. The supporters and advisors also collaborated by e-mail or by telephone, but much work was carried out by personal encounters, thus settling the matter right away without delays. In line with the ambition of the Beta branch manager to promote the investment team as the centre of calculative space in both discursive and sociotechnical ways, the supporters' table showed itself as an alternative centre of the calculation when it came to the concrete, daily work tasks of finishing paperwork and building facts (Latour, 1987). The manager's ambitions to build a calculative space that reflected specific ideas of work is thus in many occasions confronted with the mundane, practical tasks that make up much of the work of advisors in ValueBank.⁴⁷ In the next section this argument is further substantiated with an example of the paperless office.

3.3 Expanding Space Towards the Screen

The traffic of advisors across the branch floors is of a more general character and is closely connected to notions of calculative space. The design of branches appear to be based on work ideals that do not necessarily resemble actual work, as the example with the supporters in Beta branch also illustrate. The new calculative space in ValueBank is defined by conceptions of cooperation and communication, as expressed in the ways technologies are provided for the advisors in their work. They work in accordance with concepts of a 'paperless office', that is a practice where all

⁴⁷ In relation to my discussion of the hierarchy of advisors as opposed to supporters, it was interesting to see that the advisors always approached the supporters, even though the opposite would seem more plausible. But due to the many forms, letters and other material parts of the supporters' work, advisors and supporters have agreed that the advisors take action because the supporters are more fixed in their places than the advisors.

tasks are principally supported by and contained within electronic or digital document standards.⁴⁸ Neither physical handling of documents nor face-to-face communication is part of such an ideal work practice. In principle, face-to-face communication and paper handling is relegated to informal, non-work related issues and to past practices. In the efforts to create and sustain a certain order, other (dis)orders have been eliminated, at least in theory. As an example, producing a client portfolio involves creating an electronic portfolio that combines information from other information sources such as an overall client database and a credit evaluation database in ValueBank. The advisor produces an investment plan that exists only electronically, and only when the client's signature is needed arises the need to produce paper documents.

In reality, the situation is almost the opposite. When matters are cleared in a hurry or when important issues are settled between employees, the advisors almost always deviate from the directions of a paperless regime. As an example, the advisors returned to printing out the electronic documents and handing over physical copies to their colleagues. This gave them the opportunity to write comments, additions or corrections on the forms in a joint written communication.⁴⁹ The reason for not carrying out these changes in the electronic versions was a pragmatic matter of saving time and speeding up the process, according to the advisors and supporters I talked to in Beta branch. With the advent of a master electronic version, the interaction between colleagues was obstructed because it was only possible to pass on the electronic document between the advisors in one copy. On paper, several copies were often distributed among the people involved simultaneously, after which the advisor in charge was responsible for assembling the different versions into one again. A majority of my interviewees expressed their concerns about the functionality of the electronic document handling. The advisors experienced a dilemma between

⁴⁸ On the paperless office, see Sellen & Harper, 2002: *The Myth of the Paperless Office*, The MIT Press, Cambridge, Mass.

⁴⁹ In quite another setting, Olesen & Markussen have studied such material-semiotic exchanges in medical practice (Olesen & Markussen, 2003). In their study of the introduction of a medicine prescription module, itself a part of the larger material-semiotic network of an electronic patient record (EPR), nurses diverged from the formalism of the EPR. This was done to ensure the right medication to the right patient in every single situation. The nurses found themselves trapped between following the rules of the formalism intrinsic to the EPR, and using their common sense and professional experience in situations where the EPR did not fully consider the problem at hand.

complying with procedures for the paperless office on the one hand, while struggling to keep up with the amount of work tasks, on the other. Dispensing with the electronic ‘document career’ gave the employees an opportunity to alter documents in a quick and versatile way, as described above (Harper, 1998; Suchman, Trigg, & Blomberg, 2002). I use Harper’s notion of a document career in this context to describe how the trajectory of an electronic document is often minutely prescribed in work procedures such as the ones the advisors in ValueBank are confronted with. The electronic document career is represented in a single, standardized way of filling out forms and passing them on to fellow workers, which conflicts with the situated practice of work that is not standardized and homogenous in the same way for each individual user.⁵⁰ Both Harper as well as Suchman et al. recognize that there is a tension between the smooth-running careers of electronic documents as they are provided for the users, and the unpredictable, heterogeneous practice of collaborative work. Their proposals for closing the gaps between design and use, however, are different. Harper argues that introducing changes from paper-based to electronic document handling is a political issue that it is up to the management to take care of. In other words, there seems to be no problems with transforming one practice into another by use of technologies such as electronic documents, except for the challenge of securing organization-wide consent. In the case of investment counselling in ValueBank, this would mean that individual, local judgment of which procedure is the most appropriate for a task at hand would come into conflict with a global power structure of command shared by all in ValueBank. At any time and at any cost, the advisors would have to consider whether or not to follow the procedures for producing an investment plan for their clients, which could take away the independent and situated expert knowledge that any advisor may possess. Singled out, this conflict may not be important, but it seems unfortunate to refrain from considering the special characteristics of ValueBank as an organization in the design of new work practices. Suchman et al. approach the tension between paper and electronic documents from a point of view of the users as opposed to Harper’s organizational approach. Thus, the tension turns to a discussion of whether design and use are two different realms. The gaps between the prescribed document career and actual work practice is an issue that

⁵⁰ Harper specifically studies the ethnography of documents in the International Monetary Fund (IMF). I apply his principles of a ‘document career’ more generally to every practice that involves electronic document handling, such as in ValueBank.

can never ultimately be solved. Instead, the use of new, collaborative technologies is always a work of appropriation and accommodation due to the complex sociotechnical circumstances that occur (op.cit, 167). Compared with the example of ValueBank, Suchman et al. express a view that would fit well with the dilemma for the investment advisors. At the same time, such an approach may not quite consider the ties to other parts of the organization.

In general, a range of tasks, of which I have only reported on a fraction, constitutes the work of the advisors. As my studies turn specifically towards the work of the investment advisors, I put emphasis on the tasks that are specifically related to this field of work, thus leaving the advisors' immediate collaboration with supporters, for instance. Nevertheless, much of an advisor's work is never similarly exclusive to work in investment counselling. The advisors combine ValueBank's areas of expertise by using their knowledge depending on the situations they engage in, for instance by approaching their clients' overall status as it is stored in a client database.⁵¹ In this way, advisors obtain a detailed profile of clients that enable them to promote products in more than one area at the time, specifically designed for the individual client's financial situation.⁵² Consequently, there are no clear boundaries between the different tasks that the advisors are performing in their daily work as I describe it here. However, these circumstances are mostly limited to the non-technical side of the advisors' work. When it comes to the technologically supported part of work, which means tasks that are closely incorporated with for instance information systems, the picture is quite different.

The work of the advisors includes interaction with a range of resources for information retrieval and storage, of which more and more take the form of

⁵¹ At present, much work in ValueBank goes into building a detailed and comprehensive account of all clients. So far, this has directed attention towards categorizing clients as 'profiles' defined by a set of measurable and comparable data that applies to all clients.

⁵² When entering a new branch during my fieldwork, I often introduced myself by saying that I was interested in the work of the investment advisors, and the work that they were engaged in as investment advisors. Very often, I was met with confusion as to why the investment advisors were interesting as a topic for research. Similarly, many of the advisors told me that they carried out many other tasks than plain investment counseling. Actually, it turned out that very few advisors in ValueBank's branches are full-time investment advisors; the team in branch O was a special constellation, organization-wide.

centralized information systems, databases, or web resources. The work of banking professionals in general involves intensive use of information management systems, for instance client and credit scoring databases. In itself, this is not new. Once again we return to the Victorian clearinghouse and its organization for comparison. The technologies of present time are individually customizable, compared to the sociotechnical institution of the clearinghouses in the 19th century (Millo et al, 2005). The multiple financial technologies of today are both individual and shared at the same time, whereas the clearinghouse was an integrated sociotechnical mechanism. In ValueBank, each advisor's calculative space expands beyond the physical space of the branch or the bank. The practice of counselling spreads from the physical space of the team table and the branch to the computer screen, to the company intranet, and to the Internet. This is a point that is also made by studies of international currency traders, as mentioned in Chapter 1.

Trading under Transformation

The work of currency trading is based on taking advantage of the profitability of trading different positions, for instance benefiting from discrepancies between the price of a US Dollars in New York and in Zurich simultaneously. In recent years, more and more of such trading activity have undergone transformations due to technological innovations and standardization. Ten years ago, international trading was dependent on a complex sociotechnical setup of people, prices and communication technologies that seem antiquated today. Often, the successful traders were the ones who managed to establish a social network of peers in the financial centres of the world. This enabled these traders to obtain prices faster than other traders who did not benefit from the same network of contacts. The speed of information is crucial to this exact kind of trading, which further emphasized the need for social networking.⁵³ Often, the social mechanisms that support the transactions and trades are regarded as external to trading itself, as pointed out by social studies of finance.⁵⁴ However, such work of purification (Latour, 1987) unjustifiably drains the practice of international trading of anything but numbers. In this process, prices

⁵³ Hasselström (2003) provides an interesting insight into the building of social relations among traders and brokers. On the specialized terminology among traders see Knorr Cetina & Bruegger, 2002a, pp 932-35.

⁵⁴ See for instance Knorr Cetina & Bruegger, 2002a, 2002b; MacKenzie, 2004a; Preda, 2002b, 2004.

become the only valid form of information that characterizes the market (Czarniawska, 2000). With the advent of the Internet and a long range of specialized electronic resources, the question of what constitutes finance has been reopened. If finance is nothing but numbers, then why does it matter if these numbers are represented and distributed in one form or the other? This question has become relevant to ask with the dawn of electronic trading systems. Major parts of trading is transferred to the realm of computers and the Internet, and attention is drawn to the ways in which technologies transform networks of social practice, both on a general societal level and in particular work situations such as for international currency traders (Knorr Cetina & Bruegger, 2002a).

A similar point about the transformation of sociotechnical practice among finance professionals is made by sociologist Fabian Muniesa, who describes the automation of the Paris Stock Exchange in the late 1980s (Muniesa, 2004). Prior to this process of automation, trading consisted of a detailed sociotechnical arrangement, of which some parts dated back to the birth of the *Bourse de Paris*:

In the early 1980s, trading activities at the Paris Bourse were controlled by the *Compagnie des Agents de Change*, the corporate body of the official stockbrokers, the *agents de change*, that were appointed as ministry officials and transmitted their business to their sons in a hereditary fashion. (Muniesa, 2004, 13)

All trading at the *Bourse* was carried out according to rules and regulations that were outdated by the general technical development in financial technologies, and the independence and survival of the Paris Stock Exchange was threatened.⁵⁵ Because of the hereditary social organization of the central trading mechanism, new trading technologies were met with resistance and obstruction, which again held back further developments (ibid, 14). As an organization, the people in charge of operations – the *agents de change* – were interested in *not* changing the organization and instead keeping it going in the most conservative fashion possible. However, international competition and demands for change from large clients initiated a modernization program, including detailed studies of work at the *Bourse*, and visits to other stock exchanges for inspiration. Muniesa's point with a narrative of the modernization of

⁵⁵ In the 1980s, independence for stock exchanges was still an ideal to strive for. Today, with the current standardizing of currencies and markets, several major stock exchanges have either merged or joined with other stock exchanges in formal business formations.

the Paris stock exchange is to illustrate how the sociotechnical assemblage of *Bourse de Paris* underwent more than just a technical or instrumental upgrade in the form of more computers and other financial technologies. There is no doubt that the technologies at use in Paris did impede the transformation of the *Bourse* into a modern, financial organization. Muniesa's argument is that this was not a technological issue, even though the technologies posed one of the most severe problems. Similarly, the organization of trading, until then incorporated in the body of the *Compagnie des Agents de Change*, was transformed by the modernization program. As part of the process, the *agents de change* were enrolled in the new technical processes to secure its success socially. Technological change included more actors at the *Bourse* than was initially identified, human as well as nonhuman. And, subsequently, the result of the transformation benefited from an ability to include many actors at any time in the process. Both technologies and *agents de change* were considered as important elements of the complex transformations process, and supporting the integration of both in a new sociotechnical assemblage resulted in a successful organizational change.

Muniesa's example resonates with recent changes in ValueBank, and especially in the investment division that serves as my field of study. In the following, I will present two examples of the efforts that have gone into modernizing and homogenizing work in ValueBank. The first example concerns the introduction of the Investment Guide that has been presented to the investment advisors, the other concerns an organization-wide intranet that equips all employees with their own customizable computer desktop. But first the Investment Guide. This system has been introduced as a support system to the practice of investment counselling (the working of the Investment Guide is further elaborated in Chapter 2). The functionality of the system is based on an ambition to provide the individual advisor with all the necessary information to recommend investment solutions that correspond with a set of general business objectives. In other words, the advisors are expected to consult the Investment Guide in order to secure that they comply with general expectations to investment advisors in ValueBank. As in Muniesa's account of the Paris stock exchange, the technology of the Investment Guide is a calculative technology that gathers together advisors, management, investment experts, clients, and information technologies in a sociotechnical mechanism. Equally, advisors have been reluctant to

take part in transforming the practice of investment counselling. This situation has been met with an increased focus on the workings of both investment advisors and financial technologies such as the Investment Guide.⁵⁶ Not only in relation to technological support to financial practices, but also related to the business potential of the entire field of investment.

The other aspect of the transformation of work in ValueBank's investment division that I want to illustrate here extends to the entire organization but amplifies what is observed in the Investment Guide above. Every employee in ValueBank is provided with a digital roaming profile that enables access to relevant information and data in whatever location in ValueBank. By logging in with a profile name and a password, the employee gets access to an individually customized virtual desktop referred to as the Webtop. The benefits of roaming profiles in general are multiple; but two points are worth mentioning. For the employee, all information is stored in a central data structure, thus preserving the information that has been entered into the system at any time. In this way, employees are able to access their work on any computer in ValueBank without having to transfer documents or settings between workstations. Such functionality also reflects the expected benefits of the paperless office as mentioned above.

The other point is related to business in general: roaming profiles and thus a central storage of documents and data in the entire organization homogenizes and standardizes the work of employees throughout the branch network. In the efforts to ease the integration of technologically supported work for the advisors, the Webtop has been developed. The purpose of an individually customized computer desktop is to give each employee an opportunity to create a personal workspace. The content of the Webtop is both related to business, for instance intranet news services or mailboxes, but informal discussion lists are also part of the content. The functionality of the Webtop has shown itself to be overwhelming or irrelevant to most employees. There is a default setup in the Webtop that includes e-mail and a few other features, and many of the advisors I spoke to had made only minor changes to this setup, despite the fact that they were aware of the many features of their Webtop. Instead,

⁵⁶ According to my informants and the employees I have talked to in headquarters and in branches, there have never been conducted studies of the actual work among the advisors in ValueBank prior to mine. Traditionally, user-centered studies in relation to systems development involve inviting a group of people to visit headquarters for design sessions in collaboration with software developers.

they stuck to other means of achieving the information that was available in the Webtop customization.

Both the Investment Guide and the Webtop express an ambition to concentrate a diversity of knowledge practices into one. The Investment Guide and Webtop could be seen as coordination devices that help the advisors align an array of different resources that in sum constitute their work. Star and Griesemer have termed such coordination devices ‘boundary objects’ (Star & Griesemer, 1989): objects capable of gathering people together without requiring them to dispense with the heterogeneity of their work practices. In Beta branch, a relatively large branch with 35 employees, the portfolio manager HH described how he managed the branch’s client portfolios in collaboration with his colleague PI. The following observation illustrates how they are jointly working with a spreadsheet document that resembles the functionality of the Investment Guide, but somehow appears to suit them better in their current situation.⁵⁷

HH shows me the tools he and PI use. The most important tool is a Microsoft Excel spreadsheet for calculating returns and profits. HH and PI have made the spreadsheet themselves and customized it to fit with the company layout for documents (colours). HH and PI update the spreadsheet every morning in the central ValueBank system and then copy the information to the spreadsheet. They have designed the spreadsheet to reflect the information that is available to the other advisors in their systems. The update is carried out manually, even though “technically, it is possible to automate this work via links,” HH says. HH and PI share the same spreadsheet workbook, and for every customer there is a separate sheet in the book. On this sheet, each investment in every client portfolio is recorded, and HH and PI then update the information to be able to recommend to their clients when to buy and sell. Additionally, the spreadsheet is used to offer advice on taxes. “The sheet is nice to have if a clients calls to consult them”, HH says

[..]

HH says that if he should be forced to use the system that the bank has provided for him, everything would be more confusing and would lack the information that is present in the spreadsheet. He shows me an example of a summary report prepared

⁵⁷ This observation set was carried out on November 25, 2003

for a client and says, “this layout and these graphics don’t sell.” In contrast, he claims that their model [the spreadsheet] does because it reflects reports that other banks offer, with the addition of ValueBank’s exclusive characteristics.

[..]

Besides the spreadsheet, which is primary to his and PI’s daily work, HH uses WebStation, a system that they are testing (according to him, it is difficult to get permission to test new programs and systems in general). In addition, he uses a free, publicly accessible web site (investor.stockpoint.com) and the internally available investment resources. Apart from that he uses ValueNet, Outlook Mail (primarily StockNews and FinanceNews), and chat. In the chat, HH most often chats privately with contacts in his address book, whom he then contacts when necessary. The public chat is mostly used for general information about stock markets, business reports etc, and HH thinks it is of no purpose to him. He illustrates how his private chat works by sending a message to one of his contacts and asking him to observe a certain company’s shares. Prior to sending the message, HH had discussed the shares with a colleague in Trading at headquarters. HH was preparing to decide what to suggest to one of his clients who was considering to sell his shares in the company.

HH and PI work in different ways, but manage to agree on the relevance of a shared spreadsheet for all their clients.⁵⁸ PI is a young, female investment advisor, who recently joined ValueBank from one of its competitors. She has still not entirely accustomed to her role as expert advisor in the branch, she told me, whereas HH is an experienced portfolio manager. At times, the relation between HH and PI appeared to be that of master and apprentice, for instance when they disagreed on the future performance of a company’s shares or the overall composition of a client’s portfolio. At other times, the roles were reversed and PI was providing HH with information and knowledge that he did not possess already, but was relevant to his clients or the management of their portfolios. The spreadsheet was the middle ground, in which PI and HH experienced the power of collaboration despite their indifferences. They frequently discussed clients with each other, and shared background information about them. Individually, they used the spreadsheet in different ways, but managed to agree on a set of conventions that enabled them to create a multifunctional, highly

⁵⁸ Further description of PI’s work is provided in Chapter 4.

flexible tool. Maintaining the spreadsheet and updating the information appeared to have been standardized, whereas the ways they used the information differed. PI called her clients by telephone or set up meetings to present recent developments in the client's shares, based on the information attained in the spreadsheet. HH would use the information as a summary of all the other kinds of information he used to guide his clients; a feature he does not think is available in the Investment Guide. On another level, but similarly emphasising the flexibility of the spreadsheet is the work that HH and PI put into making the spreadsheet look like official documents from ValueBank. They deliberately create a layout for their spreadsheet that resembles other documents issued from ValueBank by applying certain colours and a letterhead. In this way, the spreadsheet gains the authority of official documents that are verified as ValueBank's official recommendations. In addition to offering the required information to the client, HH claims that their recommendation report sells as compared to the standard recommendation reports that are automatically generated in the Investment Guide. In terms of boundary objects, HH and PI acknowledge that recommendation reports are "nice to have if a clients calls to consult them", but they lack some information in the standard model provided in the Investment Guide.

The use of boundary objects that support collaborative action such as in the case of HH and PI, directs my attention to the diversity of tools that populate the desks of the advisors, despite the presence of the Investment Guide. In the following section, I focus on the experimental character of the work of advisors in ValueBank.

3.4 Experimental Space: The Branch as a Laboratory

What does it mean to study ValueBank as an experimental laboratory? Two interrelated issues are worth focusing on here, and they both relate to a reconceptualization of calculative space. Firstly, I regard the branches as laboratories in a general sense. This means that they are places of experiments, where new practices of calculation are tested and evaluated. In line with arguments from STS, experiments and technologies are two sides of the same coin, which is also the case in the branches of ValueBank (Rheinberger, 1992; Strathern, 2005). Secondly, an assemblage of instrumentation, as illustrated in Figure 3.1 below, often constitutes experimental laboratories. I suggest here that the instruments in ValueBank are

introduced to enforce control and ensure a homogenization of services. However, if you think of the branches as laboratories, the space of control that is enforced by the technologies present is simultaneously met with another program of action, that is the space of experimentation represented by the same technologies.

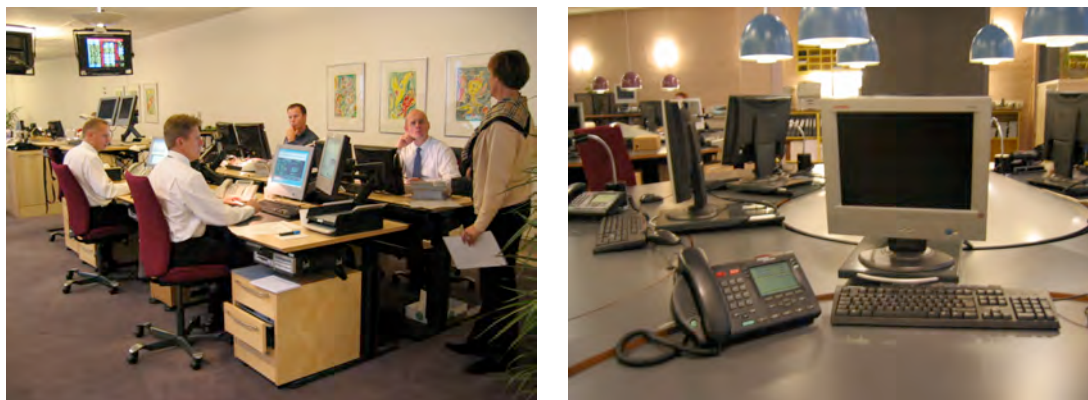


Figure 3.1: Workspace in Epsilon branch

Beunza and Stark argue that finance today is defined by extensive use of tools of the trade (Beunza & Stark, 2004). This characteristic applies to several financial areas, in which they designate arbitrage as indicative of a quantitative revolution in finance:⁵⁹

[If] we are to understand the organization of trading in the era of modern finance, we must examine all three pillars of the quantitative revolution: network connectivity, mathematical formulae and computing. (Beunza & Stark, 2004, 371)

In a ValueBank branch, similar pillars of financial organization are in place. Figure 3.2 depicts one such assemblage of instrumentation in ValueBank.⁶⁰ In the picture on the left, a male investment advisor is facing his two personal computer screens while talking to a client on the telephone, using a headset that enables him to work with both hands as he simultaneously talks on the telephone. The picture on the right illustrates the complex, laboratory-like setup of a branch. There are a number of instruments available to the advisors who are sitting along two lines of tables facing each other: personal computers in front of each advisor, screens showing updated stock quotes on the wall near the ceiling (visible from the advisors' seats), and a

⁵⁹ On the notion of quantitative finance, see Knorr Cetina & Preda, 2005; Leyshon & Thrift, 1999; MacKenzie & Millo, 2003. See also Chapter 1.

⁶⁰ This particular branch has specifically asked not to be reorganized according to the design guidelines that have been made for all the ValueBank branches. Therefore, there are no circular team tables, but instead, rows of tables for each team.

Bloomberg stock information machine placed at the wall in the middle of the two rows of tables. Also, the advisors are equipped with tools for communication and collaboration, both across the room and out of the branch. Additionally, there is a range of inscription devices present, for instance paper-based news sources piled up on the advisors' tables and behind them along the walls.



Figure 3.2: Experimental instrumentation of Epsilon branch

These pictures illustrate both the connectivity of advisors (and clients), the use of mathematical formulae in different form and, not least, the computing of recommendations and products that reflects changing market conditions. This complex array of instruments in an experimental setting contributes to the impression of complexity that struck me when I entered the branch for the first time. Apart from a few nods and stares from a few advisors, they all seemed occupied with their work as I walked around on the branch floor.⁶¹ There was no apparent sense of chaos, despite the many different instruments that were in place at the workplace. The advisors seemed to be content with the way their workstations were organized, and they frequently directed their attention away from their computer screens and in whatever direction necessary.

Through the lens of a laboratory setup, the advisors are carrying out financial experiments that require the use of technological tools to generate profit for their clients and for ValueBank. As Beunza & Stark also argue, the experiments that are

⁶¹ My overall impression very much resembles the account of the trading floor at International Securities (IS) quoted from Beunza & Stark in Chapter 1. They approached IS expecting to enter a roaring space of agitated traders, but found themselves in what looked like a luxury hotel.

carried out in the financial laboratory are social (op.cit, 10-11). The advisors seamlessly switch between individual and shared technologies, for instance by obtaining information from both their own computer screens and the Bloomberg screens on the wall for the same task, as well as from the ValueBank's intranet, telephone calls to colleagues, and from printed manuals and news services. They discuss their respective trades in the open, and in this way pave the way for sharing their knowledge and experiences with peers. Collaborative, experimental work is thus a matter of sharing both individual knowledge and expertise here, and using the instrumental setup in the branch/laboratory as a way to enhance the possibilities of information retrieval, cooperation and communication.

Experimental Space

So far, it may not seem clear why I characterize work in ValueBank as experimental, or why the location of a ValueBank branch acts as experimental space. The advisors base their counselling on standardized products that have been thoroughly tested before introduction, thus reducing the amount of unpredictability and experimentation in the proposals that they present to their clients. However, investment counselling always includes a certain amount of uncertainty and unpredictability, and thus take an experimental character. The calculability of investment proposals rests partly on mathematical formulae and decision support systems, while other parts reside in future expectations of the respective markets. How are the recommended investment products going to perform? Will they live up to the expectations of the advisor and the bank's experts? Are there external conditions that would change the market in unexpected ways? These questions have been central to the development of the Investment Guide as a manager and distributor of information and knowledge to advisors and clients.

As suggested in Chapter 2, the Investment Guide represents a formalized communication that involves advisors, clients and a decision support system in the work of uncovering clients' expectations and reactions to any development in the markets. This kind of communication is necessary for ValueBank in order to present clients with appropriate investment plans that reflect the ambitions inscribed in the different investment risk profiles that have been generated. But it is equally so in efforts to reduce the amount of unpredictability and uncertainty in the relations between ValueBank and its clients. Advice given by the advisors to clients is

followed by a disclaimer of responsibility in relation to non-calculable developments in the market. The disclaimer is an agreement between the advisor and his client that ensures that neither the advisor nor ValueBank can be held responsible for anything that has not been stated in the disclaimer as part of the bank's responsibility; for instance global politics that may affect the economy, or a sudden general change in investor attitude. The Investment Guide is constructed to black box the process of experimentation that the advisors are facing when they produce investment plans. Decoding the entire process of investment, which is stated as a primary aim of developing the Investment Guide, means studying and analyzing how and when cases of unpredictability and insecurity causes the advisors to change their behaviour and deviate from the course laid out in the system. CG, the project manager for the Investment Guide, phrases it this way:

We would like the advisors to go through the entire [*investment*] process and engage in a dialogue with their clients, but how do we make sure that this is what they do? Do we try to contain the process within the Investment Guide to make it hard for them not to go through the entire process there, or do we try to affect them in other ways, for instance organizationally by, erhm [hesitates], well, this isn't a good way to do it either, but in principle by measuring up the number of profiles they generate or, erhm, finish. There are other ways to make them do it the right way, or, how should I put it, make them try to go through the entire process, because you could say "okay, you've had ten client sessions, out of which you have cut off eight at this point. Maybe we should take a look at your argumentation in relation to why the solution [*the investment plan*] is presented by the system in the way it is. It seems as if you are having trouble complying with this.

In this way, the Investment Guide serves as a controlling device that makes it possible for advisors to imitate the work of others in order to comply with the standards of counseling. The experimental work space that incorporates the Investment Guide and the advisors is guided by the functionality of the Investment Guide, as expressed by CG above. The advisors are expected to comply with the way the system approaches the client-advisor relationship and not the other way around. "There are other ways to make them do it the right way", as CG says. If there is a discrepancy between the way the advisor and the Investment Guide interprets information from clients, the Investment Guide is always right in the eyes of the project manager. The task for the advisor is to understand how the Investment Guide generates the solutions it does, and then to adapt to these circumstances. In terms of a laboratory setup, the Investment Guide is an obligatory passage point (Latour, 1987) through which all activity is filtered into a purified practice of investment counseling. The advisors are equipped with an instrument that represents a standard operating procedure to follow. If the

advisors perform their work the “right way” by using the Investment Guide as intended, the results will be accountable to the standard defined within the confines of the Investment Guide. In this way, the work of advisors is likely to transform into a uniform practice susceptible to further homogenization.

Investment and investment counselling in ValueBank is an activity of experimentation, and the results are partially unpredictable despite the efforts to purify the work of the advisors by introducing the Investment Guide. The presence of a multitude of objects incorporated in the calculative practice of the advisors produces uncertainty and instability as much as it produces uniform and homogeneous work practices. The amount of instruments and the knowledge needed to operate the complexity of financial counseling increases complexity rather than reducing it. After studying work in several branches, the project manager CG concluded that the development of the Investment Guide had to be reversed if the system was to be accepted by the advisors. There is a diversity in knowledge and expertise among employees that contrasts the construction of one system suitable for all. In an evaluation report addressed to the *Markets* division management, CG writes:

Observation: users [*advisors*] request simpler and faster solutions – the presence of specialists often makes it difficult to break down complexity.

Reflection: systems development can be seen as a kind of change management intended to move our users mentally as well as attitudinal. We believe that it would be best to proceed by focusing on iterative development processes, in which we divide our deliverables into phases. The first part would have to be simple to ensure that all users are covered. We would then move on to developing a more advanced version 2. If we deliver a version 1 that is too complicated, we are never going to be able to include all users.” (internal evaluation report, 21)

From the quote above, it appears as if the process of developing systems such as the Investment Guide takes an experimental character. First, a simple system that covers the most necessary functions is built (a preliminary model). The simple model is developed in hopes of engaging all users in providing feedback for further development of a more specialized and complex system in the future. Users (the advisors) are included in an experimental development process referred to as “change management”. As in the case of the Paris *Bourse* described earlier in this chapter, it is necessary to enrol the advisors in the experimental development of complex systems, even though it is acknowledged that they do not want them. By engaging possible opponents in the future developments of the Investment Guide in advance, CG

reduces the potential unpredictability of the outcomes of developing even more complex models for investment counseling. At the same time, a testing ground for the future practice of investment counseling in ValueBank is established. The users are selective in their use of systems and other technologies, and they discard of any functionality that they find unnecessary, as expressed by CG. The procedures inscribed in the Investment Guide are being translated as they enter local practice in the branches with the individual advisor and clients. The Investment Guide, at first conceived of as a global, systematic, and efficient object of knowledge, transforms local, situated action in the branches into spaces of negotiation and experimentation.

3.5 Conclusion: Calculative Space

To recapitulate this chapter, I summarize the most important points that I have brought forward in my investigation of ValueBank as a calculative space. The notions of calculation and space have added the first layer to my analytical approach to markets in general, and have set the scene for approaching ValueBank and banking in particular. The different instances of space that I apply here, all relate to the calculative space that the advisors in ValueBank are working in. The advisors are situated in branches that are simultaneously financial markets, marketing displays, discursive identity machines, and experimental laboratories. By way of the term calculative space, the first ambition of this dissertation has been achieved; ValueBank and its branches is now no longer only a regular retail bank that can only be studied as a financial institution, it has also become a venue for grasping how markets and technologies are mutually constitutive. In addition, the co-development of markets and market actors thus deconstructs ValueBank as a financial institution and reconstructs in its place a calculative machine that generates different sorts of output. The question that follows is how the notion of calculative space is further substantiated to account for the heterogeneous practice of banking professionals. Or rather, how a calculative space influences the people and technologies that are part of a calculative space. This will be the topic of the next chapter, where I enter specifically into the work of investment advisors to illustrate how they are simultaneously subject to and protagonists of changes in the organization of work in ValueBank.

Chapter 4: Constructing Sociotechnical Calculators

Introduction

In a study of traders in the foreign exchange market, sociologist Urs Bruegger reflects on the possible benefits of performing ethnographic work in financial markets (Bruegger, 2000). He lists some of the reasons for a renewed interest in markets among social scientists as a result of the search for “an efficient market” within economics. This perpetual search for market conceptualizations is an indication of an interest among sociologists and ethnographers in the ‘real’ actors and ‘real’ actions that reside in markets and organizations, Bruegger claims. Studying these actors add substantially to the current framings of markets in for instance economic sociology or the anthropology of markets.⁶² The motivation for returning to study economy and markets is found in an ambition to open the black boxes of financial markets and organizations (ibid, 230; MacKenzie, 2005b).⁶³ In Bruegger’s view, ethnographic work provides the most appropriate ways to delve into new aspects of financial markets. Aspects whose significance may be unknown in advance to sociologists and ethnographers as well as to economists, but may turn out to help redefine the economy as a practice and thus lead to new insights.

Studying markets ethnographically opens up the possibility of gaining knowledge about local and situated practices that may be overlooked or dismissed in a neoclassical economic tradition, exemplified here by the notion of an ‘efficient market paradigm’:

Since the 1970s, when the efficient market paradigm was at its peak, much empirical research has been carried out in which the models have been tested with empirical data. In the process, many cases were discovered in which the data did not fit the models or vice versa. Economists called these cases “anomalies” and gave them names such as “mental accounting”, “calendar effects”, “herding behaviour” or “overreactions.” (ibid, 230).

⁶² Bruegger defines a market as ‘a market in which prices always fully reflect available information’ (op. cit., 230). See also Millo, Muniesa, Panourgias, & Scott (2005) on the relations between efficiency in clearinghouses and markets, Preda (2004) on the science of financial investments and efficient markets, and Maurer (2002) on mathematical formulas related to the notion of efficient markets.

⁶³ A social study of economy is not at all a new discipline. Weber and Simmel both wrote extensively on topics such as the psychology of money and commodities (Simmel, 1997) or the positive and negative effects of speculation for the economy (Lestition, 2000; Swedberg, 2000).

This chapter is concerned with presenting the outcome of a study of ‘real’ market actors that has led to a redefinition of relations between the actors involved. I claim here that by introducing the Investment Guide, transformations take place on several levels in the organization and work practices are rearranged, thus turning the investment advisors into *sociotechnical calculators*. In line with Bruegger’s general ambitions mentioned above, I look into the practices of the advisors in ValueBank to investigate further the ‘anomalies’ in their practice from a sociotechnical point of view.⁶⁴ I wish to use these so called anomalous occurrences as a way of expanding the understanding of how and why the practices of investment advisors change. By including the part of the work of advisors that is often dismissed as insignificant and different from the expected, I bring these anomalies back in to understand the work that goes into distinguishing between what is normal and what is not (Barley & Kunda, 2001; Leigh Star & Strauss, 1999).

4.1 Approaching Speculating

I now follow the trails of ethnographic approaches to financial markets (Abolafia, 1998; Hasselström, 2003). That is, I wish to contribute to spreading the knowledge about approaches that seriously takes into account ‘real actors’ and ‘real actions’ in markets.⁶⁵ By ‘serious’ I mean to develop an approach that does not discard of observations and occurrences as ‘anomalous’ or ‘overreactions’ in the way noted by Bruegger. Instead, I see these events as entryways into deconstructing a formally established world of banking consisting of a foreground and a background (Goffman, 1959). The foreground of ValueBank is constituted by the descriptions that are provided in the way the bank presents itself as well as by the interviews with employees that I have performed. The foreground resembles what is often termed ‘the official story’, that is an idealized image of the organization characterized by for

⁶⁴ See Chapter 2 for an account of the sociotechnical ethnography that I engage in throughout this dissertation.

⁶⁵ I realize here that by referring to ‘real’ actors and actions my account may be subject to scrutiny. I do not wish to state that there exist ‘real’ and ‘unreal’ actors and actions in financial markets. Instead, I recognize the argument by Bruegger that studying markets can be done in several ways, and that students from a neoclassical economics point of view have excelled in “developing models based on the assumption of a psychology of rational action” (op. cit., 230). Thereby, neoclassical economics has removed itself from the empirical data, that is, concrete market action, and thus ‘real’ action.

instance clearly established, efficient, and rational procedures and activities. An image of efficiency, unity, and success is also produced to persuade customers and shareholders to take a particular interest in ValueBank, and thus to reaffirm the image of ValueBank as a successful business. The foregrounding of particular features of ValueBank is not false or untrue, but this depiction excludes other important factors of organizational action.

The background materializes when this foreground is compared with my observations of local practice in branches and in headquarters. In the case of ValueBank and the Investment Guide, advisors' work is described in a general sense by for instance project managers or advisors themselves, thus emphasizing how certain generalizable circumstances produce one description while silencing or ignoring other, supplementary descriptions. In the following section I provide an example of how the work of investment advisors is framed by such a general approach that disregards the local, situated circumstances of that work. In this sense, the background is produced by the discrepancies between the ideals described in the foreground and what takes place in local practice around ValueBank.

How is it that economics has become the primary account of the activity in markets? Why are models of 'efficient markets' – or even *perfect markets* (MacKenzie & Millo, 2003) – an appropriate way to describe the action of people and organizations within a market setting? Or in the words of the economist Thaler: "Why has economics largely ignored the people in preference to the prices?" Thaler provides the answer himself: "There are better data on prices than on people" (quoted in Bruegger (2000). The reason for discarding 'real' actors and actions in the study of markets seems to be found in a lack of information about what people are actually doing in markets, according to this argument. Descriptions and understandings of the role of the work of banking professional are lacking, for instance how financial technologies influence the social relations between investment advisors and clients (Zaloom, 2003). Also, Thaler's statement seems to express a need for better tools in a search for more explicit information about market actors and action, which would justify an ethnographic approach. To elaborate from Thaler's arguments from within STS, ethnographies of markets are excluded by economic accounts because social and human action is often regarded as irrelevant to economic action. Historical studies of experimental science as well as ethnographies of contemporary experimental

laboratories have provided arguments that indicate a similar deletion of concrete social and human action (Haraway, 1997; Shapin & Schafer, 1985).

The separation of prices and people seems to be rooted in conventions that reflect methodological and analytical restraints in how to grasp the impact of the people that take part in economic action. In a concluding remark, Bruegger reflects on his own ethnography of speculators carried out in an global investment bank:

In performing an ethnography of a speculator one is observing a professional observer of the future. It is not the means and ends of his work that are interesting to study. A speculator's end is to make a profit and his means are buying and selling. [...] More revealing is the study of the process of knowledge production and transformation as well as the cultural tools that are used in this process" (op. cit, 251).

In my understanding of this, Bruegger claims that it is possible to separate the market activity of speculators (that is, trading) from the knowledge production that informs the traders' choices. For an outsider trying to get in (for instance an ethnographer such as Bruegger), it is possible to obtain large amount of data on the trades that have been executed, as well as information about the decisions that set trading in motion.

Transcripts of trades are easy to come by, for instance, and they provide very precise accounts of the time of trades as well as the amounts of each financial product that has been traded.⁶⁶ This is the part of trading activity – the prices – that Bruegger regards as uninteresting, because they only represent the means and ends to make a profit in the market. I will return to distinctions between different types of work in the following in relation to my own fieldwork.

The other, closely related part of the activity in markets is the knowledge work, that is, the activities that go before the actual trading. This knowledge work manifests itself in multiple ways, and incorporates a range of different practices, of which most hinge on the use of technologies such as computers, telephones, financial information sources, and much more. Once again, an approach that embraces the practice of work in financial markets from a sociotechnical point of view is likely to be able to analyze the changes that take place by the introduction of new technologies in a productive way. In the current case of ValueBank, this claim is shared with the developers of the Investment Guide. The project managers AM and CG thus express how

⁶⁶ For an example of how trading transcripts are used for conversation analysis, see Knorr Cetina & Bruegger (2002a, 933ff).

ethnographically inspired observations and interviews give valuable information about work practices in ValueBank:

We have chosen this [*ethnographic*] approach because we expect our investigation to provide us with valuable information about the following issues: 1) a better understanding of the processes that relate to investment counselling on branch level, 2) to be able to trace patterns of cooperation among advisors on all levels of the organization, 3) provide us with better ways of approaching future detailed analyses in relation to further development of systems and products, and 4) to decode existing connections between systems related to the patterns of use that the advisors are displaying in their work in investment counselling. (internal evaluation report, 8)

In their report addressed to the division manager, CG and AM argue for investigations into local practice in the efforts to understand the process of investment counselling better. They assert that obtaining knowledge of the advisors' actions is not immediately accessible through the usual means, for instance from databases or monitoring systems. The arguments from their report indicate that knowledge of investment counselling is also a resource that is transferable to other areas of expertise in ValueBank, thus leading to "better ways of approaching future detailed analyses in relation to further development of systems and products". How this is done is the theme for the preceeding section.

4.2 Knowledge Work

I now wish to trace the activities of investment advisors in ValueBank in order to substantiate the arguments above with reference to the results of my own fieldwork. The advisors in ValueBank are building their knowledge of markets from a range of dispersed resources when they produce investment proposals for their clients (Hasselström, 2004). The knowledge on which they base their decisions, is compiled from experience, formal education, as well as from the constant flow of information from news services, mailing lists, or the Internet (Knorr Cetina, 2003). In general, the practice of providing counselling to clients about investment opportunities is an interactive process between advisor and client, in which two assets are generated: 1) an investment profile for the client, and 2) an investment proposal.⁶⁷ The manager CG, who leads the team that develops and maintains the Investment Guide describes

⁶⁷ The generation of client profiles is used in several areas of ValueBank's different divisions. As such, an investment profile adds to an overall profile of the client, which may be of benefit in other situations. In other words, the investment profile is specifically generated relative to investment, but some data may be used in other situations. See also Chapter 5.

the following procedure in an interview. The interview was carried out while he demonstrated the functionality of the Investment Guide to me in one of the branches in ValueBank.

First, we try to place the client in a category based on information about his financial status: income, savings, debt, real property and so on. This is supplied with information about marital status and employment, for instance. [...] From the information that the clients provide for the advisor, an 'investment profile' is generated. [...] This profile serves as the basis for the next step, which is proceeding with concrete investment proposals.

[...]

Secondly, the advisor produces an investment proposal that reflects the proposals that the computer has generated for this type of profile with the requirements of this particular client. [...] The advisor then processes the proposal by questioning the potential investor about the amount of investment capital involved, the time span of the investment, and the willingness to take risks, for instance. In the end, a concrete proposal is presented to the client on the computer screen on one page with colours and pie charts, and the client has the opportunity to review the choices that he's made. [...] If the client has no objections, the advisor prints the proposal and hands it over to the client for a signature. [...] The rest is processed automatically in the system: a duplicate letter is printed and the advisor hands it over, or it is sent by mail to the client, and the advisor also processes any investment action that has been agreed on subsequently.

The practice of generating an investment proposal is thus presented here by the project manager as a rational, almost algorithmic procedure that requires a list of quantitative data, but little else apart from that. The prices come before the people, keeping the above quote by Thaler in mind. It is also important to notice how the procedure is described as both a sequential and all-inclusive knowledge practice. The work of the advisors is described as completing a list of formalized tasks that are needed to be able to present an investment proposal to the client. While this foregrounds certain requirements, it leaves out other aspects of work at the same time, a point to which I will return later. To illustrate my point about the formalization of

work implied in the construction of the Investment Guide, compare the passage above with the notes below from my observations of an advisor in ValueBank:

I was placed in a chair next to PI, a young female investment advisor. It was 8.30. in the morning, and she had recently started working. I asked her what she was doing, and she answered that she was preparing for today's trading. I watched her while she obtained information from the Internet and from the ValueBank intranet. She was working with a spreadsheet, featuring a list of clients' accounts. She explained to me that she was comparing her previous recommendations to clients with the present rates on the stock markets. She did this from day to day, updating her clients' portfolios manually.

[..]

Every account entry in the spreadsheet was thoroughly compared to the list of stocks that was visible to her on the screen in front of us. More than once she sounded irritated and punched her keyboard with a little more force than seemed necessary. She explained to me that she was updating her clients' portfolios in order to keep up with the market. Some of them were more important than others, she said, because she knew that as soon as the stock market opened and her clients checked their portfolios in their online bank, they would call her and expect her to be prepared to guide them to what they should do now.

[..]

Her colleague HH, a man around forty, was joking about her way of preparing for the day. He was sitting opposite us at the team desk, and seemed confident and relaxed, whereas PI seemed irritated and a bit nervous. HH said that if PI had trouble with managing all her accounts, he would be happy to take over some of them. They both explained to me that they had a couple of big clients that were trading very often, and they expected them to be well prepared every day.

PI continued with her work, and said that as soon as her spreadsheet was ready, she would pick up her phone and start calling her VIP clients. She would then have prepared a couple of recommendations for her most important clients, and for the rest she would be able to explain how the market would evolve during the day.

A few points are to be made when comparing the two transcripts that describe the work of PI and HH. First of all, the setting of PI is very different from the one

described by CG. Investment counselling is only part of the average daily activities for an advisor, and several other tasks are included in their work within a joint practice of the branch.⁶⁸ The description by the project manager CG expresses his attention as a project manager to the functionality of the specific financial technology that features as his perception of the work. In his account, the advisor is presented as an operator that interacts with a system in order to obtain and store certain types of information. The scene of the investment advisor also seems to be emptied for content that reveals anything specific about the advisor or his setting. Where does this take place? Who is this advisor? Is it a man or a woman? Is she confident with her clients? In the description taken from my observations, the situation is different. Not only in terms of the amount of details provided about the advisor, but also relative to the work setting. For CG, the task of the advisor is to stick to a program of action as it is defined by a formalized work procedure: first, define an investment profile, second, feed the information into the decision support system and process an investment proposal for acceptance or revision.⁶⁹ In the context of a branch on a specific morning as in my description, the practice of the investment advisor differs from the description by CG. As an example, PI's decisions are questioned by another advisor, a circumstance that is not incorporated in CG's description but, nevertheless, seems to be of great importance to her work in a fundamental way.

It does not seem surprising that there are differences in the way the work of an advisor is described by a project manager and by me. However, the implications are important to consider, especially in light of the transformations that the advisors have experienced recently with the advent of the Investment Guide. This argument also relates to the point made in the previous chapter about representing work.

Representations of work are subjective and significant beyond the level of documentation.⁷⁰ The effort of CG to describe the work of advisors in general terms

⁶⁸ My description of PI's work does not quite resemble the work of average advisors. PI is a member of a specific team that mostly works with investment, whereas most of the advisors are working with investment on a level with general account management, pension, mortgage, and the like.

⁶⁹ The issue of agreement between advisor and client is important for ValueBank, which is referred to as 'compliance', also emphasizes the fact that counseling in banks is as much sales and service as it is counseling.

⁷⁰ Some of these issues have been discussed in the social studies of financial markets. For instance, gender (Hasselström, 2003; Levin, 2001), trust (Mennicken, 2000), or discipline (Zaloom, 2003, 2005).

generates an image of advisors' work, from which system requirements are being made. When these requirements turn out not to meet the expectations of the advisors, attention is directed towards the activity of the advisors and not towards the description of them:

There are other ways of guiding them [*the advisors*] to do it the right way, or, how should I put it, to try to make them go through the whole [*investment*] process. You could say to them, "okay, you have had ten counselling sessions, out of which you have left eight at this or that point, and have switched to another profile. Maybe we should look at your arguments for this as compared to why the proposal looks the way it does in the system. You seem to have trouble following the guidelines..."

[...]

It's like we, we're making it more difficult for them in order to force them through some kind of workflow...that does not support an alternative way, or, at least, anything that is not the primary model of work. (interview with project manager CG)

CG expresses an understanding of advisors' work based on how the counselling process is described and formalized in the Investment Guide. If an advisor abandons a session with a client or modifies the results that the Investment Guide has produced by default, these actions are recorded and stored in each advisor's performance profile. This enables CG to investigate in detail how the advisors are interacting with the Investment Guide.

Leigh Star and Strauss claim that there lies a tension between 'formal task descriptions' and 'overt work' that is observable in context (Leigh Star & Strauss, 1999). They offer the following example of an ecologist studying elephant migration trying to explain to an African tribesman what he is doing:

The !Kung man asks the Western man about his work. The Western man replies that he is an ecologist, a natural historian. Seeing the puzzled look on the !Kung man's face, he translates to the level of activity: "Well, actually, I walk around all day behind elephants and pick up their dung." The !Kung's expression changes to one of pity mixed with thinly-veiled amusement. Lacking a mutual context, all that is visible is the unadorned action, meaningful in the wider scientific world, but ludicrous in the world of tribal bush culture. (ibid, 14)

How does the meeting between an ecologist and a bushman in the Kalahari Desert relate to the work of investment advisors in ValueBank? Leigh Star & Strauss are exemplifying to us how the context of work has great significance, and that the term 'ecologist' implies a whole world of meaning, just as the term 'investment advisor'. The puzzled !Kung bushman has no image of what an ecologist is, other than the

word ‘ecologist’. When the ecologist is ridiculed by his own description of what he is doing, it is because he tries to shortcut his way to describe what constitutes his work without explaining the context of an ecologist’s fieldwork. When describing the work of an ecologist studying elephant migration by merely describing the formal task of collecting excrement, the ecologist thereby reduces his work to overt tasks deprived of any contextual contents. The point to be made is that the work of an ecologist is much more than doing fieldwork, but it may be difficult to describe exactly how this work relates to formal tasks that are easy to observe and thus initially grasp for an outsider.

The description of the advisors’ work in ValueBank as represented by CG’s account is produced in the same way as the ecologist is describing his work to the !Kung bushman. But whereas the ecologist is met with pity and amusement, the advisors are facing a different situation as their work is translated into an decision support system, which emphasizes the need for a thorough and rich description in order to build an appropriate model of the work that the decision support system is to reproduce. I will return to ‘modelling work’ in the next section.

4.3 Enter the Investment Guide

By analogy with the above example, the work of ValueBank advisors is construed as a knowledge practice partly constituted by formal tasks that are subject to description at face value, and partly by covert work that is not easily understood or described, but is important because it relates to the context of work. These descriptions of the covert, ‘invisible’ work are brought to light by observation, and form the basis for an ‘arena of work’ that I wish to bring forth (Leigh Star & Strauss, 1999). This arena is the venue for struggles between what is represented as work and what is rendered invisible. The efforts to disembed work and articulate the particular tasks that have been silenced by the formal descriptions, are activities related to standards of work (ibid, 15). These standards are important in the transfer from existing practices to the design of financial technologies such as the Investment Guide. The consolidation of standards in this case is thus a negotiation of what deserves to be visible and what is produced as invisible at the same time.

The distinction between the visible work of advisors in ValueBank on the one hand, that is, the tasks described by the project team manager CG, and the invisible work of

the advisors' situated practices as I have observed them in my field work on the other, is here articulated by way of the ambitions to develop an Investment Guide. The decision support system is in one sense a formalization of advisors' work, which points to the question of how their work is conceptualized in a formal description. It is also clear that the designation 'decision support system' which CG uses to categorize the Investment Guide, attaches certain features to the Investment Guide while detaching other:

To secure a highly qualified and consistent level of counselling – and to facilitate this process – we have developed a counselling tool. It is a guide that leads the advisor through a series of questions to identify the particular requirements of every single client in relation to investment counselling. (ValueNet, May 2nd 2002, archive accessed October 2003)

By the discursive framing of the Investment Guide as a technology that facilitates the work of advisors, the advisors are placed as central to the practice of investment counselling, whereas the Investment Guide is assigned an inferior, purely technical role. However, the actual relations between advisors and the Investment Guide are more subtle than that.

The Investment Guide represents a system that has been designed to accommodate to the work of the advisors, according to the project team: "We wish to decode the patterns of action in the entire process of investment – a process where the Investment Guide is an essential component" (project recommendation abstract, internal report: 1). As this quote indicates, the function of the Investment Guide is to emulate the work of a human advisor in a technical system. This is done as a work of translating what the advisors are doing into an information system, and this is where the descriptions of work and the struggles between visible and invisible work are important.

Within the field of Computer-Supported Cooperative Work (CSCW), systems such as the Investment Guide rely on building accurate models of working processes, based on representations of work (Leigh Star & Strauss, 1999; Suchman, 1995). For that reason, much debate in CSCW has been centered on how to study work and to formalize the observations and other data into workable systems (Berg, 1998; Hayes,

2001; Hughes et al, 2002).⁷¹ For instance, Leigh Star and Strauss argue that “work does not disappear with technological aid. Rather, it is displaced – sometimes onto the machine, as often, onto other workers” (op. cit., 20). So, when information systems are introduced as a way of facilitating the work of humans in the general sense, the design of these systems often lead to a displacement of the tasks that the systems were introduced to eradicate. As Leigh Star & Strauss argue, in line with Adler (1986), the descriptions of work practice entail political content. An example from Leigh Star and Strauss relates to nurses in the US and to the ambitions to integrate a universal medical language in the American health system:

The impetus for creating the system is several fold, but one primary motive is to disembed what has previously been embedded, invisible work done by nurses, and make it visible to the medical record, for research purposes, and for the legitimation and professionalization of nursing (op. cit., 20).

In relation to the advisors in my study, I have observed similar ambitions from the point of view of information systems development. The Investment Guide is designed to disembed the knowledge practices of the advisors throughout the branch network. This is present in the description made by the team manager CG, and it also lies inherent in the ambitions to align the practice of investment advisors in the entire organization as manifested in the design of a single version of the Investment Guide for all advisors, regardless of their positions or skills.⁷² As quoted from the project proposal report earlier, the development of the Investment Guide involves “decoding the patterns of action in the entire process of investment”, that is, to remove the activities of the advisors from the contextual setting and to develop a decision support system that represents such a decontextualized process. To separate out knowledge in this way does not fit easily with the ambitions to support the advisors as primary to the practice of investment counselling. They become subject to a formalization of their work, which will require that they accommodate to the systems design to be able to become a part of the “entire process of investment”. As mentioned earlier, the

⁷¹ I refer to CSCW in this discussion because of the methodological similarities between CSCW and the sociotechnical approach that I am practicing here. Much work in CSCW focuses on the heterogeneity of practices and the implications of formalization of knowledge.

⁷² As part of my fieldwork in the ValueBank branches, I participated in collecting data about the existing knowledge acquisition processes that served as the basis for developing new software in ValueBank in general. Most of this work was based on studies of advisors working with the Investment Guide, and the conclusions showed that the Investment Guide was a system far too complex to be introduced without dedicated training and support. See also the concluding chapter of this dissertation.

advisors were provided with a supporting system, a tool that would support their decisions as needed. The technical fix is introduced to remedy an increase in the many functions of an investment advisor that has taken place in recent years, as illustrated in the training manual provided for the advisors below.

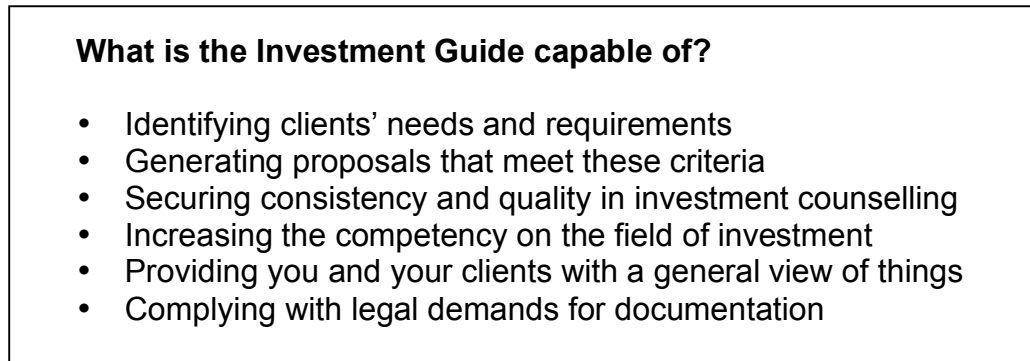


Figure 4.1: internal training manual, p. 11

But the technical fix reaches far beyond the technical sphere, and this is visible as the concrete work of the advisors unfolds before us.

I don't use the Investment Guide primarily because it's incompatible with my position as an investment advisor. [...] I feel that there's a special relationship between the client and me as advisor that the Investment Guide is trying to interfere with: I take the role of an expert over the client who is often financially illiterate when it comes to investment. [...] My usual procedure is to prepare a proposal for the client before we meet. I like to be prepared before a meeting with clients, and that can't be done with the Investment Guide. [...] The Investment Guide doesn't seem relevant to me. (Interview with the advisor MH, Alpha branch)

The advisor MH, a man in the mid-forties, has tried to use the Investment Guide. He has a personal interest in investment, and he is an active investor both privately and for a range of clients whom he has managed to get to open accounts in ValueBank. When I interviewed him about his work, he was very open to his way of producing proposals for his clients, despite his reservation towards using the Investment Guide. To him, the Investment Guide was irrelevant, he said, and referred to the procedures that were required by the Investment Guide in order to end up with an investment proposal. The Investment Guide is designed to include both the advisor and the client in the production of the investment proposal. The synchronicity that is incorporated into the Investment Guide thus forces the advisor to reveal to his clients the process of producing investment proposals. To management, this indicates that the advisors have nothing to hide for their clients during the process. For clients as well as for advisors,

cooperation is important to reach a satisfactory result. The production of an investment proposal in the Investment Guide is a collaborative undertaking. MH's practice is different in that he prepares everything in advance, and thus presents a proposal that reflects his position as an expert relative to the client as a novice. According to MH, the proposals he produced without the Investment Guide were always followed by explanations of how the proposal was put together, and he emphasized that his clients always had the opportunity to request another proposal if they were not satisfied with the one he had produced. When asked whether his clients often requested alternatives to his proposals, he answered with a smile "No, that doesn't happen often. I'm the expert, you know".

In comparison with the representation of practice incorporated in the Investment Guide, the practice of MH could be characterized as that of an expert that acts on behalf of his client. The Investment Guide is in his perception inserted by management as an attempt to align him as an expert and the novice by bringing them together in the production of an investment proposal. For MH, this renders the Investment Guide irrelevant because he does not want the Investment Guide to take over his role as expert and enrol the clients in the calculative practice of producing investment proposals. Nor does he want to offer to his clients any unnecessary insight into how his expertise is established, because he believes this would weaken the authoritative position that he has spent years building up.

In supporting the advisors, the Investment Guide affects the practice of counselling in two, interrelated ways: it acts as an *objectifying resource* (Haraway, 1997) and as a *tool of democratization*. As an objectifying resource, the Investment Guide factors out the single actor, for instance MH, and aims at incorporating his specific knowledge into the collaborative practice that the Investment Guide supports across branches in ValueBank. This condition is also described in the proposal report that preceded the Investment Guide. In this report, investment practice is characterized as a process subject to decoding, as mentioned earlier in this dissertation. This implies that the advisors' practice is the property of the entire organization, and not the individual advisor. In the efforts to construct an Investment Guide, the problem is not whether information about the practice of the investment advisors is available, but rather how to decode this information and convert it into computer code. In other words, the knowledge that MH has accumulated throughout his work is decontextualized and

turned into a knowledge resource that developers think of as accessible to everyone. The Investment Guide is thus central to the process of decontextualizing and objectifying knowledge that is generated by the individual advisors. It also serves as the mechanism that translates local, situated knowledges into general and decontextualized information that is regarded as widely applicable by management and developers in ValueBank.

Such work of translation simultaneously constitutes a democratization of knowledge: no single actor should possess knowledge that others might benefit from also accessing; knowledge sharing is for the benefit of all in the effort to secure that “flexibility is incorporated into our systems and the way we manage investment counselling”, as the proposal report from the development team states (project recommendation proposal, internal report: 1). Flexibility is here attached to the idea of sharing knowledge across branches and divisions in the form of quantifiable, objective resources.

As referred to earlier, the introduction of the Investment Guide hinges on decoding “the patterns of action in the entire process of investment”, as expressed in the initial development proposal for the Investment Guide. On the other hand, as an objectifying resource the Investment Guide also poses a threat to the individual advisors who may feel that their position as experts is trivialized. In MH’s eyes, the Investment Guide is introduced to make generally known how an investment proposal is produced. He regards the knowledge that he possesses as private, and does not want to share his expertise with the Investment Guide; thus he characterizes it as irrelevant.

4.4 A Proto-Instrument For A New Practice

So far, my account of the transformation of calculative practices in ValueBank has involved a range of very different actors that depicts the scope of the project that has been initiated in ValueBank. The development and implementation of the Investment Guide is a joint organizational project that can only succeed with the participation of a majority of the employees frequently working with investment counselling. The project is promoted in much the same way as previous projects have been introduced in ValueBank. This involves formal instructions from management as well as more persuasive means of enrolling the advisors to secure cooperation and consent to the changes that are introduced; the statement from CG earlier in this chapter illustrates

the latter. These two very different management practices seem to go hand in hand during the project. At the time of my fieldwork, the Investment Guide was already a part of the practice of the advisors. They had partly incorporated the Investment Guide into their everyday work schedules, and had thus accepted the instructions from management to attune their work to the emergence of yet another piece of technology, as expressed in the training manuals provided for the advisors (Figure 4.2).

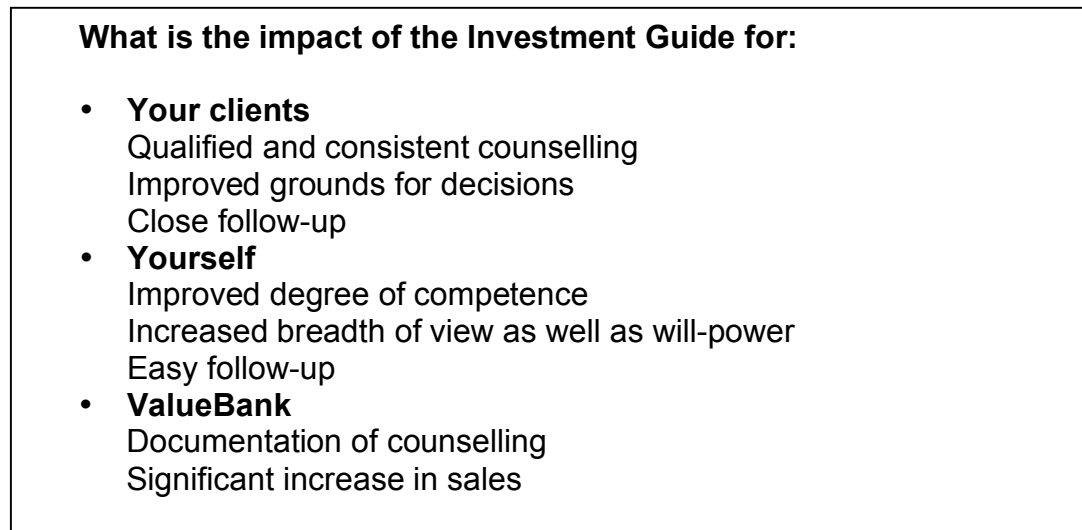


Figure 4.2: internal training manual, p. 12

From the point of view of the project team, the Investment Guide is an attempt to provide the advisors with a model that corresponds with the advisors' own interpretation of their work. The software developers in ValueBank decode the process of investment and recode this into a workable model that has been accepted and incorporated into the practice of the advisors. This conclusion is supported by interviews with advisors, as well as on quantitative data on the use of the Investment Guide that has been generated by the project manager CG.⁷³ Answers to the overall impression of the Investment Guide turned out very different in a survey among advisors who had participated in training sessions. One female advisor wrote "a great tool, easy to use. I think it is a tool that will be used on a daily basis". Another female advisor stated that the Investment Guide is "a super tool that enables you to guide

⁷³ The surveys among the advisors as well as the quantitative data have been carried out as preparations for the development of a second version of the Investment Guide. I have been given access to the answers to the survey from 18 advisors, 10 of them male and 8 female. The advisors were given a survey of 32 questions relating to questions such as: "To what degree do you expect to be using the Investment Guide?" and "In which situations do you consider the Investment Guide to provide you with the best support possible?"

your clients better without being an ‘expert’”. One male advisor wrote that “no matter how good the Investment Guide is, investment counselling is always a matter of trust between the client and the advisor. An IT system can’t replace trust”, whereas yet another male advisor wrote “the interaction with and involvement of the client as mutually responsible for the results is really good. The output gives the impression of professionalism. The system is easy to handle – user friendly”.

Despite the almost unanimous support to the Investment Guide expressed in the surveys, details about the overall use of the Investment Guide for investment counselling show a decline that takes its beginning shortly after the introduction of the system, and subsequently leads to an investigation into the reasons for this decline. The following is a transcript from my observations on the initiation of the investigation that was about to be carried out.

The investigation of the advisors’ work is initiated to search for explanations among the advisors as to why the number of counselling sessions involving the Investment Guide has decreased. The investigation is proposed by the project manager CG together with another project manager AM, and has an initial duration of five weeks.
[..]

In line with traditions in ValueBank, this investigation is carried out as an investigation that tries to identify a problem within the development process that incorporates the Investment Guide. Initially, CG and AM has planned to invite a number of advisors to headquarters for a session with the software developers. This is traditionally done to interview role models among the advisors and to reveal whether or not they are not satisfied with the Investment Guide.
[..]

During the course of planning the design sessions, the managers have come up with the idea that they should visit the advisors in the branches instead. I encouraged the idea because the project managers’ approach might turn out to situate the use of the Investment Guide in a different and more appropriate way in relation to the individual advisor. They wrote a proposal for how to perform their investigation, and after some persuasion of a superior manager they were granted permission to carry on with their investigations.
[..]

I have been asked to join CG and AM in their investigations and act as 'the scientist' that secures proper conduct as we enter the branches to investigate the advisors. I have agreed to this.

At first, my participation in this investigation seemed insignificant to me, but during the realization of the investigations I recognized that I served as the alien intruder onto whom insecurity and scepticism was projected from the advisors. In retrospect, I realized that this gave CG and AM an opportunity to avoid being associated solely with management and headquarters among the employees in the branches; instead they were on a par with the advisors they were actually evaluating. At the same time, I was observing another side of the meeting between developers and users, which I could compare to the one CG and AM were observing. In this way, two very different sides of the advisors were presented to us during the investigations, thus complementing the overall impression of the work of an advisor. The ambitions to represent the work in the branches in rich detail were aspired for by explaining to the advisors that this was not an investigation of them as individuals, nor was this part of a management-restructuring program. The reasons were strictly related to the development and implementation of the Investment Guide, and the advisors were encouraged to pretend that we were not there watching over their shoulders:

Your involvement in this is, as I said earlier, to go out and do as you use to do. If you can't remember anything else from what I have said here now, then the most important thing is to go down and do the things you usually do. (CG's presentation in the Zeta branch, December 4th, 2003)

It is very, very important for us to say that it is what you do in your daily work that you must continue to do now, and you have to, for God's sake, have to do everything you can to not let yourselves be affected by us. (CG's presentation in the Beta branch, November 24th, 2003)

CG's presentation of the investigation was a persuasive manoeuvre attempting to align the development team (represented by CG and AM) and the advisors by acknowledging the importance of the situated practice of the advisors. As mentioned earlier in this chapter, CG had realized that the advisors were an important resource, from which further detailed knowledge about the use of the Investment Guide could be found.

Much of this was described by CG and AM as a necessary way of gaining new knowledge of the reluctance to the Investment Guide among the advisors. Before

performing the observations in the branches, CG extracted data on the use of the Investment Guide in order to locate ‘anomalous’ branches. The locations were the branches, in which the Investment Guide was used much more or much less than average for all the branches. After generating a list of ‘over-performing and under-performing branches’, an additional list of ‘good and bad investment advisors’ was produced. These lists were then used to identify branches that were suitable for observations, and subsequently five prototypical branches were selected. In total, these five branches represented a continuum of possible ways to accommodate the Investment Guide: from no use at all to extensive use, both in terms of individual advisors and the specific branch in total.

Moving away from the ethnographic details of the investigation of the advisors, a reflexive question arises: what is happening in the process from development to use of the Investment Guide? How does the transformations of practice come about, and what are the implications of these transformations that I have witnessed in the branches? My claim here is that the process of developing the Investment Guide is influenced by unseen consequences that appear concurrently with the introduction throughout the organization. By introducing the Investment Guide with both persuasion and authoritarian power, management illustrates that this project is of great importance for the future of ValueBank. Hopes of a uniform and formalized process are inscribed in the design of the Investment Guide, and the ambitions for a new, uniform calculative practice are translated to the practice of the advisors by way of the technologies that they interact with. Not by upgrading their individual expertise, but by introducing a shared, collaborative system that incorporates the knowledge that all the advisors have accumulated throughout the years. The Investment Guide has thus been delegated responsibility from management and developers to enrol the advisors in a new calculative practice that attempts to align advisors and clients, as well as aligning all advisors according to the descriptions of work that is incorporated into the Investment Guide.

For these reasons, I claim that the Investment Guide is a *proto-instrument* (Callon & Rabeharisoa, 2003) for a new kind of organizational practice. As mentioned in Chapter 1, a proto-instrument is a preliminary, open-ended instrument that relates actors in other and new ways. In this case, the Investment Guide acts as the

intermediary that aligns the advisors with their superiors in a network (Bijker & Law, 1992; Callon, 1992), in accordance with the principles for how the practice of investment advisors should be. The term ‘intermediary’ is used to describe how an actor, in this case an artefact, acts as a constitutive part of network of investment practice in ValueBank. An intermediary can be anything that “passes between actors in the course of relatively stable transactions” (Bijker & Law, 1992, 25).

The Investment Guide is thus an ambiguous, unstable artefact that enables the transformation of counselling practice, and that enrolls advisors, developers, managers, and the Investment Guide itself. However, the continuous negotiations between advisors and the Investment Guide that form the network of action are suddenly brought to a halt. If not, there would be no need for them to initiate an investigation into the activity of the Investment Guide. The interruption is not caused by a manager who wants things done in another way, nor by advisors who refuse to follow the prescriptions and manuals they have been provided with. Apparently, the investment practice is still working, and clients are still offered advice on their investments. So, why the need for further investigations?

On one level, there is a general consensus on the demand for more and more sophisticated systems and technologies for the work of advisors. This is both manifested in the way advisors’ workstations are designed and maintained as well as in the ambitions in ValueBank to develop their own software instead of purchasing standardized solutions. According to the project managers I have interviewed, the ‘self-made mode’ in the systems development department is high priority. Both in relation to reducing the costs of introducing new financial technologies, but also to ensure that the technologies that are brought into ValueBank, correspond with the particular way work is carried out. The technologies have to reflect the work of the employees, is the common opinion in ValueBank. On another level, the ways in which these technologies are used diverge from initial intentions of securing a homogeneous counselling practice throughout the organization by way of standardized technological aids. This is illustrated by the concept of the Investment Value Chain and how this initiative manifests itself throughout the organization of ValueBank:

The concept includes professional support, organizational setup, and attractive systems to the advisors, while having an eye for the initiatives that are launched for benefit of the clients at the same time. (Project proposal report, 1)

In other words, the advisors are categorized in relation to their abilities to reflect an ‘ideal advisor’ and an ideal practice as defined in the Investment Value Chain. The categorization and standardization of advisors is a way of constructing the identities of the employees who are expected to act according to their expertise and experience, while also following the ‘scripts’ that have been produced for them in the Investment Guide (Hughes et al, 2002).

4.5 Conclusion: Constructing Calculators

To conclude this chapter I present the term *sociotechnical calculators* as a way to describe the mutual transformation of investment practice, advisors, and the Investment Guide that occur by the introduction of the Investment Guide in ValueBank. The term ‘sociotechnical’ is here used to describe a *hybridization* (Latour, 1993) of the activity of investment in ValueBank among the network constituted by advisors, management, decision support systems, and clients. My claim is that management, and thus the promotion of the Investment Guide, is similar to other initiatives which express a ‘modernist settlement’:

[T]he word ‘modern’ designates two sets of entirely different practices which must remain distinct if they are to remain effective [...] The first set of practices, by ‘translation,’ creates mixtures between entirely new types of beings, hybrids of nature and culture [...] The second, by ‘purification,’ creates two entirely distinct ontological zones: that of human beings on the one hand; that of nonhumans on the other. (Latour, op. cit., 10-11)

The Investment Guide is introduced by management in an effort to remove unwanted contingency of a situated practice – to purify the process of investment and bring the work of the advisors back into a ‘modern’ mode, that is, to “establish a partition between a natural world that has always been there, a society with predictable and stable interests and stakes, and a discourse that is independent of both reference and society” (ibid., 11) This includes constructing a borderline between the work of the advisors and the work that information systems do – a separation of humans and nonhumans. The separation of humans and nonhumans is a construction that reflects an ambition from management to define and control the activities of both the advisors and the technologies that the advisors use. In order to obtain control, a work of purification has to be done, which divides the hybrid practice of the investment advisors into two: the social circumstances that are present, that is the organization of ValueBank, including branches, branch managers, and advisors that relate to specific

clients on a basis of situatedness. The other side of the divide is the world of the technologies that are introduced into this – allegedly purely – social practice. The technologies represent an opposition to the advisors and the social organization of branches and ValueBank in general: the Investment Guide is free of interest and organizational politics, and represent knowledge and information in a pure form that easily transfers from one context to another as *immutable mobiles* (Latour, 1987).⁷⁴ What we are experiencing by the introduction of the Investment Guide, is an attempt to reinstate a modernist division of humans and nonhumans, brought about by an ambition to instil a homogeneous, calculative procedure into the heterogeneous world of the advisors. Because of the finite character of the Investment Guide, that is, the calculative procedures and the limitations that a technical model entails, the advisors are forced to accommodate their practice to the Investment Guide in their work. Additionally, the Investment Guide is introduced as an unavoidable part of their work, which means that the advisors have to change the way they work in order to fulfil the expectations put on them by management.

These conditions lead to the construction of ‘sociotechnical calculators’ that I propose here. The term implicates two things: at first, the advisors are turned into calculators by the advent of the Investment Guide. The Investment Guide acts as a proprietary technology that sets a standard to follow in investment counselling, thus initially reducing the advisors to machine operators. Secondly, this integration of the advisors and the Investment Guide in a new practice creates new alliances, hybrids of humans and nonhumans that breach the modernist separation described above. But first the construction of sociotechnical calculators. The introduction of the Investment Guide encourages the advisors to adjust their work to a new procedure. The advice that they offer to clients is now produced in close interaction with the Investment Guide, because the system in a general sense represents the official company procedure for investment counselling. In terms of organizational culture, the advisors are subjected to an authoritative management decision that has been enforced on all advisors, regardless of their level of expertise or former practice. In other words, the advisors are aligned to the Investment Guide. According to several of the advisors that I interviewed, they were concerned about using the Investment Guide, because they felt

⁷⁴ Or, at least, technologies are part of the natural world of predictable and stable interests.

that they were turned into mechanical pieces of an automated process. They were reconfigured as calculators, as pieces in machinery that had taken over their practice. However, I wish to shift the focus to the hybridization of investment practice as a way of doing organizational politics.⁷⁵

I want to point to the second implication of constructing advisors as sociotechnical calculators mentioned above. The reservation towards the Investment Guide among the advisors indicates that they themselves are occupied with upholding a separation between humans as specifically knowledgeable, whereas technologies are regarded as mechanical systems that serve limited functions of support for the advisors. Such a distinction suggests reasons for the advisors' resistance to the Investment Guide as compared to how other similar changes in the organization of work have been consented to without the same objections.⁷⁶ The advisors are refusing to incorporate the Investment Guide in their work practice in the way that management would have expected. They express their concern about their professional status as experts in relation to their work, and they fear that eventually, they will be replaced by technologies such as the Investment Guide. This causes a range of 'anomalies' to occur as the Investment Guide is being introduced, through which advisors and the Investment Guide are transformed. For instance, the advisors describe how they 'forgot' to appropriately register their actions in the shared databases that record statistics about the advisors' counselling activities (CG, personal conversation). Or they found ways to circumvent the prescribed procedures for using the Investment Guide in client sessions, thus producing new routines that incorporate both advisors and the Investment Guide (see the transcript from the interview with MH above in section 4.3).

Instead of seeing these transformations as struggles between advisors and the Investment Guide, it makes sense to regard the interaction as a *tuning* to each other (Pickering, 1995). Tuning constitutes a decentring of the advisors, and points to "the adoption of a more symmetric, *decentred*, perspective that seeks to grasp at once the social, the extrasocial (material, conceptual) and their interrelations" (Pickering, 2005, 353, original emphasis). In the case of ValueBank, it is not only the advisors who are

⁷⁵ Accounts of organizational transformations are multiple. For instance, the sociotechnical tradition that takes its departure in the Tavistock Institute in London, has inspired studies of work cultures for over half a century now (Kaghan & Bowker, 2001).

⁷⁶ I have not studied the introduction of other systems in ValueBank, but base my assumptions on the statements by advisors that I have interviewed and spoken to.

objecting to the introduction of the Investment Guide, and thus have the intention of circumventing practice. The Investment Guide itself takes an active part in this tuning, or *dance of agency*, that centres on the practice that both actors are part of.⁷⁷ If the Investment Guide had been constructed as the advisors have expressed, that is as an insufficient mechanical piece of equipment unsuitable for the complex practice of investment counselling, it would have been easy to work around it. However, what the advisors are experiencing is a sociotechnical actor that both encompass the technical characteristics of a decision support system and some of the social skills of an investment advisor. Likewise, the advisors both comprise of experience and expertise that enable them to relate to customers and thus generate business. But they also simultaneously incorporate parts of the technical qualities of the Investment Guide. Consequently, my notion of ‘sociotechnical calculators’ is not a description of highly skilled investment advisors that have been turned into mindless operators, nor is it a description of the consequences of imposing a dominant technical infrastructure on a social practice. Rather, the term designates a reciprocal hybridization of humans and nonhumans, of advisors and the Investment Guide that has taken place in this particular organizational context. The advisors are hybrids in the sense that the role of an investment advisor is already an assemblage of heterogeneous elements such as technologies, colleagues, procedures, and manuals. The Investment Guide serves to reconfigure the type of heterogeneity of the assemblages out of which they as advisors emerge, and in which they operate. In this process, the distribution of agency, and its ascription of action, is altered.

⁷⁷ “The dance of agency, seen symmetrically from the human end, takes the form of a dialectic of resistance and accommodation, where resistance denotes the failure to achieve an intended capture of agency in practice, and accommodation an active human strategy of response to resistance, which can include revisions to goals and intentions, as well as to the material form of the machine in question and to the frame of gestures and social relations that surround it” (Pickering, 1995).

Chapter 5: The Politics of Calculative Practices

Introduction

The last empirical chapter takes its point of departure in a discussion of the organizational action that has been invoked in the proliferation of a new sociotechnical hybrid, the Investment Guide, in ValueBank. Why do transformations of existing work practices – seemingly well integrated practices, that is – appear to be imperative to management in ValueBank? And, additionally, what are the reasons for trusting the financial technologies (and not the advisors and their expertise) to secure continuously efficient and standardized counselling across ValueBank's branches? In this chapter, I discuss some implications of ascribing faith to sociotechnical hybrids and how this affects the relations both between humans and between humans and nonhumans in ValueBank. In particular, I consider the notions of calculation and calculative practices to be organizational prerequisites for the proliferation of an *investment machine*.

5.1 Organizational Logic

In this chapter, I engage in a practice of speculation myself. Not in the sense of financial speculation as it has been presented so far, but rather in the activity of conceptual speculation. This speculation is made necessary as I return to one of the principal questions of this dissertation: why is an analysis of technical tools and the organizational management of trading in ValueBank interesting to others than system developers and financial professionals? Throughout the study in ValueBank, I have been confronted with a contrast between a logic of *representation* and a logic of *practice* (Czarniawska, 2001). In Chapter 4, I referred to two different images of work as described by the project manager CG and by the advisors, respectively. The description presented by the project manager CG is phrased in general terms in relation to how advisors are generally expected to interact with the Investment Guide. The advisors' work is described as guided by rational behaviour, and CG's description resembles a narrative structure congruent with the design of the Investment Guide. These are all indications of an account that has been rhetorically accomplished to present the work of advisors in a representational manner

(Czarniawska, op.cit, 256). As mentioned earlier in this dissertation, CG's representational account of investment counselling is a description of the systematic actions that take place along a straight line from initial contact between advisor and client to the final investment proposal. His description is reflecting how he considers the design of the Investment Guide to be an appropriate way of carrying out counselling work. CG's description of investment advisors is thus guided by a logic of representation that seeks to decontextualize the work of the advisors in order to establish standard operating procedures for their actions.

Contrary to this account are the descriptions provided by the advisors MH and PI, in which other narrative characteristics appear. These accounts express close connection to local practice and to concrete circumstances, for references to a specific time and place, relations to colleagues or particular clients. Their accounts are characterized by discursive fragmentation, which also indicates the close connection to practice, in which all knowledge is not always explicit and present. The logic of representation manifested by CG attempts to decontextualize and homogenize the practice of investment advisors, whereas the advisors themselves are doing the opposite. They constantly refer to their colleagues, to clients, and to specific places and incidents:

We have 13 million in pension funds on 82 cash accounts, and we don't make much money from them because the clients' interest rates are between 1 and 1,75 percent before [...] taxes and inflation, so there's nothing left. And this is typically long funds, so we might as well get them to work for us, and I have set an activity in motion of what happens, so, this is what I do to send it on to them. (Interview with investment advisor FI)

FI, a male investment advisor who is in charge of investment in branch Zeta is explaining to me how he cooperates with his colleagues. He provides a general view of the investment activities in the branch and makes sure that they set "activities in motion" that generates profits for the clients and the branch. Despite his position as responsible for launching activities in relation to investment, he refers to specific details and numbers as he explains how new contacts to clients are initiated. His account also illustrates the close relations between other parts of ValueBank's activities, for instance pension funds, taxes, and inflation. To FI, investment counselling and pension management are two sides of the same coin, and his descriptions of work change from describing pension management to investment management and back again.

I will return to these representations of work later. For now, consider the following quote, in which Barbara Czarniawska (BC) interviews a city councillor about his job:

BC: What do you see as your main task in your work right now?

Interviewee: My main task is to fill the role of a group leader of the next to biggest political party and to lead the opposition.

BC: But what does it mean? What do you do?

Interviewee: The political sciences state clearly that this role is that of a person who, in a democracy, was elected to be the foremost representative of some kind of political movement or a group. (Czarniawska, 2001, 253)

This quote illustrates that there are more than one version to the work of the city councillor, and that different levels of description are being presented here. At first, the city councillor refers to his work in general terms by referring to his role as a member of a political opposition and as a group leader. The interviewer then encourages him to describe what his work as a group leader involves, which leads to an even more general description of how politically appointed representatives act in a democracy. The interview situation demonstrates some of the difficulties of studying organizational practice. Studies of organizational practice necessitate multiple, polyphonic, and variegated accounts that resemble reality in the social life of organizations, because the world that these descriptions refer to are similarly complex (Law & Mol, 2002).

Czarniawska suggests that the many and different descriptions produced by analysts on account of practitioners' actions and reflections express a proliferation of *constructionist* accounts of organizational life. In her opinion, these constructionist studies of practice "seeks not only to faithfully render the logic of practice but to show how it arises; and to make it symmetrical with the logic of theory, showing how the latter is constructed – the 'instruments of objectification' at work" (op.cit, 254). My conceptual speculation takes its departure in the constructionist accounts of organizational life that is also presented in the case of ValueBank.⁷⁸ According to Czarniawska, the aim of a constructionist account is to reveal how seemingly universal truths are constructed and supported by organizational narratives and

⁷⁸ My use of the word 'speculation' here is not intended to indicate that I am deliberately making things up. Rather, I use speculation to indicate that I am forming a concept about a subject without firm "evidence". In line with a constructionist view, firm evidence is never absolute, but more likely held together by actors with certain interests in keeping the "evidentiality" of things intact.

“action nets” (Czarniawska, 1998, 2000); worlds are not given, they are constantly made and remade. ‘Action nets’ is a term developed by Czarniawska and specifically tailored to organizational studies. Implied in action nets is the recognition of the ways in which actors are produced in networks of action:

A standard analysis begins with ‘actors’ or ‘organizations’; an action net approach permits us to notice that these are the products rather than the sources of the organizing—taking place within, enabled by and constitutive of an action net. Identities are produced by and in an action net, not vice versa. (Czarniawska, 2004, 780)

A constructionist approach similar to Czarniawska’s often includes two main constituent parts, of which I reserve the concept of the ‘social’ for the next section.⁷⁹ The other part that I now present is the constant work of making and remaking the world that goes on in organizational action, thus revisiting the theoretical discussion from Chapter 1. The conceptual work of world-building draws on both a logic of practice and a logic of representation as mentioned above.⁸⁰ The advisors in ValueBank reconfigure their world in interaction with clients, technologies, management and colleagues. The work of advisors is not contained in a complete description of their work documented by manuals or inscribed in information systems, neither in relation to the financial world in particular nor to their work in general. Instead, the advisors, individually and in collaboration with others, enrol in and influence the action nets that encompass their work and what this work involves: what are their responsibilities, what are their legitimate and reasonable requests for changes, how do they collaborate and so on. A pivotal point in such a constructionist account of financial work is that there exists no essence to an advisor’s work prior to the forming of action nets; work is made up of negotiations, translations and constant redefinitions of relations.

For this reason, the means and motives for forming organizational action nets are often the focus of a constructionist account, for instance how the alignment and ordering of actors in networks is institutionalized and managed (Power, 1996).⁸¹ When practice is studied, it changes as actions are articulated and observed, thus

⁷⁹ One such resource that describes in detail several constructionist accounts is (Bijker, Hughes, & Pinch, 1989). For similar work in the social studies of finance, see Leyshon et al (2005) on e-commerce or MacKenzie (2003) on the Black-Scholes formula.

⁸⁰ See also Chapter 3 for an account of the concepts of world-building and ideal advisors.

⁸¹ Power explicitly examines the world of auditing as an institutionalized practice. However, auditing and economics are closely intertwined which makes many of Power’s arguments viable within the context of ValueBank as well.

reconstructing existing practice. The Investment Guide becomes more prominent with the attention that is directed towards the system. Several employees, both advisors and managers, have managed to promote investment as an important part of business in ValueBank. In order to promote investment at the cost of other areas such as for instance pension planning, the Investment Guide serves as a powerful ally in the efforts to demonstrate how investment is a profitable business opportunity that should be developed further for the benefit of both ValueBank and clients. Initially, the Investment Guide was not designed to play such a powerful role, but it has been shaped into an example of an increased focus on the benefits of investment counselling for ValueBank as a business.

As coined by Czarniawska, the work of financial advisors in ValueBank is framed within both a logic of practice as exemplified with advisors' work, and a logic of representation, as exemplified with management's discourse about advisors' work. However, this does not mean that practice is restricted to advisors on an operational level whereas representations are attributed to management on a strategic level.⁸² The advisors also work towards establishing certain representations of their work as correct, which I have contrasted on occasion by my observations from the branches. The following example from observations in branch Alpha illustrates that practical and representational logic intertwine in local practice:

ML, a man around twenty, is working on a virtual client's portfolio with the Investment Guide as part of his trainee program. He tells me that he is working with real figures of a client's portfolio, and that the program mirrors real action. His actions are not stored in the databases in the way real action is. [...] He encounters a problem and is unsure of what to do. After a while I ask him if there is any help in the system that he can use, and he says "yes, you can use the help menu that accompanies every part of the counselling session in the Investment Guide". He explains to me that he often uses this menu when he encounters problems, and to illustrate he moves the mouse cursor around on the screen. When the cursor reaches the help menu, a window appears for a second but then disappears again [a "mouse-over" feature].

⁸² More precisely, it reveals how my investigations are carried out. I have observed the work of advisors' practice by being present in their worlds, whereas my studies of management is dominated by readings of manuals, strategies etc.

ML says “that’s odd, I don’t understand why it disappears so quickly”. After trying a couple of times, he turns to one of his colleagues for help.

The trainee ML is what I would regard as a skilled computer user. He is young, male, and has a general interest in computers.⁸³ I had expected him to be a good case study because he would be able to show me some of the ‘workarounds’ that would eventually occur when many advisors were observed. I also expected him to be able to easily overcome obstacles caused by malfunction or counterintuitive design of the Investment Guide. In the excerpt above, the work of ML expresses both a logic of practice and a logic of representation. As I observe his work, he describes to me what he is doing, for example by saying “yes, you can use the help menu...” and further on by explaining that he often uses the feature. This expresses a logic of representation. Yet he does not seem to be able to use the help menu despite his insistence on its familiarity. His actions reveal the logic of representation present in his descriptions: if he were familiar with the help menu, he would either have moved the mouse cursor exactly to the help menu, or he would have read the information provided on the screen, or read in the manual how to activate the help menu. This is a logic of practice that does not correspond with the ‘official’ description of work present in his representational logic. ML knows that he is expected to use the help menu provided in the Investment Guide or in the paper manual, and this is what he explains to me.⁸⁴ But when he is confronted with a concrete problem in the system, he forgets his representational logic, and exerts a logic of practice that reflects his general skills as a computer user. He tries to solve the problem himself by trial and error, but eventually he has to ask a colleague for help.

My observations of ML illustrates that the logic of practice and the logic of representation coincide, and that there is no coherent logic predominating his work. In studies of practice, the logic of representation is equally forceful, as ML’s case also displays. However, the study of practice is able to reveal when and how the representations of work are used to describe an ideal practice that does not resemble the actual work that takes place. The work of representation is the ‘front stage’ that is

⁸³ At the end of a working day in branch Alpha, ML joined me on his way to the nearest train station. I asked him about his skills with a computer, and he told me that he was playing computer games at home, as well as used it for other activities, private and related to work.

⁸⁴ The help options are explicitly stated in the Investment Guide user manual available to the advisors (p. 2).

produced by the ‘back stage’ of practice (Goffman, 1959). On the front stage, there is a general agreement to the way work is carried out (“*yes, you can use the help menu*”), but this is produced by reflections on back stage (“*that’s odd, I don’t understand why it disappears so quickly*”). The front stage is thus maintained by a systematic stabilization of the work on the back stage, and depends on aligning the individual, heterogeneous work of the advisors into a joint, collective practice for the advisors. My observations do not stand alone, as illustrated by a quote from Power:

All practices give accounts of themselves which are aspirational rather than descriptive. These accounts exist at the collective, or what can be called the ‘official’ level and for many years sociologists and others have been interested in digging into these accounts, showing what they leave out and demonstrating how a certain ideal and institutionally acceptable ‘front stage’ account of practice is only produced after much ‘back stage’ work which is rendered invisible [...] what has been left out must be brought back in, even at the expense of the official account itself. The obviousness of practitioner common sense must be questioned by revealing the process by which that common sense was formed. (Power, 1997, pp 7-8)

In the present case of ValueBank, the investment advisors tend to describe their work in a representational way, both in terms of their work as a totality of activities, but also when they have been asked to describe particular features about their interaction with the Investment Guide. As such, their descriptions display efforts to construct and circulate the ‘official’ version of ‘the work of investment advisors in ValueBank’ as Power argues in the quote above. In my view, the ‘official’ account of work thus reflects an existing nexus between what the advisors are doing (their practice) and how they relate to the organization of ValueBank (their common sense of their practice).

My argument here is not intended as part of an emancipatory strategy to free the advisors of an oppressive management or of inherited representations of organizational hierarchies.⁸⁵ However, it is important to realize that these representations sustain existing relations and internalize these as ‘correct’ and suitable for the activity in ValueBank, with the consequences that other relations experience difficulties in attracting attention and interest. In the case of the Investment Guide, the predominant use displayed by MH’s actions does not facilitate the use of the system

⁸⁵ I agree with Latour (2005) that emancipation does not mean ‘freed from all bonds’, but instead ‘well-attached’ (p. 218). Latour’s argument is that good attachments are always preferred over an imagined freedom from any attachments. In a world of actor-networks, being unattached is not being free in the sense of independence and subjectivity. Being well attached means being able to use the attachments in your own favor as compared to being under the ruling of someone else.

by advisors who may not be likely to pursue questions by trial and error. Advisors who are uncomfortable with using a supporting system in the first place very often turned away from the Investment Guide at the first sign of problems. I will pursue such organizational politics in the following section under the heading of ‘the social’.

5.2 The Social in Sociotechnical

I now turn to the second part of the dual characteristic of a constructionist account that I introduced in the above section: that of the ‘social’. To Czarniawska, ‘social’ means relations, or associations of any kind (Czarniawska, 2001). In line with a general observation within current STS, Czarniawska identifies the social as associated with the activity of humans, whether as individual or organizational actors. Thus, ‘the social’ addresses human life; that is, phenomena which emerge from the collective features of human life (Pickering, 2005).⁸⁶ In sociology, it is possible conceptually to identify ‘the social’ as an object of study, but this objectification also isolates ‘the social’ in the area of humans and externalizes technologies as passive tools for human use. In this way, the separation of humans and technology becomes a disciplinary distinction that is again enforced by the scholarly work that is carried out. Pickering has coined this as a centering of the social at the cost of limited understanding of how technologies and the material are interrelated with human action (op. cit., 352). As a consequence of the resistance that material actors offer – for instance in ‘social’ settings such as in ValueBank – Pickering suggests a decentering of social theory to appreciate the importance of material agency and actors and to avoid ‘social’ explanations that reside outside the world of material actors:

[The] solution I want to elaborate here [...] entails the adoption of a more symmetric, *decentered*, perspective that seeks to grasp at once the social, the extrasocial (material, conceptual) and their interrelations. (Pickering, op. cit., 353, original emphasis)

⁸⁶ In *Reassembling the Social: An Introduction to Actor-Network-Theory*, Latour explicitly takes on the task of dealing with the notion of the ‘social’, thus demonstrating a current interest in STS to open yet another black box and to destabilize the power of a ‘social explanation’, see also Strum and Latour (1987). There are many other connotations to the term ‘social’. Here, I refrain from giving an exhaustive, sociological or ethnographic description but base my account on recent discussions in STS as presented in Pickering (2005) and Latour.

Pickering continues: “I want to try to inject the decentered perspective into the mainstream of the discipline [i.e. sociology], and my particular strategy here is to move to the macro – a terrain that should be of great interest to sociologists.” In my understanding of this, Pickering distinguishes between sociology in a somewhat traditional sense and STS as related, but different. At the same time he tries to combine the two fields of knowledge by engaging in an analysis that resembles Knorr Cetina’s concept of a ‘global microstructure’ (Knorr Cetina & Bruegger, 2002a; MacKenzie, 2006). Both Pickering and Knorr Cetina (along with Latour) argue that a reconfigured concept of the social is appropriate both in terms of conducting microsociological work as they have previously done (Knorr Cetina, 1997; Latour, 1996; Pickering, 1984), but also as a way of explaining “major transformation at the heart of our technoscientific social world” (Pickering, op. cit., 253). In this way, Pickering, Knorr Cetina and Latour use ‘the social’ as a general and *generalizing* category to explain the shortcomings of traditional sociology in relation to the status of the extrasocial (or, material). But, at the same time, they also take the concept of the social as the point of departure for a new, decentered macrosociology as presented by their studies of dyes, financial markets and trains as sociotechnical assemblages. Following this controversial suggestion, the ambition is to analytically align the material and the social, or rather, to join the social and the material, and thus displace any of the elements as the centre of attention or explanation.⁸⁷

In a similar way of decentering, Latour goes even further than Pickering and makes a distinction between a ‘sociology of the social’ and a ‘sociology of associations’, thus evidently separating the work of STS from traditional sociology at the most fundamental level (Latour, 2005, 9)⁸⁸. Traditional sociology, according to Latour, is characterized by referring to an underlying social fabric or aggregate that relates to – or generates – different social activities and institutions (op. cit., 8). This condition

⁸⁷ Pickering elaborates his decentered position as a move away from a ‘Durkheimian blueprint’ of the social that still exists in sociology: “Durkheim’s sociology was, then, centered on the social in a double sense: (1) its unit or object of analysis was purely social, excluding the proper objects of the other sciences (which objects were, nevertheless, acknowledged to exist), and (2) the causes of social phenomena were to be sought within the sphere of the social itself.” (Pickering 2005, 355) Scientific objects and technological artifacts are thus being rendered as external to such sociology, even though social space is abundant with extrasocial objects. For Pickering, along with Knorr Cetina and Latour I suppose, sociologists thus exert a disciplinary approach that enforces categories and separations instead of discovering them. This claim is what I term controversial in Pickering’s approach.

⁸⁸ See also Beunza and Stark (2004) and ‘the art of association’.

obstructs the ability of sociology to understand the development of fundamentally new social activities, simply because sociologists of the social have mistaken the explanation for what they should explain. The ‘social’ is not a given entity in any fixed and stable state that society can be build upon. Instead – at least from the point of view of sociologists of associations – the relations that are produced between the many actors in society continually constitute the ‘social’. And, additionally, the social is not to be distinguished beforehand by any disciplinary or conventional characteristic:

The laws of the social world may exist, but they occupy a very different position from what the tradition had first thought. They are not *behind* the scene, *above* our heads and *before* the action, but *after* the action, *below* the participants and smack in the *foreground*. They don’t cover, nor encompass, nor gather, nor explain; they circulate, they format, they standardize, they coordinate, they have to be explained. There is no society, or rather, society is not the name of the whole terrain. (Latour, 2005, 246, original emphasis)

What Latour has set out to promote here, is the concept of ‘reassembling the social’, to look for a new explanation. The first step in this quest lies in realizing that sociology (of the social) is not the prerequisite for developing further what qualifies to be termed ‘social’. Instead, the social as an analytical category has to extend to entities that have been discarded in any traditional sociological description; for instance technologies and other material actors, as also Pickering argues. The second step is to focus on the relations between this multitude of actors as much as on the actors themselves. This brings us back to the introduction to this dissertation and my ambition to follow the actors as a way of describing the action in ValueBank. Following the actors conveniently removes or breaks down the distinctions constructed by disciplines or tradition. “Actors do the sociology for the sociologists and sociologists learn from the actors what makes up their set of associations.” (Latour, 2005, 32) So, Latour’s claims to reassemble the social is not a way of just saying that the sociologists should include the material actors in their studies, and then carry on with their work. Rather, it is to develop an entirely new approach to what constitutes the social, and how to build an understanding of society based on dynamic associations, not disciplines and predefined assumptions that direct attention towards identifying and revealing already existing, permanent structures. The sociology of associations is the task of taking into account the uncertainties of action as it happens instead of imposing a disciplinary order in advance.

5.3 Incorporating the Social and the Technological

So far, I have referred to my approach as a study of the introduction of a new financial technology in the practice of the investment advisors. This approach seems to sustain a separation of human actors and material actors as well as allocating the social in the hands and minds of human actors. However, I have also illustrated how the Investment Guide is not just a tool or instrument whose utilization depends on the activity of skilled humans. Instead, the Investment Guide and the advisors have been reconfigured, respectively, with new associations as their result. The investment advisors are now in one sense operators of a very complex decision support system that acts as a fundamental premise for their activities. They have become an interface between ValueBank and its clients, translating the working of both. At the same time, the advisors are employees to whom management and software developers have to listen, if ValueBank is to continue attracting clients. Without the translations of the advisors, it is difficult for the clients to relate to the Investment Guide. There is a need for identifying the intermediaries and mediators that establish and maintain associations between ValueBank and its clients.⁸⁹ In terms of a sociology of associations, the advisor is a highly ambiguous entity, as is also the Investment Guide. One way to meaningfully grasp what is going on is to let the advisors and the Investment Guide dissolve as stable, autonomous entities. Instead, the advisors and the Investment Guide take different positions in the networks of action that they are part of: at one point, the advisor is acting as a loyal employee who responds to management's demand for a skilled workforce; at another point, the advisor is a disobedient, independent agent that takes care of his own career by choosing to disregard the Investment Guide as relevant. The Investment Guide, simultaneously, is also proposing its own theory of action (Latour, 2005, 57) that follows not one, but several different paths: as a supporting tool for the advisors, responding to their queries in the expected way, as the interface between advisors and clients, and as a monitoring tool for management. But the Investment Guide also challenges the

⁸⁹ Latour (2005) distinguishes between mediators and intermediaries in the following way: "An *intermediary* [...] is what transports meaning or force without transformation [...] *Mediators* [...] transform, translate, distort, and modify the meaning or the elements they are supposed to carry." (Latour, 2005, 39, original emphasis). These are not fixed categories, and much of the work of studying organizational action goes into observing the transition of actors from mediators to intermediaries and back.

advisors' expectations of the ability of a system to enrol new actors in an organizational struggle over power and influence.

A guide like this most often generates, well gradually you get to know the guide, right, and you know what the result will be in the end. Most of the time you know what the client needs, right. If they are of the speculative kind you might want to go where they get individual stocks, and if they are not interested at all, then... I think it is in the interest of most people, the clients, to buy mutual funds, because today, they can easily buy their own bonds and shares, but that requires a very, very active involvement, because suddenly, it just takes off, and here you have Value Invest to nurture it for you, so... (Interview with investment advisor FI)

It should be clear by now that the introduction of the Investment Guide is an ambiguous activity that sets the organization in motion, and thus creating new associations between the actors involved. If this is approached within an economic or a sociological framework, great effort has to be made in order to keep these changes within the framework, if possible. It is possible to regard the introduction of the Investment Guide as an improvement on the business performance of the advisors in terms of the amount of sessions and transactions that they achieve. This argument is present in the evaluation reports that have been generated prior to the investigations I have taken part in. But that hardly accounts for the individual customization of the Investment Guide by the advisors that I observed during my fieldwork. Likewise, it would be possible to see the Investment Guide as a management tool imposed on loyal and obedient employees to control their every move. But that does not concur with a general upscaling of competencies and the growing independence of the knowledge of investment experts that the advisors are experiencing as they are being equipped with a state-of-the-art financial technology. What is happening then? The trails of the Investment Guide lead to many actors, and reveal many associations. One important trail is the incorporation of the social and the technological, as exemplified by the following quote from the training manual that has been produced for a group of delegates assigned to train the rest of the advisors:⁹⁰

The advisors who have been appointed as implementors have participated in a "kick-off day" prior to their work with the Investment Guide. They have been introduced to the system and to the training manuals. At the same time, they have been instructed in the organizational values and viewpoints that are incorporated in the Investment Guide. (Internal report, p. 19)

⁹⁰ This group consisted of approximately 30 investment advisors who had been appointed as 'implementors'.

The implementation of the Investment Guide is thus inseparable from the organizational values that are present in ValueBank. Or, in other words, the social organization of ValueBank has in practice been *incorporated* into the technologies. In the training manual that was created to facilitate the introduction of the Investment Guide, this is expressed by phrases such as “add value through our portfolio strategy” and “create long-term relationships by a growing amount of satisfied clients generated by an increased focus on investment” (Figure 5.1).

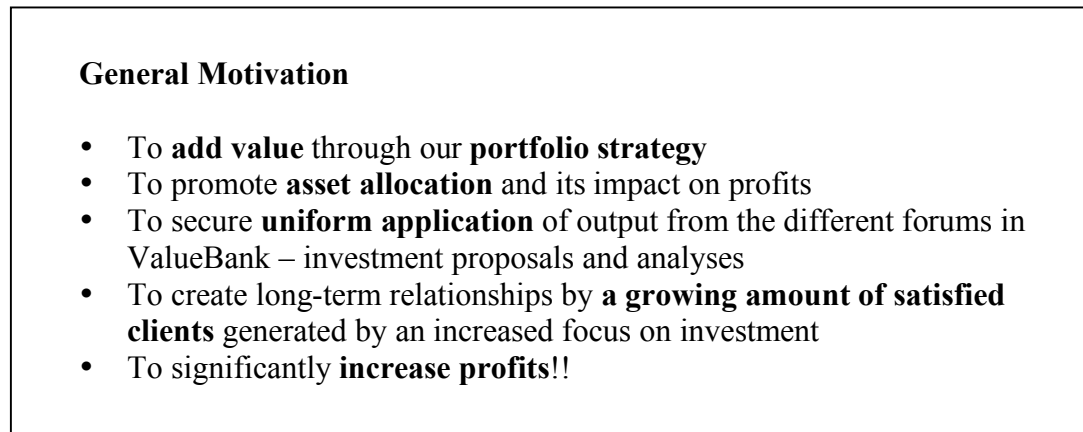


Figure 5.1: internal training manual, 11, original emphasis

These statements resemble arguments that thrive among the advisors and the project manager CG as they describe their work. In terms of incorporating the values of ValueBank into technologies, this seems to be accomplished through a discursive construction of the roles of advisors and technologies, respectively, as also discussed in Chapter 3 and 4. The advisors reflexively assert that they are operating according to the guidelines of the Investment Guide, because they know that this activity authorizes their work according to the general values and guidelines of the bank.

Organizational Knowledge

Knowledge is assigned to the realm of the social, incorporated in situated and local practices (Haraway, 1991) and in technologies (Knorr Cetina & Preda, 2001).⁹¹ With the risk of reducing knowledge to only one of its many constituent parts, I offer some examples from ValueBank that I consider to represent the presence of knowledge elements or structures as important parts of organizational practice. I will also

⁹¹ Much work in STS centers on the construction and proliferation of knowledge, and equally so do social studies of finance. See chapter 1 in (MacKenzie, 2006) for a general introduction to the field of social studies of finance and its affiliation to STS.

describe how knowledge in ValueBank is being transformed and displaced by the introduction of the Investment Guide, thus demonstrating the interrelatedness of the social and the technical, and paving the way for a decentered approach to knowledge in the field of finance and markets.

In Chapter 4, I suggested the term ‘human calculators’ to designate the transformation of work practices caused by the introduction of the Investment Guide as an expert decision support system. Introducing the Investment Guide into the world of the advisors initiated a destabilization of ownership to the knowledge generated by the investment advisors throughout their work. Management and the Investment Guide now expect the advisors to incorporate their individual knowledge of the market and their clients into a shared “structuring template” for knowledge manifested in the Investment Guide (Latour, 2005, 196). The organizational background for this transformation lies in a common consent that sharing knowledge or information benefits all.⁹² In terms of information and knowledge sharing, the Investment Guide was intended to provide support for both experienced and novice advisors, thus improving the practices of both kinds of advisors. As also described in the previous chapter, the prerequisites for this change in practice among the advisors led to work patterns that were more or less guided by the design of the Investment Guide.

The Investment Guide has been introduced as a way of automating and standardizing the complex and knowledge-intensive practice of the advisors. The advisors expressed difficulties in understanding the relevance of applying the Investment Guide to their work, primarily because they did not share the feeling that standardization was needed, as requested from management. In terms of sociotechnical calculators, my claim was that the advisors are reduced to manual computers or automats, whose primary occupation is to ensure that the right knowledge was fed into the machinery of the Investment Guide. However, as the advisors become familiar with the functionality of the Investment Guide, they are transformed into powerful actors rather than reduced to human operators. Both the advisors and the Investment Guide are put to the test in encounters with clients. In several cases, the advisors abandoned their initial reservation towards the Investment Guide when they were facing their

⁹² I do not categorically distinguish between information and knowledge here. However, this may blur the picture a little, since financial knowledge and organizational experience are two very different things. Still, for my arguments here, it makes no difference to distinguish between the two as they are present together and influence each other, for instance through collaborative work practices.

clients. It would seem as if the advisors were of the opinion that they should express concern about the introduction of the Investment Guide, thus confirming to me that they were being constrained by management. But because of the general business of work, the advisors were not always able to defend their position as oppressed employees. What I observed was not automatons that had come to terms with a new, delimited role as system operators. The advisors still did not use the Investment Guide in all occasions, despite of management's proclaimed goal. Instead, the advisors found ways of translating the directions they were given from their superiors into something they were able to accommodate to their present situation. In the concluding section of this chapter I will discuss this with the concept of *investment machines*, referring to the title of this dissertation.

5.4 Conclusion: Investment Machines

The advisors in ValueBank generally object to being reduced to mere automatons whose function is to punch numbers into information systems. The resistance among the advisors resulted in the Investment Guide being gradually neglected as a collaborative and knowledge based support for instant, real-time counselling of clients for which it had been designed at the outset. Instead, the advisors regarded the Investment Guide as a tool they were able to configure and mould to suit their specific needs and wants. As I described in Chapter 4, several advisors incorporated the Investment Guide as an aid to preparing for sessions with clients, instead of including the client and the Investment Guide simultaneously as described in the manual. In this way, the advisors did not have to decide whether they felt that their expertise was being threatened by the introduction of the Investment Guide. This work of translation solved a dilemma for the advisors, but generated a new situation for the developers and for management.

A significant feature in the design of the Investment Guide was the ability to create stronger affiliation between advisors, client and ValueBank as a business:

“ValueBank's investment clients are guaranteed a continuous, professional management of their investments, based on the client's individual risk profile and the extent of the investment” (training manual, p. 3). In the original training manual that

accompanies the Investment Guide, investment counselling is visualized as a ‘flow’.⁹³ This flow ties together a range of actors, of which the Investment Guide is the only recent newcomer. This flow of information from the different phases of counselling is gathered together in a funnel movement that ends up with the generation of an individual investment profile for each client.⁹⁴ In the case of ValueBank, the work of profiling clients individually corresponds with a total of 120 different profiles, to which each individually generated profile is matched. This means that clients in ValueBank are profiled twice in order for them individually to fit into the flow of information represented in the Investment Guide. First, a large quantity of information is fed to the Investment Guide as a requisite for generating an accurate client profile. Then, the client profile is compared with the 120 potential profiles present in the system to search for the best match. After this, an investment solution is presented to the advisor and to the client, in which the chosen profile is once again matched with new information about the actual investment, thus securing the maximum return.⁹⁵ The investment solution that is generated is thus a product of the gathering of knowledge from advisors, clients, and the Investment Guide, a trinity that produces knowledge that has been dispersed between the different actors prior to the Investment Guide. My argument is that management sees the Investment Guide as an *investment machine* that creates a network of associations between the actors that management regards as important and relevant.

In Chapter 4, the advisor MH expressed his reservations towards the Investment Guide. He said that counselling is about proving to the clients that the advisors possesses the necessary knowledge about investments; knowledge that the clients do not possess themselves. Therefore, counselling is a matter of trust and expertise played out between client and advisor, not a question of presenting the client with a

⁹³ I use ‘flow’ here as a way of describing how actors are joined together in a process that focuses on a single target despite the multiplicity of ways things could develop. This flow technique resembles cultural theorist Raymond Williams’ studies of television and the devices used to create continuity and flow in order to maintain the audience share (Elmer, 2004; Williams, 1974). See also Zaloom (2003)

⁹⁴ See Chapter 2 for a description of how such a profile is generated. For a description of consumer profiling in general, see Elmer (2004). In relation to financial client profiling, see Leyshon and Thrift (1998, 1999).

⁹⁵ For now, I refrain from discussing how such information retrieval is shaping the identity of clients rather than revealing their “true identity”. Generally, profiling in ValueBank is the work of making specific data universally applicable throughout the different business divisions despite their origin in a local setting. See also Leyshon and Thrift (1999).

specific profile generated by the Investment Guide. MH's objection to use the Investment Guide is thus rooted in discrepancies between how he perceives advisors' work, and how management and the developers of the Investment Guide perceive his and other advisors' work. MH expresses a humanist position common among the advisors: the act of providing advice and service to ValueBank's clients is a matter for humans, not for technologies or information systems.

The differences in organizational logic expressed by the diverging descriptions of the same work practice presented above, is shifted to the design of an investment machine as well, leaving the inconsistencies untouched.⁹⁶ This condition is another feature of building an investment machine: advisors as well as other actors (for instance clients, developers, and diverse information sources) are all being drawn into the construction and realization of the investment machine, whether they want to or not. The organizational (that is, management) support for making the Investment Guide a real part of work is strong. Viewed from the outside, it does not seem plausible that the Investment Guide would have been abandoned at any time, in spite of resistance from the actors involved. The financial arguments from investment experts in ValueBank overrule conflicting arguments from local practice in the branches, and in a sense the introduction of the Investment Guide imposes a contradictory dynamics of a 'global microstructure' (Knorr Cetina & Bruegger, 2002a). On the one side, the investment machine establishes a general and centralized control mechanism throughout the branches by introducing a model for how investment counselling *ought to be*. At the same time, it would be naive to imagine that the Investment Guide would be incorporated in the same way in all branches and with all advisors considering the heterogeneity of financial practice in ValueBank. The local level of knowledge and expertise does not disappear because of the arrival of an investment machine such as the Investment Guide. Hence, there are two different conditions for management,

⁹⁶ I would go so far as to claim that on occasions, the introduction of the Investment Guide is used as an attempt to silence critical voices among the advisors. The increased interest in "activating clients' deposits" (Investment Guide training manual) reflects that the deposits represent a business opportunity for ValueBank while simultaneously posing very little financial risk for the bank. Clients' savings and retirement benefits are attractive because the interests earned from these investments benefit both the owner and the bank at the same time. However, the campaign to attract new investment clients is not met with enthusiasm among all advisors because they feel that they are forcing clients into taking on the offer, which could damage their overall relation to ValueBank.

developers, and advisors to consider: one is the efforts to create and maintain a universal⁹⁷ model of investment practice in ValueBank, the other is to respect and encourage the development of expertise in the branches locally. Knorr Cetina's notion of 'global microstructures' is useful here, because it helps to grasp how the Investment Guide is simultaneously working in several, different ways in ValueBank. The Investment Guide is in no sense a reified technological artefact with a clearly defined purpose:

It is also important that the idea of global microstructures captures the sociological side of information technologies: global microstructures instantiate technology systems as sequentially and culturally specific social actions performed from a distance. (Knorr Cetina & Bruegger, 2002, 909)

In a narrow sense, the Investment Guide is *global* in the sense that it addresses and incorporates so many actors in ValueBank at some point in the course from conception to implementation; a wide range of actors are drawn towards making the investment machine a reality, as described earlier. This globality refers to establishing a community of practice within the organizational boundaries of ValueBank (Lave & Wenger, 1991). But such globality only touches on general practices that spread across the organization, and thus does not account for the specificities of the culturally specific action that the quote refers to above, that is, the contingent circumstances under which a specific advisor in a specific branch is operating. So, in this sense, global means general and distributed. And in particular it means instantiated by standardized technologies that are able to transfer and translate practices across time and space, as in the case with the Investment Guide.⁹⁸ The scope of financial activities are global in character, but microsocial in character due to the proliferation of standardized financial information and communication technologies (Knorr Cetina & Bruegger, 2002, 905).

The global condition is in the case of ValueBank contrasted by local, situated circumstances of branches and advisors. In every instance of transfer of the investment machine in ValueBank, aspects are added to the machine: other ways of engaging with the Investment Guide, other ways of including clients in the production

⁹⁷ 'Universal' here refers to the organization as the totality that employees and management act within. There is a world outside ValueBank as well, but in this instance only the internal dynamics is of relevance.

⁹⁸ This dynamics resembles Latour's distinction between the model of diffusion and translation (Latour 1987, 133ff, see also the discussion of translation vs. transportation in Latour 2005, 106ff).

Investment Machines

of investment proposals, other ways of collaboration, and other ways of expressing employees' consent and resistance towards the ambitions to build a general model of calculative practices in ValueBank. However global the investment machine operates in ValueBank, there is still a corresponding world of local practice that translates and alters the investment machine in ongoing motion.

Conclusions

In this last chapter, I return to answer the two questions that I raised in the introduction. I simultaneously consider the implications of carrying out a sociotechnical ethnography in ValueBank. Finally, I reflect on the implications of studying the practices that incorporate the Investment Guide through the conceptual lens of ‘investment machines’.

Recapitulation

The first question in my introduction was phrased: *how do the investment advisors respond to transformations of their work practices by the introduction of the Investment Guide?* As the result of the reconfiguration of investment practice in ValueBank, I suggest the conceptual term *investment machines* to describe how an assemblage of knowledge practices are joined together in a decision support system. I suggest the term ‘investment machine’ to identify the relations between humans and nonhumans that are constantly and dynamically established, maintained, and displaced by the introduction of the Investment Guide. The investment machine is a sociotechnical mechanism that incorporates advisors, systems developers, information systems, databases, clients, and managers in a heterogenous, organizational practice. By approaching the introduction of a decision support system in ValueBank as an *investment machine*, I have been able to identify multiple practices as social, economical, and technological relations that are entangled. In practice, the Investment Guide multiplies (that is, produce multiple actions and relations), despite management’s ambitions to homogenize and standardize advisors and practice. Some of the advisors simply disposed of the Investment Guide in their work, whereas others used it as a preparation tool before meeting with clients, as described in Chapter 4. I claim that an investment machine is an absorbent, but permeable conceptual tool that enables me to describe the different instances of interaction between advisors and the Investment Guide. This interaction is part of the heterogeneous multiplicity of local practice produced by the Investment Guide.

Thus, the term ‘investment machines’ designates the transformations that take place as the Investment Guide is introduced to branches, managers, clients, and advisors

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throughout the organization. The investment machine signifies an assemblage of heterogeneous practices that is able to accommodate to the differences and inconsistencies in the advisors' local practices. An investment machine is not a generalizing concept in the sense that it detaches itself from local practice. There are two implications of this. An investment machine serves as an analytical tool that manages to expand the relations and actions that are included in a description of practice. At the same time, it is able to embrace general guidelines that have been translated into standardizing systems such as the Investment Guide.

Resistance towards the introduction of the Investment Guide among the advisors is at most times accompanied by reflections about their overall benefits as their practices are subjected to transformation. The Investment Guide is one element in the business strategy of developing an *Investment Value Chain* that spreads throughout ValueBank. The Investment Value Chain is similarly one element out of several that together constitute the efforts that ValueBank put into staying competitive. An investment machine is able to mix together management initiatives, organizational culture, local action, technologies, humans and nonhumans. Describing the heterogeneity of actors and actions in singularizing terms as for instance exclusively management initiatives, technological changes, or organizational rigor misses the relations that transcend the boundaries of these terms. As described in Chapter 5, the organizational values that characterize ValueBank are inscribed in the operating procedures in the Investment Guide, which blur the boundaries of technology and organization. The investment machine is a notion that analytically matches the diversity of elements that all contribute to transforming the work of the investment advisors, and has enabled me to explore the intricacies of the transformations of actors in ValueBank.

The second question from the introduction was expressed in the following way: *how are the organizational transformations that occur interpreted by the advisors, systems developers, and management?* I claim that examining the situation as an investment machine makes it possible to study how the actors present in such assemblages are transformed: the advisors are changed by the influence of the Investment Guide, by management, project managers, clients, and developers. The Investment Guide is correspondingly transformed by reactions from advisors, clients and developers as they experience the transformations that take place with the introduction of a decision

support system. An example from Chapter 5 is the advisor FI whose familiarity with the Investment Guide led him to conclude the results prematurely.

In other words, the investment machine is mutually enacting advisors and the Investment Guide, thus reproducing the investment machine and financial actors in different ‘versions’ (Mol, 2002). Concurrently, the investment machine constitutes a mechanism of stabilization in local practice, but only as long as the actors in the machine are relatively stable. When for instance the Investment Guide is updated or clients’ risk profiles are changed, the investment machine is again destabilized and prone to reconfiguring the relations between the different actors. As I described in Chapter 4, the advisor MH uses the Investment Guide to prepare for meetings with clients, which turns the Investment Guide into a supporting tool that precedes the interactions that it was intended to encourage.

These evolving stages of mutual reconfiguration in the practice of the advisors are complicated to trace in one strictly disciplinary view because the various reactions from advisors are most often unexpected. From the point of view of STS, inconsistencies and unexpected occurrences are valuable contributions to a better understanding of the local practices, because they indicate how practice is susceptible to influences from many sources apart from the authoritative or rational. The advisors in the ValueBank branches are adhering to the guidelines described in the Investment Guide while simultaneously circumventing these guidelines. Hence, analysis in terms of the investment machine relates to the unexpected actions of advisors with the same attention as to the expected reactions from management.

I now move on to relate my answers to the questions from the introduction to methodological implications of engaging STS and financial markets. I have introduced the term *sociotechnical ethnography* as a way of methodologically grasping the diversity of objects present in ValueBank during my study. I consider ethnographic methods to be crucial for my study, and the addition of the word ‘sociotechnical’ to my empirical approach was intended to indicate a symmetrical approach to humans and nonhumans. Studying sociotechnical action implies studying the technologies that enable and assist in shaping social action. What I have set out to do is to point to the many connections between humans and technologies that evolve in a particular organizational setting. I have traced these connections in ValueBank by gradually assembling a tool box of analytical and methodological resources. My tool

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box was not fixed or complete from the outset, but has gradually been filled with notions, methods, techniques, and assumptions that proved useful for me as my study of financial practices and technologies in ValueBank evolved. Such work is not trivial, particularly considering the heterogeneity of resources I have put together. I feel that it has been necessary to collect and test a diversity of tools to be able to properly carry out the work for this dissertation.

In my case, the sociotechnical ethnography has given insights into ways of improving actual practice. The evaluation of the Investment Guide that I have described in Chapter 2, lead to significant changes in the design of future versions of the Investment Guide. A 'light' version of the Investment Guide was then offered to advisors who had little experience or few investment counselling sessions. My experiments with a sociotechnical ethnography has inspired the project managers CG and AM to incorporate elements of this approach in their future work with the Investment Value Chain, the business strategy that has been outlined for the entire bank. My collaboration with informants, advisors and project managers has enabled us all to generate better question of immediate relevance to the objects that we study and work with. In Chapter 4, I quoted CG and AM for expressing that a sociotechnical ethnography would help them in "tracing patterns of cooperation" and provide them with "better ways of approaching future detailed analyses in relation to further development of systems and products".

Being sensitive to the intricacies of local, sociotechnical practices as they occur around the organization provides the opportunity to gain knowledge of how financial actions is practically produced and reproduced. But, equally important, proximity to and engagement in the practices makes it possible to test assumptions, theories and methods and to experimentally mix and combine theories and techniques. In this way, I am part of the investment machines myself and my approach has continuously been transformed by studying and intervening in the development of the Investment Guide. I have entered financial practice in ValueBank with tools from STS to observe how the work of advisors is transformed by the introduction of a decision support system. In this process, my own assumptions about analytical fields, methods, and techniques have been influenced by practices that do not easily fit into disciplinary categorizations.

Having elaborated on the three fields of inquiry that initiated my study, I move on to some of the implications that accompany my investigations in ValueBank. There are analytical as well as methodological and empirical implications to this kind of study. Gathering together humans and nonhumans in a study of organizational transformations is not new to STS, but doing this kind of study in ValueBank is, both methodologically and conceptually. In the introduction to the dissertation, I outlined some of the relations between recent studies of markets and finance compared to more traditional studies in STS. There is a large amount of instruments, tools, systems, and procedures that thrive and evolve in the world of finance. All of these nonhumans are closely connected to the humans and organizations that are mutually reconfigured by and reconfiguring changing financial practices. Studying these practices as mechanisms that shape knowledges and identities could generate further understanding of sociotechnical assemblages as well as tools for approaching them. In my own study, the concept of *investment machines* reconfigures a view of a standalone, standardized information system thereby making visible multiple sociotechnical assemblages. The implementation of a multiplying technology has also enabled the investment advisors to enter into new relations with their tools in order to contribute to further tuning to the practice of investment counselling.

Black Shoals

Black Shoals Stock Market Planetarium is an animated night sky that is also a live representation of the world's stock markets, with each star representing a traded company. Fed by massive streams of live financial information, the stars glimmer and pulse, immediately flickering brighter whenever their stock is traded anywhere in the world. The stars slowly move across the sky, clustering together or drifting apart in response to the shifting affinities of their respective companies, growing or shrinking as the company's fortunes change. Digital creatures, a form of artificial life, inhabit this world, feeding on the light released by the stars, breeding, dying and slowly evolving – while trying to learn to live in this strange artificial ecology into which they've been born.
(<http://www.blackshoals.net/description.html>)

I will now relate my present study in ValueBank to my general interest in financial markets. Throughout this study, I have been inspired by several descriptions and interpretations of financial markets that contribute to widening the general perception of how these markets are constituted. One description has been particularly forceful in articulating how financial markets are dynamic and subject to interpretation: the Black Shoals Stock Market Planetarium, an art project created by Joshua Portway and

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Lise Autogena.⁹⁹ As I am now approaching the end of this dissertation, I will use Black Shoals in a dual mode to reflect on how the project has influenced the results of my study of ValueBank and the Investment Guide.

I see Black Shoals as further illustrating the points about financial markets that I have proposed throughout the previous chapters. Black Shoals is thus a way of analytically extending the range of the particular arguments that I have presented in relation to my study in ValueBank. Both projects express a reservation towards the general assumption in for instance economics that markets are conditioned by rational action and actors. Additionally, I view Black Shoals through the lens of the investment machine to emphasize its ability as a model to incorporate the dynamics of financial markets as compared to the Investment Guide.

The picture on the front cover of this dissertation is a clipping from an image that has been generated (in) the Black Shoals Stock Market Planetarium. The above description of the project illustrates how a graphical representation of financial activity is presented as a stellar constellation. But the description also points to something else: that within a singular depiction of financial activity reside numerous different objects and actions. Black Shoals is not just an art project intended to comment on the financial world's impact on society today. It is a *machine* that incorporates the world of finance and actively transforms it. The “massive streams of live financial information” that feed the project are only accessed with security clearance from the New York Stock Exchange. Additionally, the information that enable constellations and nebulas to form on the “animated night sky”, is conditioned by the presence of broadband connections to secure that information from stock exchanges around the world is fed to the computers that project the image onto the sky. Similarly, the stars are digital artificial creatures that evolve by feeding on the light generated by trading activity. The artists reflect on their project in the following way:

⁹⁹ The title of the project Black Shoals (a ‘shoal’ is a large number of fish swimming together) is deliberately intended to resonate with the influential Black-Scholes formula for calculating investment risk: “Black Shoals was designed as a kind of parody of the trading desk of the übermensch - the Mount Olympus from which they would survey their creation” (<http://www.blackshoals.net/thoughts.html>). See Chapter 1 in this dissertation for a description of the Black-Scholes formula.

The dome attempts to recall the feeling of the panopticon, that all this information and power gathered from around the world has been focussed in the room. We're interested in the double effect this has – the feeling of power accompanied by the vertiginous feeling of powerlessness when confronted by such overwhelming amounts of information.
(<http://www.blackshoals.net/thoughts.html>)

I claim that that the introduction of the Investment Guide has generated a similar double feeling of power and powerlessness among the advisors in ValueBank. The Investment Guide enables them to generate investment proposals that include information from so many sources in ValueBank (and beyond) that it greatly exceed their needs. And here lies the explanation to the powerlessness that accompanies the newly obtained feeling of power: having access to all available information about investment does not make the work of an advisor easier or less complex. I have observed the appearance of large amounts of *detached knowledge* that they are encouraged to relate to their practices themselves (Millo et al, 2005). The Investment Guide was constructed to delegate expertise and decision power to the individual advisor, but it has caused powerlessness as well. The powerlessness is caused by a separation of knowledge and practice, in which knowledge is taken out of the hands of the advisors and inserted in the Investment Guide. The implications of this separation of knowledge and practice in the work of the investment advisors are multiple. Some advisors simply rate the Investment Guide as irrelevant as for instance the advisor MH in Alpha branch, whereas others attempt to adapt to the changing conditions by transforming the way they organise their work.

This dissertation is the result of my study of changing relations between advisors, a decision support system, and the organization of ValueBank. Black Shoals is the outcome of an experiment that combines art, technology and finance. In the artists' own words, the purpose of their project is to "explore the aesthetics of information - this feeling of the sublime that accompanies such visualisations of huge quantities of information (from medieval maps of the world to representations of the human genome) - where that beauty comes from and why people desire it"
(<http://www.blackshoals.net/thoughts.html>). In my understanding, the Investment Guide has been visualized by management in a similar way: as a sublime, powerful mechanism that enables the advisors to control and take advantage of the totality of knowledge that reside in the organization. In contrary to Black Shoals, there has not been the same attention to the underlying dynamics of the constituent parts. The

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advisors, developers, the Investment Guide, clients, and management have created new nebulas, clusters, and constellations that have greatly exceeded the expectations of the project team and management. But the overlying structure – the Investment Guide – has not been able to fully absorb this organizational activity.

Models of the World

Contrary to Black Shoals as a depiction of the underlying activity in markets, I think that the Investment Guide fails to adequately depict how investment advisors, developers, clients, and management act in ValueBank. The differences and multiple effects that I have witnessed by studying the introduction of the Investment Guide leads me to see an *investment machine* in ValueBank, exemplified by the Investment Guide. I view ValueBank as a locus of activity related to financial markets in several ways, and the Investment Guide is just one, evolving element in the multiplicity of things going on in ValueBank. Black Shoals is an attempt to “understand something about the operations of big finance”, as the artists phrase it. They conclude:

[T]he market is only a natural expression of the particular artificial world model that it embodies - in the same way that the artificial life creatures in Black Shoals are natural expressions of the computer program that they exist in.
(<http://www.blackshoals.net/thoughts.html>)

In analogy to Black Shoals, the Investment Guide is a model of an investment advisor's practice. As a model, Black Shoals does not attempt to transgress the borders of this world. In contrast, and seen through my lens of the investment machine, the Investment Guide is an example of a model that aims at improving practice without subsuming the existence of more than a general understanding of the world it depicts. It is a model that attempts to improve the advisor's practice without thoroughly understanding the heterogeneity of such practice. This general model of the advisors' world distorts and reduces the heterogeneity of actual practice. For this reason, my approach is an important contribution to grasping the particular practice of investment advisors in a more detailed way. Concurrently, the contribution I make also provides new tools to approaching financial knowledge practices in novel and more elaborate ways.

Dansk resumé af:

***Investment Machines. An STS Study of a
Decision Support System in a Retail Bank***

**(Dansk titel: *Investeringsmaskiner. Et STS-studie af
indførelsen af et beslutnings-støttesystem i en bank*)**

Hvordan er det muligt at undersøge bankvirksomhed med udgangspunkt i *Science and Technology Studies* (STS)? Hvad er det en bankrådgiver gør, når han for eksempel behandler en låneansøgning eller prøver at forklare mig hvordan renten på et kreditforeningslån er afhængig af renteniveauet i EU? Disse spørgsmål var medvirkende til at sætte arbejdet med denne afhandling i gang, men i kraft af et øget kendskab til den finansielle verden og den praksis som udspiller sig, måtte jeg indse at svarene til den type spørgsmål ville være vanskelige at finde.

Jeg valgte i stedet at anskue bank- og finansverdenen på en anden, relateret måde, som mit studie af ValueBank illustrerer. Jeg har ledt efter indgange til en delvist lukket finansverden og har fået adgang til ValueBank, en bank med et bredt sortiment af løsninger til både private og virksomheder. Efter at have indgået en fortrolighedsaftale fik jeg mulighed for at færdes i bankens hovedkvarter såvel som i afdelingerne. Som modydelse blev jeg opfordret til at dele mine antagelser og erfaringer med to ansatte, som senere skulle vise sig at blive mine vigtigste informanter i forbindelse med mit empiriske arbejde.

Jeg vil nu vende tilbage til det første spørgsmål som blev stillet ovenfor: hvordan er det muligt at anskue bankvirksomhed med udgangspunkt i STS? Det har været vanskeligt for mig at beskrive den sammensatte praksis som repræsenterer rådgivere, ledere og systemudviklere i én, samlet fremstilling på grund af de mange aspekter som knytter sig særligt til finansiell ekspertise og viden. Ved at anlægge en STS-vinkel er denne forhindring dog blevet mindre, da det har givet værktøjer til at stille spørgsmålstejn ved implicitte forhold som er til stede i den finansielle verden. Nogle af de spørgsmål som er blevet genereret omhandler hvordan bankvæsen er en praksis som på forskellige måder drejer sig om at udregne, analysere, redegøre for,

repræsentere, spekulere i, forhandle om, stole på og vurdere viden og ekspertise inden for et særligt felt.

Sådanne forhold er på ingen måde unikke for bankvirksomhed generelt, men de særlige måder hvorpå disse praksisser manifesterer sig i institutioner og teknologier i ValueBank er i høj grad. Derfor er den primære opgave for mig i denne afhandling at undersøge hvordan begreber som analyse, finansiell spekulation, forhandling og tillid materialiseres i ValueBank, og samtidigt at undersøge hvordan denne materialitet – i form af teknologier – bliver bragt i anvendelse.

Afhandlingen er struktureret i to dele. I del 1 kaldet *Approaching ValueBank*, redegør jeg for det teoretiske og metodiske udgangspunkt for mit studie af et såkaldt beslutningsstøttesystem i ValueBank. Første del udgør grundlaget for at bygge en forståelse af de processer der er involveret i udviklingen og implementeringen af nye teknologier i en konkret markeds-mæssig kontekst, anskuet fra en STS-vinkel. Kapitel 1, *Opening the Black Boxes of Markets*, introducerer til markeder som en gruppering eller samling af elementer der bliver holdt sammen af humane og nonhumane aktørers situerede aktiviteter. Kapitlets titel refererer til et efterhånden klassisk credo inden for STS om at identificere dynamiske relationer som er blevet fastfrosset og stabiliseret – black boxed – i for eksempel hierarkier, institutioner og teknologier, med det formål at fasthold kontrol eller autoritet. I kapitel 2, *Exploring Multi-Sited Ontologies*, reflekterer jeg over min egen og andres forsøg med at få adgang til finansielle organisationer som ValueBank. Samtidigt omhandler kapitel 2 også hvordan min deltagelse i udviklingsprocesserne i ValueBank har påvirket min opfattelse af og viden om organisationen gennem dette projekt. Kapitlet introducerer desuden læseren til en ny metodisk tilgang, *socioteknisk etnografi*, en etnografisk inspireret tilgang som jeg har udviklet gennem dette projekt.

Udviklingen af denne sociotekniske etnografi har budt på en række udfordringer, hvor nogle fremstår som nye og tæt knyttet til den konkrete problemstilling som diskuteres i denne afhandling. Andre udfordringer er velkendte og til stede i de studier og tilgange som har været min inspiration i arbejdet med afhandlingen. Et eksempel kunne være hvordan det er muligt empirisk at studere en praksis som er meget påvirkelig af observationer og interviews. Eller hvilke konsekvenser det har at udføre

en socioteknisk undersøgelse, det vil sige at studere humane og ikke-humane aktører som ligeværdige for praksis.

Del 2 med titlen *Studying ValueBank* udgør den empiriske del. I denne del træder jeg ind på investeringsrådgivernes domæne for at illustrere hvordan *anvendelsen* af et beslutningsstøttesystem ændrer praksis for rådgiverne. Del 2 er ikke en udtømmende beskrivelse af rådgivernes arbejde, ligesom det heller ikke repræsenterer en redegørelse af ledelsesmæssig relevans for de udfordringer der præger finansielle virksomheder i dag. Det er derimod beskrivelser af hverdagens arbejde for investeringsrådgivere, som er funderet på tilsynekomsten af en ny aktør, Investeringsguiden, som har implikationer for rådgivernes arbejde og for deres opfattelse af deres arbejde. Kapitel 3, *The Socio-Technology of Calculative Space*, er et studie af den sociotekniske sammensætning af en afdeling i ValueBank. Jeg hævder at der er en uoverensstemmelse mellem den enkelte rådgivers lokale, situerede aktivitet og de generelle ambitioner om at standardisere og ensrette finansiell ekspertise, hvilket bliver udtalt i de måder hvorpå ValueBanks afdelinger fysisk bliver omorganiseret på. Denne nye organisering af afdelingerne manifesterer sig i eksperimentelle arbejds mønstre som påvirker relationerne mellem de forskellige typer af medarbejdere som findes i en gennemsnitlig afdeling i ValueBank. Jeg fremhæver at disse forandringer primært skyldes tilstedeværelsen af nærmest obligatoriske finansielle værktøjer som indruller rådgiverne i komplekse netværk der i én og samme omgang omhandler både rådgivning, regnskaber og monitorering. I kapitel 4, *Constructing Sociotechnical Calculators*, undersøger jeg de førnævnte uoverensstemmelser yderligere. Hvor kapitel 3 omhandlede organiseringen af afdelinger, går jeg i dette kapitel endnu tættere på den individuelle rådgiver for at undersøge interaktionen med beslutningsstøttesystemer. Jeg betragter sammenhængen mellem disse to kapitler som et skift fra hvad man kan betegne som et organisatorisk meso- eller mellemniveau til et mikro-niveau. Jeg argumenterer her for at rådgiverne delvist bliver omdannet til humane regnemaskiner på trods af ledelsesmæssige beslutninger om at inddrage rådgiverne aktivt i skabelsen af komplekse, sociotekniske vidensnetværk baseret på Investeringsguiden. Kapitel 5, *The Politics of Calculative Practices*, afslutter den empiriske del af afhandlingen med at diskutere den organisatoriske politik som udspiller sig i ValueBank i tilknytning til indførelsen af nye beslutningsstøttesystemer. Jeg fremfører det argument at en *investeringsmaskine*

skabes i forlængelse af ledelsens bestræbelser på at erstatte lokal, situeret viden og ekspertise med generelle skabeloner for rådgivningsarbejde i ValueBank. En *investeringsmaskine* er min måde at artikulere hvordan udviklingen af sociotekniske mekanismer i stigende grad baseres på stadig mere avancerede teknologiske løsninger, men social og menneskelige faktorer i tilsvarende grad ignoreres. I en STS-optik betyder dette dog ikke at rådgivernes betydning for rådgivningspraksis i ValueBank entydigt reduceres til fordel for teknologiske løsninger. I stedet kan man anskue de forhold som rådgiverne står over for som forandringsprocesser der forårsager forskydninger for alle involverede aktører, og som derved ombryder og genskaber netværk af mennesker og teknologier i form af en dynamisk *investeringsmaskine*.

Afhandlingen afsluttes med afsnittet *Conclusions*, i hvilket jeg opsummerer hovedpunkterne af mine empiriske undersøgelser. Jeg vender derudover også tilbage til de indledende spørgsmål fra introduktionen for at relatere disse til resultatet af mit studie i ValueBank. Afslutningsvis overvejer jeg de teoretiske og metodiske implikationer af at introducere og udvikle termene 'socioteknisk etnografi' og 'investeringsmaskine' som metodiske og analytiske greb på praksis.

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