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Soft Systems Methodology and Organizational Informatics

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Master's Thesis

Soft Systems Methodology and Organizational Informatics

- A Successful Partnership?

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Informatics and Systems Science

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Foreword

We would like to take the opportunity to thank people who have helped us in different ways to complete this thesis. First of all, our supervisor Anita Mirijamdotter who has given us support and encouragement whenever we needed it. She has also been able to understand and clarify our confused thoughts when we needed it the most.

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Marita Holst Lena Nidhall

Abstract

Information Technology is receiving a larger and more important role in organizations since more and more functions are built into technical systems. This means that the challenge of creating useful, workable systems for organizations is an important issue. Good organizational computing is a challenge because technical excellence alone does not guarantee that an Information System will be consistently used well. Organizations depend on computer professionals to design systems that help people to do their jobs well.

An Information System can be seen as two linked systems, i.e. the data storage and data processing system and the organization. The relation between these two can be seen as symbiotic – each help to define the other. It is however common to put more emphasis on the technical system and less on the organization in the analysis and design phase in information systems development. Earlier there have been attempts to solve this problem with a combining of one method for analysis of the organization followed by another for the analysis of the technical system.

This thesis tries to strengthen the analysis and design phase in information systems design through two approaches of systems design, which can complement each other. Both of them emphasize that the process of developing an information system needs to start with a focus on the organization served by the intended system not, as is so often the case at present, with attention focused on data and technology. A designer of an information system should already in the analysis phase consider the technical aspects as well as the social ones.

We have found that Soft Systems Methodology and Organizational Informatics can complement each other with different aspects in the analysis phase and thereby improve the process of designing information systems.

Key Words: Information systems, information systems design, organization, Organizational Informatics, Soft Systems Methodology

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1. Introduction

Information Technology (IT) is receiving a larger and more important role in organizations since more and more functions are built into technical systems. The importance of IT in organizations is shown by the fact that it does not only change the ways we work but also how we think and thereby it affects the dominating cultures in an organization. (Neuman, 1997)

This means that the challenge of creating useful, workable systems for organizations is an important issue. Good organizational computing is a challenge because technical excellence alone does not guarantee that a computer system will be consistently used well. Organizations depend on computer professionals to design systems that help people to do their jobs well. Poor computer systems can undermine the effectiveness of organizations, or even drive them into bankruptcy.

According to Hirschheim and Klein (1989) Information Systems Development (ISD) involves making a number of implicit and explicit assumption. These assumptions have to do with the nature of human organizations, the nature of the design task and what is expected from the designer. The designers play a central role in the guiding of the process of ISD as well as the system itself. That our worldviews and perceptions play an important role in the design process is also pointed out by for example Checkland (1994b), Ehn and Malmborg (1998), Mirijamdotter (1998) and Kling (1996). One view we have found interesting in this study is that technologies are not neutral, objective, or independent, instead they are social because people construct them (Orlikowski, 1999).

Another view is that every Information System (IS) can be thought about as two linked systems. The rounded square to the left in figure 1.1 can be seen as the data storage and data processing system, which provides support to the people in the organization, the rounded square to the right. Checkland (1999) argue that the relation between the technology and the activity, which it supports is symbiotic - each can help define the other. These two views can bee seen as a starting point for our work.

Our work began with the idea that information system development should start with an extensive analysis of the organization before the work with the technical IS started. During our literature review we found an article by Henfridsson et al. (1997) where Organizational Informatics (OI) was mentioned and we thought that this was the answer. Here was an approach that takes the organization into consideration in its work. We began to search for articles and books that were written within this area. We soon found that Rob Kling was one of the founders of this approach and he had also written a lot about it. Organizational

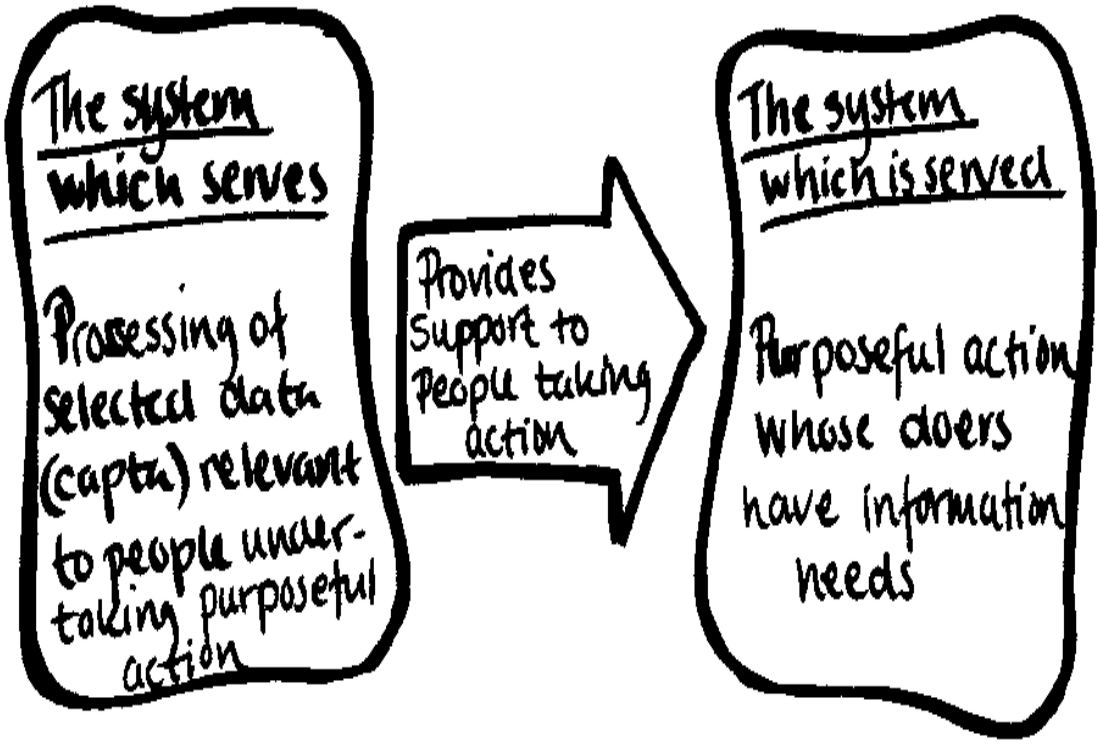

Figure 1.1 Two linked systems that are entailed in the concept ' an Information System'.

(After Checkland and Holwell 1998a. p. 111)

Informatics refers to the interdisciplinary study of the design, uses and consequences of Information and Communication Technology (ICT) that takes into account their interaction with institutional and cultural contexts (Kling, 1992; Kling & Leigh Star, 1997). One key idea is that ICTs do not exist in social or technological isolation. Their cultural and institutional contexts influence the ways in which they are developed, the kinds of workable configurations that are proposed, how they are implemented and used, and the range of consequences that occur for organizations and other social groupings. (Kling, 1992)

Our reading left us with many good ideas but we also found that Kling did not declare in so many words what theories he based his work on, and he did not present a method or methodology to use in ISD. Therefore we decided to find out if we could fill this gap with an approach with similar ideas and a well-developed methodology. The obvious choice was Soft Systems Methodology (SSM), a methodology we were familiar with, it is also based on similar ideas of an IS and it is a well-established methodology.

Soft Systems Methodology (Checkland, 1981; Checkland & Scholes 1990) is a well-known methodology and has been used for systems design (Checkland,

1981) and for information systems design (Checkland & Holwell, 1993, 1998a; Winter et al., 1995). SSM is a methodology, which tries to solve real-world problems within the realm of social systems. It is suited for ill structured and complex problem situations and the focus is on people's perceptions of reality, their worldview.

The ideas of ISD that a first overview of Checkland and Kling show is that if a system supports another, it is a basic tenet of systems thinking that the system that serves can be conceptualized only after prior conceptualization of the system served (Checkland, 1981; Winter et al. 1995). This is so because the form of a serving system will be dictated by the nature of the system served. Further, Kling (1993) argues that practitioners who compute for the future in organizations need some refined skills in organizational analysis to understand appropriate systems requirements and the conditions that transform high performance computing into high performance human organizations.

The process of developing an information system needs to start with a focus on the organization served by the intended system not, as is so often the case at present, with attention focused on data and technology. Both Kling (1994) and Checkland (1995a) emphasize this strand. It is also most important to have a good theoretical framework of the organization when designing its IS. Orlikowski and Gash (1994) point out the importance of theoretical frames. This focus on the organization still can not ignore the technology, there has to be some balance.

In this thesis we are interested with systems design and the analysis phase that starts the process of information systems development. There have been many attempts to bridge the gap between the analysis of organizations and the more technical analysis necessary for Computer Based Information Systems (CBIS), among them Stowell (1985), Mansell (1993) and Probert (1992). SSM is often used as a tool for analysis of the organization and some other tool is then used for the more technical domain i.e. the design of computer application as an integral part of organizational change. We are not interested as the authors mentioned above to bridge the gap with some technical tool; instead we are interested to strengthen the analysis and design phase. We consider the two phases' analysis and design as inseparable and therefore they can be seen as one phase. A designer of an IS should already in the analysis phase consider the technical aspects as well as the social ones. An attempt towards this is made by Checkland and Holwell (1998a) with the POM-model (Processes for Organization Meanings), but further development is needed. We believe that Organizational Informatics can present some aspects that will help the designer with this question.

It is our purpose to find out if SSM and OI can complement each other with different aspects and thereby improve the process of information systems development. We do not intend to combine SSM and OI to form a new methodology for information systems design. We will however discuss some issues concerning combination of methods and methodologies that are discussed at present in the academic world. This is done because issues concerned with combining and complementing are interrelated in our opinion.

We will study Kling's work and thereafter make a comparison between his work and the work of Checkland. The purpose of this work is hence:

To explore whether Soft Systems Methodology and Organizational Informatics can complement each other into an enhanced way of analyzing and designing Information Systems.

The structure of this thesis is as follows. After this introduction, the second chapter describes our research strategy and important concepts. Chapter three gives a closer presentation of Soft Systems Methodology. In chapter four Organizational Informatics is outlined in a fuller description. Our analysis and discussion is presented in chapter five and in chapter six we draw some conclusions and give some suggestions for further research.

2. Research Strategy

In this chapter we will discuss some questions that are important for this thesis. It begins with a short explanation of qualitative research, followed by a brief presentation of the debate on combining methodologies. Thereafter will we give an introduction to the framework for our analysis and to the concepts we build our analysis upon. We will declare our own standpoint in the areas mentioned above before giving the limitations of our study.

2.1 Qualitative Method

The qualitative approach is grounded in a philosophical position, which is broadly interpretive in the sense that it is concerned with how the social world is interpreted, understood, experienced or produced. Qualitative research aims to produce understanding on the basis of rich, contextual and detailed data (Mason, 1996). Qualitative research involves the use of qualitative data, such as interviews, documents, and participant observation data, to understand and explain social phenomena. There has been a general shift in IS research away from technological to managerial and organizational issues, hence an increasing interest in the application of qualitative research methods. (Myers, 1997)

It is a common practice to distinguish between primary and secondary sources of data. Generally speaking, primary sources are those data which are unpublished and which the researcher has gathered from the people or organization directly. Secondary sources refer to any materials (books, articles etc.) which have been previously published. (Myers, 1997)

Text, unlike spoken words endures physically and thus can be separated across space and time from its author, producer, or user. They can thus often have to be interpreted without the benefit of indigenous commentary. Meaning does not reside in a text but in the writing and reading of it. Once words are transformed in to a written text the gap between the author and the reader widens and the possibility of multiple reinterpretation increases. The text can say many different things in different contexts. (Hodder, 1994)

2.2 Combining Methodologies

Since our study has the objective to find out whether SSM and OI can complement each other we will give a short reference to the ongoing debate on the issue of combining methodologies. As we mentioned in the introduction we see issues concerning combining and complementing as interrelated. One might

say that two things complementing each other can be a starting point to a possible combining. Our references to the debate starts with one side that argues that if the methodologies reside in different paradigms[1] they are incommensurable. This strand is taken by for example von Wright (1986) and Burell and Morgan (1979). On the other hand Mingers and Gill (1997) argue that one can combine methodologies both within and between different paradigms.

There is also a debate whether one should combine methodologies at all (Midgley, 1997), as well as a search for one paradigm which will integrate the many perspectives associated with IS (van Gigch & Pipino, 1986; van Gigch & le Moigne, 1989; van Gigch, 1991). Flood and Romm (1995) acknowledge that any attempt to methodological pluralism will involve the researcher making assumptions that other methodologists may not agree with. It is therefore very difficult to suggest that there is genuine commensurability between paradigms. Flood and Jackson (1991) present Total Systems Intervention (TSI) as a meta methodology because it offers direction to systems practitioners wishing to choose between methodologies, and relate them together, in a theoretically informed manner. Methodologies are not so much mixed in TSI as related together.

In a study made by Stolterman (1992) about systems design, the systems designers say they do use some method, but not the complete method, instead they pick some part of a method they conceive to fit in the particular situation. Stolterman call this the hidden rationale of design work. This is also mentioned as one of the advantages with multimethodology (Mingers & Gill, 1997). Bergvall-Kåreborn (2000) believes that each designer moulds the theories to fit his assumptions of the world. This puts the discussion of paradigm or methodology incommensurability out of the context of mixing methods according to her.

Finally, Mingers and Gill (1997) claim that there are three main arguments in favor of multimethodology. Their first argument is that real world problem situations are inevitably highly complex and multidimensional. Different paradigms each focus attention on different aspects of the situation and so multimethodology is necessary to deal effectively with the full richness of the real world. Further, they argue that an intervention is not usually a single, discrete event but is a process that proceeds through a number of phases. These phases pose different tasks and problems for the agent. However, methodologies

[1] Paradigm includes “the most fundamental set of assumptions adopted by a professional community that allow them to share similar perceptions and engage in commonly shared practices” (Hirschheim & Klein, 1994. p. 108).

tend to be more useful in relation to some phases than others, so the prospect of combining them has immediate appeal. Even where methodologies do perform similar functions, combining a range of approaches may yield a better result. Their final argument is that further consideration of the philosophical and theoretical aspects of multimethodology is timely since many people are already combining methodologies in practice (which was pointed out in Stolterman's research mentioned above).

2.3 Framework for the Analysis

A theoretical perspective is really a picture of what kind of data, which will be important in the research, i.e. what will catch the central themes in the area of research. After deciding on such a perspective it will constitute the frame of ideas for our understanding. The theoretical perspectives guide the attention towards some kinds of data and bypass some other (Eneroth, 1984). In the following part of the thesis a presentation of our analysis model will be conducted. We begin with an overview of the model, which is followed by a further description of each part of the analysis model. The importance of each part will also be discussed.

In our analysis we use the hierarchical framework given by van Gigch and Pipino (1986), van Gigch and le Moigne (1989) and van Gigch (1991). We have chosen to do our analysis in these categories since the concepts are fundamental for all research and we also believe that they can point out if it is possible for SSM and OI to complement each other. This model will also give us some help when it comes to the handling of the large data mass, which we will collect. This framework will help us to divide the data into smaller parts, and thereby make it easier to comprehend and analyze the whole. We must however point out that even though we divide the data mass into parts in the analysis, the parts are still interconnected as a whole.

This framework consists of three basic levels which are; *The Epistemology of IS*, at this level we discuss theory of design (in figure 2.1 this is the square at the meta-level). *The Science of IS,* at this level we discuss design, methods and methodology (in figure 2.1 this is the square at the object-level). Finally, *the Practice of IS*, where we discuss the implementation of design (in figure 2.1 this is the square at the lower level). These three levels constitute the Discipline of Information Systems. (See Figure 2.1.)

In 1985 Checkland presented a general framework for research, which consist of three parts. They are a *framework of ideas* which are embodied in a *methodology* that is applied to an *area of concern* (Checkland, 1985). The researcher may

learn things about all three elements and it may lead to a change on ideas or methodology. Our interpretation is that these three parts can be directly connected to our analysis model. This means that frames of ideas is directly connected to the epistemology, and methodology is connected to science, while area of concern is connected to the practice.

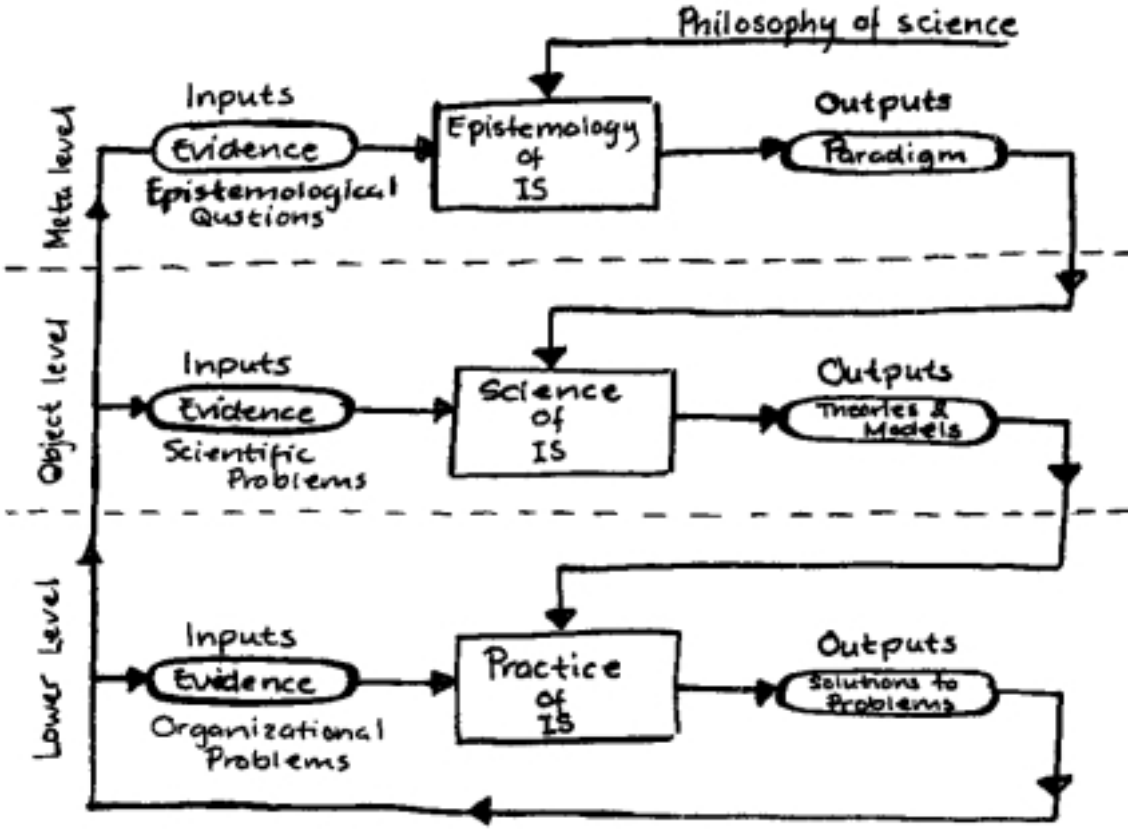

Figure 2.1 Hierarchical framework of the discipline of Information Systems.

(After van Gigch & Pipino 1986. p. 74)

Epistemology is an essential concept since it points out how the researcher thinks the world should be investigated. If SSM and OI are too far apart when it comes to the epistemological view it may be more difficult to let them complement each other. The Science is a part where the models of SSM and OI can complement each other. It is the different parts in the models used for the analysis of the organization can be related to each other. Practice is an essential part in the deciding of whether SSM and OI can complement each other. This would mean that the designers have some more tools to chose between in the real world.

2.3.1 Epistemology

Epistemology of IS (meta-level in figure 2.1) involves the activities of inquiry which seek to define the origin of knowledge of the discipline, to justify its methods of reasoning, and to enunciate its methodology. This level receives inputs from meta-meta level, which formulates the philosophy of science, and it takes place at the meta-level. The output of the meta-level is the elaboration of a paradigm and to guide the inquiry and the solution of problems of the science of IS at the object level. (van Gigch & Pipino, 1986; van Gigch & le Moigne, 1989; van Gigch, 1991)

Endemic in all studies of reality is our possibilities to know something about it (epistemology) and our assumptions about reality (ontology). These two assumptions create different conditions for the methods and techniques we use to study our reality (Löwgren & Stolterman, 1998). According to Mumford (1981) ontology and epistemology are tightly bound together, because a person's belief about what sort of world the person lives in will determine how the person sees this world and behaves in it. Similarly, the way the person perceives and behaves will determine the beliefs and interpretation of the world. We see the philosophy of science (the meta-meta level) as ontology in our analysis.

Orlikowski and Baroudi, (1991) and Walsham (1995a, 1995b) discuss two different epistemological approaches those are the positivistic and interpretative. The positivistic perspective is the assumption that there are overall relations and laws that can be identified and examined with logic and a rational behavior. The interpretive approach is the assumption that there are no overall qualities that describes the reality because the observer decides what reality looks like and this means that there is no true reality.

2.3.2 Science

The Science of IS (object level in figure 2.1) is defined as those activities by which the theories and models used to describe, explain and predict the behavior of information systems are developed. This level receives inputs in the form of a paradigm from the meta-level and it receives evidence, in the form of problems, from the lower levels of inquiry. The output of this level is theories and models to guide the practice of IS (the lower level). (van Gigch & Pipino, 1986; van Gigch & le Moigne, 1989; van Gigch, 1991)

The theories and models are often presented in a method or a methodology. The concepts of method and methodology are contradictory. Methodology is a Greek term, which means the study of methods. The two concepts are however, often used for the same concept under different names, and sometimes the same name is used for different phenomena (Cronholm & Ågerfalk, 1999). Jayaratna (1994) justifies the use of the term methodology with the claim that the term is "*pragmatically well established within the field of information systems to mean the same as method*". The Oxford dictionaries of current English defines methodology as both the science of method but also as a body of methods used in a particular activity (Concise Oxford Dictionary of Current English, 1996). We have chosen to follow this definition that a methodology can be seen as a body of methods used in a particular activity.

2.3.3 Practice

The Practice of IS (Lower level in figure 2.1) involves all those activities by which the theories, models and technology are applied to the real world of organizations and systems. These models and theories are received as inputs from the object level and are used to solve organizational problems found in the environment. The outputs of this level are solutions to those problems. (van Gigch & Pipino, 1986; van Gigch & le Moigne, 1989; van Gigch, 1991)

2.4 Our Framework

It is now in its place to present our own epistemology, science and practice, since this affects our work and it is also what our work builds on. In this thesis we will not deal with a hypothesis to verify or refute but instead will we use research categories within which lessons can be sought. This will entail trying to make sense of the literature using the categories epistemology, science and practice in our analysis. We will structure our analysis around these concepts. Since we have found some resemblance between SSM and OI we believe that our analysis of SSM and OI will point out if they can complement each other. It is important that there are similarities especially at the top-level, but we also need to find some differences, because it is within the differences that they may complement each other and thereby strengthen the ISD work.

2.4.1 Our Epistemology

Our Epistemology includes systems thinking. This means that we consider the world to be complex and that systems thinking can help us to make sense of the complexity. We have a view on reality as complex, confused and under constant change. Systems thinking provide us with the ability to strive for wholeness when interpreting the material during the literature review.

We have a view of the analysis-phase inseparable from the design-phase in information systems development. A comprehensive analysis of the organization before starting to design is most important in our view. This is what will give directions to the design of the CBIS.

When it comes to the issue of methods or methodologies complementing each other our personal view is that it is possible to let tools and methods from different methodologies complement each other if careful consideration and reflection is done to make sure that they fit to each other. We also think that letting different approaches complement each other can be made and in fact already is made both within and across different paradigms. The complementing of different methodologies or 'tools' may give a more complete 'toolbox' to use in the analysis and design. Every situation of research or work is unique in some way and this mean that some adaptation of methodology will be necessary. If the designer have several methods or models to chose from the designers work will be more flexible and it will also make the designer able to adopt his method to the actual situation. We believe that the picking of the 'best' parts from different methodologies can be an excellent way to conduct the work.

2.4.2 Our Science

We have a qualitative approach to our research. This means that we have an interpretive approach since there is no law waiting to be discovered in a case like this. Therefore our interpretation of the literature studied in this work will be the base, in addition with our pre knowledge, as well as the outcome of this work.

In our analysis we will use the framework presented by van Gigch and Pipino, (1986) van Gigch and le Moigne (1989) and van Gigch (1991). The discipline of IS is presented in a hierarchy of inquiring systems. The framework can for example be compared to the framework of research presented by Checkland (1985). We see this as a general framework and it can be found in research from many disciplines. This framework was presented in more detail in section 2.3.

2.4.3 Our Practice

The practice of our work is to do a literature review and we will focus on the works of the two main founders of SSM and OI. The literature study should help us to get a fuller view on the area of our study. The aim with the study is to find out if it is possible to use SSM and OI as complements to each other and thereby give an enhanced methodology of systems design. This methodology will draw on their respective differences; it is within the differences that the complementing or 'borrowing of tools' may be done. And through this, hopefully, facilitate designers to make better designs.

2.5 Limitations of This Study

The fact that our work is conducted as a literature study gives some implications, our interpretation of the literature is done in the context of our situation today. This means that the outcome might have been different in some other context. One other implication is that we are interpreting the interpretations of someone else's work. We considered the possibility of conducting a case study and if this would improve the outcome of our work. We realized however that as we are inexperienced users of both SSM and OI a case study conducted by us would not have given the knowledge necessary for this thesis. In line with this argument goes the fact that even if there are some limitations with a literature study we are studying the experts in the areas of SSM and OI.

This thesis will however, only present an insight into whether SSM and OI can complement each other. The time available for us in this study is another fact that prevents us from conducting a case study. However, we believe that such a study would be valuable and would deepen our understanding, but for the time being we are forced to leave it for the future.

OI consist of many researchers in different disciplines within several areas relevant to information systems. In this thesis we focus on the design of systems, therefore, other areas will only be mentioned in short. We have also chosen to limit our study to the literature presented by Rob Kling, who is one of the founders of OI. Concerning SSM we also decided to concentrate on literature of Peter Checkland since he is usually regarded as the main founder of this approach.

3. Soft Systems Methodology

In this chapter we will present the first approach in our study, namely SSM. We begin with a short review on the background of SSM. Thereafter we give a brief presentation of the Appreciative systems model, since SSM is a way of making practical use of the notion of an Appreciative system. This is followed by the methodology itself, The learning cycle of SSM. The four stages in the methodology will be presented in some detail. The POM-model is presented thereafter, since this is the model, which puts the information system in its 'place' in an organization. Finally, some critique will be given followed by a summary of the chapter.

3.1 Background of Soft System Model

Soft Systems Methodology with Peter Checkland as one of its founders evolved from a program of action research at Lancaster University more than 30 years ago. The research aimed at finding ways of dealing holistically with ill-structured real-world problems by using systems thinking. An ill structured, complex problem situation is a situation which people feel could be improved, but they do not know exactly what the problem is. (Checkland, 2000)

The intellectual starting point was that the real-world experiences would enable the researcher to gradually build up knowledge of systems of various kinds: production systems, distribution systems, purchasing systems, etc. and that this knowledge would support the better design and operation of such systems in real situations. It turned out however that Checkland and his colleagues had to distinguish between two fundamentally different stances within systems thinking, what now is known as hard and soft systems thinking[2]. Checkland had moved away from working with the idea of an obvious problem which required solution, to that of working with the idea of a situation which some people for various reasons, may regard as problematical. SSM was emerging as an organized learning system. (Checkland, 2000) Checkland (1981) notes that his work provides a basis for concrete action from an interpretative stance and that SSM implies a model of social reality in the phenomenological[3] tradition.

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[2] "The crucial difference is between on the one hand an approach which assumes *the world* to be a complex of systems, some of which may be malfunctioning, and on the other an approach which makes no assumptions about the nature of the world, beyond assuming it to be complex, but assumes that *the process of enquiry* can be organized as a system of learning. The approach which assumes the world to be systemic is 'hard'; the approach which assumes that the process of enquiry can be systemic is 'soft'." (Checkland, 1995b)

[3] Phenomenology = The study of phenomena. It stresses the careful description of phenomena in all areas of experience. (Webster, 1989)

SSM has been pictured in a number of different models. However, in *Soft Systems Methodology in Action* (Checkland & Scholes, 1990) the Seven-stages model (Checkland, 1981) was no longer felt able to capture the now more flexible use of SSM and the Two-stream model (Checkland, 1988) was felt to carry a more formal air than mature practice use of SSM characterized. Now the learning cycle of SSM was presented. It is this latest version of SSM we will describe in more detail in this thesis.

Action research has played an important role in the development and building of SSM. During the years concepts have been developed, tried out in real problem situations, modified or rejected and this process has brought SSM to what it is today. SSM is a form of action research in itself. Action research approaches have become both generally accepted and widely adopted within the research tradition of both systems theory and information systems. In this process the researcher enters a real-world situation and aims both to improve it and to acquire knowledge (Checkland & Holwell, 1998b). Action research must begin with, it is emphasized by Checkland and Holwell (1998b) that the researcher declare the framework of ideas, methodology and area of concern, which constitutes all research. This is what makes it possible to part this research from novel writing.

This short review of the background and development of SSM will be followed in the next section by an introduction to the Appreciative systems model. This theory can be seen as an underlying assumption of SSM. It has influenced some of the analyzing methods in SSM, especially analysis three, which will be further described in section 3.3.1. First however the theory of Vickers.

3.2 The Appreciative Systems Model

The concept of the Appreciative system was first outlined in 1963 by Vickers in the book *The Art of Judgement*. Vickers started by seeking an understanding of human affairs in general, and organizational life in particular. According to Vickers (1995) the mix of courses to be followed in an organization is not given from outside, they are generated internally by the previous history of the system itself and its interaction with the environment. The actions in the mix of courses to be followed are perceived as relationship maintaining (or eluding) rather than as a striving to achieve goals. Vickers set out to understand motivation, in terms of norm holding a concept derived from information systems. He was replacing both the goal seeking and the cybernetic (goal seeking with feedback) models (Checkland, 1981). It is the replacement of goal seeking relationship managing which most clearly marks Vickers theory of what he calls ‘Appreciative

systems' as different from the orthodox organizations model. For Vickers, managers set standards or norms rather than goals (Checkland & Holwell, 1998a). The Appreciative system brought together concepts of information, communication, and control and applied them in the provinces of psychology and social sciences.

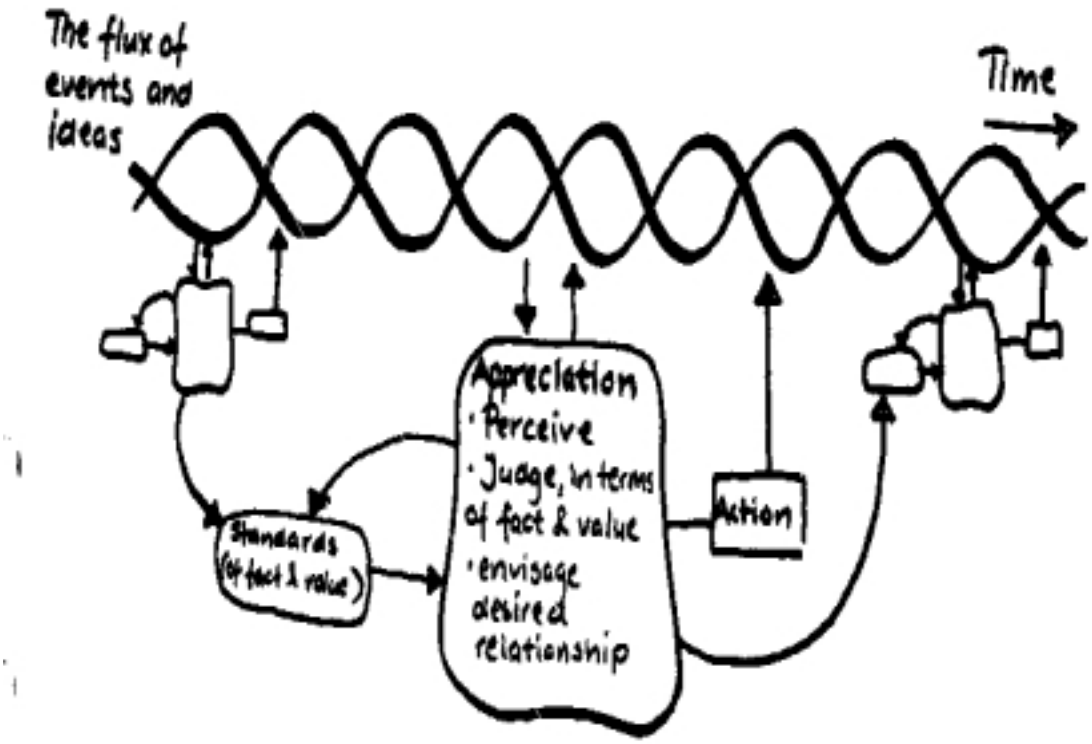

Figure 3.1 The structure of an Appreciative Systems Model expanded.
(Source Checkland & Casar 1986)

Checkland and Casar (1986) expressed Vickers ideas pictorially in the form of a model, something that Vickers never did himself. In the rounded square at the center of figure 3.1 the appreciation of both reality and value judgements take place.

Both reality and value judgments stem from standards of both fact and value, which can be found in the smaller shape at the left of the center. These activities lead to a view on how to act to maintain, modify or elude certain forms of relevant relationships. Action follows from this, this is pictured at the right of the center in a small square. The source for the standards by means of which what is noticed is deemed good or bad, relevant or irrelevant and so on is the previous history of the system itself, this is shown by the smaller figures both at the left and at the right of the center figure. They are of the same form and content as the larger at the center. The present operation of the system may as

well modify its present and future operation through its effect on the standards. The system is operationally closed via a structural component that ensures that it does not, through its actions, reproduce exactly itself. It reproduces a continually changed self, by natural drift. The Appreciative system is always open to new inputs from the flux of events and ideas. (Checkland, 1994b)

SSM is a way of making practical use of the notion of an Appreciative system. The Appreciative systems theory and SSM do not replace the older models of an organization but rather subsume and enhance them. In SSM, focusing on a unitary goal is the occasional special case of debating multiple perceptions and proceeding on the basis of accommodations between different interests. For Vickers, managing relationships is the general case of human action, the pursuit of a goal the occasional special case. (Checkland & Casar, 1986)

3.3 The Learning Cycle of SSM

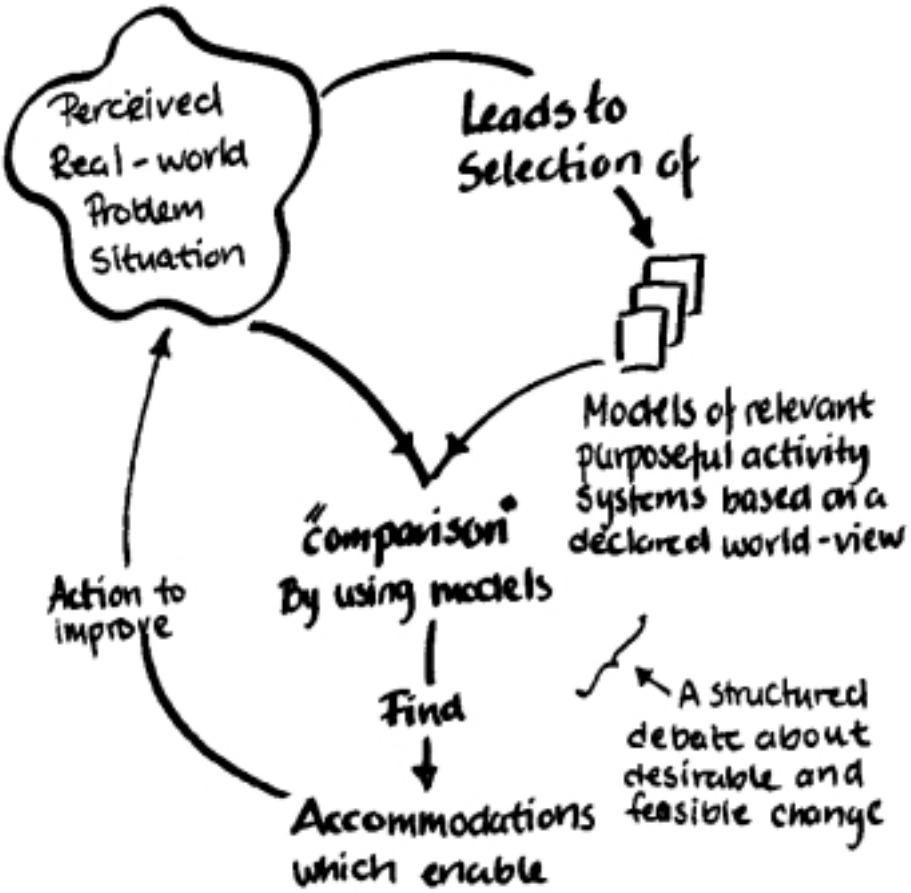

Figure 3.2 The learning cycle of SSM.
(After Checkland, 2000. p. S16)

The methodology of SSM is shaped like a four-activity model. The four activities can be seen as an organized learning system where the process is in principle ongoing. The learning cycle can start at any point, but it is usually started with the exploring of a problem situation. The learning cycle is pictured above in figure 3.2, and its parts will be presented in more detail below.

In the cloud-shaped form at the top left of figure 3.2 the learning cycle starts with a perceived real-world problem situation that needs to be explored, that is, finding out about the problem situation. The exploration leads to a selection of relevant purposeful activities, (at the top right of figure 3.2) which then are modeled. These models are used in a structured discussion where the models are compared with the perceived problem situation. The aim of the discussion is to try to find accommodation about how to improve the problem situation, this is pictured at the bottom center of the figure. Finally, when accommodation is reached, actions to improve the problem situation are taken, indicated by the arrow which points up to the starting point. The improvements change the situation, new problems arise and the learning cycle starts again. (Checkland, 2000)

3.3.1 Finding Out About a Problem Situation

The process of finding out about a problem situation starts with the building of rich pictures. The complexity of human affairs is always a complexity of multiple interacting relationships, and Checkland and Holwell (1998a) claim pictures to be a better medium than linear prose for the expression of this. Pictures can help to encourage holistic thinking about a situation. The use of rich pictures at this stage of the process has shown to be a useful way of starting the exploratory discussion with people in a problem situation. It also contributes to the understanding of the social and cultural features of the situation.

The understanding of the social and cultural features are also provided by Analysis One, Analysis Two and Analysis Three (Checkland & Scholes, 1990). All three will complement the work on selecting, naming and modeling relevant human activity systems. In Analysis One attention to the list of possible, plausible ‘problem owners’, selected by the ‘problem solver’ will be drawn from the rich pictures, and this is always a main source of ideas for ‘relevant systems’ which might be modeled. For Analysis Two, the social system’ analysis, a model which assumes a social system to be a continually changing interaction between three elements is used. The elements are roles, norms and values, each continually define, redefines and is itself defined by the other two. The Analysis Two and Analysis Three will comprise a framework for the social and political analyses. Politics is taken to be a process by which differing interests reach

accommodation. Through the answering of the power related questions in Analysis Three the cultural appreciation built up in Analyses One and Two will be enriched. The ongoing analysis of commodities, which embody power and the roles/norms/values framework, are simply expressed. They are easily kept in memory, and they guide all the thinking, which goes on throughout an intervention. (Checkland & Scholes, 1990)

It is important though, to "… *adopt the view… that social reality is no reified entity 'out there' waiting to be investigated. Rather, it is to be seen as continuously socially constructed*[4] *and reconstructed by individuals and groups…"* (Checkland, 2000, p. S24). The Model of the Appreciative systems from the work of Vickers (Checkland & Casar, 1986) gave the usable framework that underpins Analysis Two and Analysis Three. The Appreciative system model describes a social process, while Analysis Three covers one of the main determinants of the *outcomes* of that process, namely, the distribution of power in the social situation.

The metaphor of the 'commodities', which embody power, is used to encourage discussion. Views can be elicited on what the participants have to possess to be powerful in a group or organization. Recent history of the organization or group can be questioned and/or illustrated in these terms. All with the aim to find how this particular culture works, what change might be feasible and what difficulties would attend that change. Even though the aspiration is to do an 'open' analysis, great sensitivity and tact has to be used in Analysis Three. In many human situations there is not the confidence necessary for open discussion of issues hinging on power. (Checkland & Scholes, 1990)

3.3.2 Building Purposeful Activity Models

During the second phase of the learning cycle, it is important to remember that the purposeful activity models used in SSM are intellectual devices whose role is to help structure an exploration of the problem situation being addressed, they

[4]Apart from the view presented by Checkland above that we ourselves create reality, social constructionists do not accept the view that knowledge finds justification through observations (Magnusson, 1998). Reality is not a map over the existing world. and knowledge is something that is created in the practices we are part of. Therefor science is a practice where we create knowledge i.e. we do not search for knowledge. The thought that knowledge has an objective base that it is possible to find knowledge by "reading" the reality is questioned. Instead each society or culture makes its own construction of reality (Magnusson, 1998). Weick (1979) say that reality can be seen as a social construction, i.e. it is not objective but rather subjectively interpreted and experienced.

do not represent some part of the world. They are accounts of concepts of pure purposeful activity, based on declared world-views. They can be used though, as devices to stimulate, feed and structure the debate of a real situation. The models are intended to lift the thinking in the situation out of its normal, unnoticed, comfortable grooves. Therefore, the designer should not only make models, which map existing structures (Checkland, 1999). System models do not have to be restricted to purposeful activity that you would expect to find in some way institutionalized. A system to resolve conflicts on resource use might be relevant (Checkland, 1994a).

A clear definition of the purposeful activity to be modeled is required to build a model of a concept in SSM. This is what is called root definitions (RD). A root definition is a short statement that expresses the core purpose of the chosen system. A well-formulated RD should contain the elements within the mnemonic word CATWOE (Checkland, 1981; Checkland & Scholes, 1990). CATWOE identify the system's:

Customer - Anyone that would be beneficiaries or victims of the system
Actor - The persons who perform the transformation process
Transformation process - The process of transforming input to output
Weltanschauung – The worldview which makes the transformation meaningful
Owner – The persons who can stop the transformation
Environmental constraints – External elements which limit the system

The RD can also be formulated through the use of PQR and is then formulated as "*Do P by Q in order to contribute to achieving R"*(Checkland, 2000, p. S28). PQR answers the three questions: what to do (P), how to do it (Q), and why do it (R). The use of CATWOE, RD and PQR prevents the thinking from being too narrow and ensures that the thinking covers at least three levels, those of the system, sub-system and wider system. Although, different people might well make different judgements about which level to take as that of the system. (Checkland & Scholes, 1990)

When the RD has been defined, models of purposeful activities can be built, otherwise the designer can chose to do the reverse, RD can be defined on models which were built first. The activities, which are needed to transform input to output, are represented in the activity models. One has to ask what activities are necessary, and in what order they should be done. Each activity should be expressed as a verb. The activities are structured in a logic order and activities that depend on each other are linked. The model should consist of 7±2 activities. The models of purposeful activity are linked together with a sub system, which monitor and control the operational system. It is necessary to

define the criteria by which the performance will be judged. The three (or five) E's does this. The E's are (Checkland et al., 1990):

(E_1)*Efficacy* – will the means work
(E_2)*Efficiency* – will it work with minimum recourses
(E_3)*Effectiveness* – does it contribute to the long-term goals
(E_4)*Ethicality* – is the transformation morally correct
(E_5)*Elegance* – is the transformation aesthetically pleasing.

3.3.3 Exploring the Situation

Now it is time to set the human activity systems against actual perceptions of the situation. This is done in a well-structured debate with the people concerned in the problem situation. The debate aims to generate possible changes that would improve the situation. The models are used as a source for questions to bring out people's different perceptions of the situation. (Checkland & Scholes, 1990)

Accommodation between conflicting interests, which enables action to improve and thereby change the situation, is sought in the debate. This change must be both systematically desirable and culturally feasible (Checkland, 1981). The changes are systematically desirable only if the systems are perceived to be truly relevant. The changes will only be implemented if they are regarded as culturally feasible i.e. meaningful within the culture and its worldview. (Checkland, 2000)

Exploring of the situation can be conducted in many ways, and for different purposes. The POM-model (which will be discussed further in section 3.4) can be helpful in defining what supporting information systems are needed. SSM can thus be used to guide and enact the IS-related processes in the POM-model, and to do so with a focus on the purposeful activity served by IS, rather than on the IT through which the IS will eventually be realized. (Checkland & Howell, 1998a)

3.3.4 Taking Action to Improve

The final activity in SSM is to take action in the situation to bring about improvements. Three different types of change, namely, in structure, process and in attitude, are defined in SSM. The first two are rather easy to identify and accomplish while the third is far more difficult since it involves the change of people's values, norms and behavior. Any change will normally entail all three types, and it is important to consider the interactions between them. One must

also think about why the changes are necessary. How can the changes be achieved and what actions will enable the changes. When will these actions be taken and by whom. Finally, action to improve can be taken when the criteria for judging the success of the changes have been met. (Checkland, 2000)

When the participants have reached accommodation of both systematically desirable and culturally feasible changes it is time to implement the changes. This can be a quite straightforward process. The implementation of changes does however create new ill-structured problem situations, which need to be explored and improved. The learning cycle can start all over again. (Checkland, 1981)

3.4 The Process for Organizational Meanings (The POM-Model)

Checkland and Holwell (1993; 1998a) argue that the conceptual thinking of the organization and technology involved when designing an IS are linked. The nature of an organizations purpose, its structure, the desired IS and the technology which delivers the IS need to be thought about together (Checkland & Holwell, 1993).

The POM-model consists of seven elements. *Element 1* which can be found in the top right corner of figure 3.3, consists of the people as individuals and as group members. They have a concern both for purposeful real-world action and for the informational support needed by those carrying out the action. *Element 2* pictured at the opposite side of the figure, is the data-rich world they perceive selectively through their various taken-as-given-assumptions. The organizational discourse (*Element 3*) which can be found below element 1, is the arena in which meaning is created inter-subjectively. This leads to the attributions of meaning which yield information and knowledge (*Element 4*) indicated below element 3.

The whole process embodies politics as well as decision taking. All information systems operate in a political context, politics being endemic in human affairs. This is a very complex social process in which persuasion and/or coercion is attempted. Organizations have to enable assemblies of related meanings, intentions and accommodations between conflicting interests to emerge (*Element 5*). Element 5 is found to the left of element 4. This leads to that purposeful action (*Element 6*) can be taken, this is pictured above element 5. *Element 7* which constitutes the bottom square of figure 3.3 is formally organized information systems based on IT and telecommunications that support organization members. These systems are chosen, operated, maintained and modified by professional knowledge. (Checkland & Holwell, 1998a)

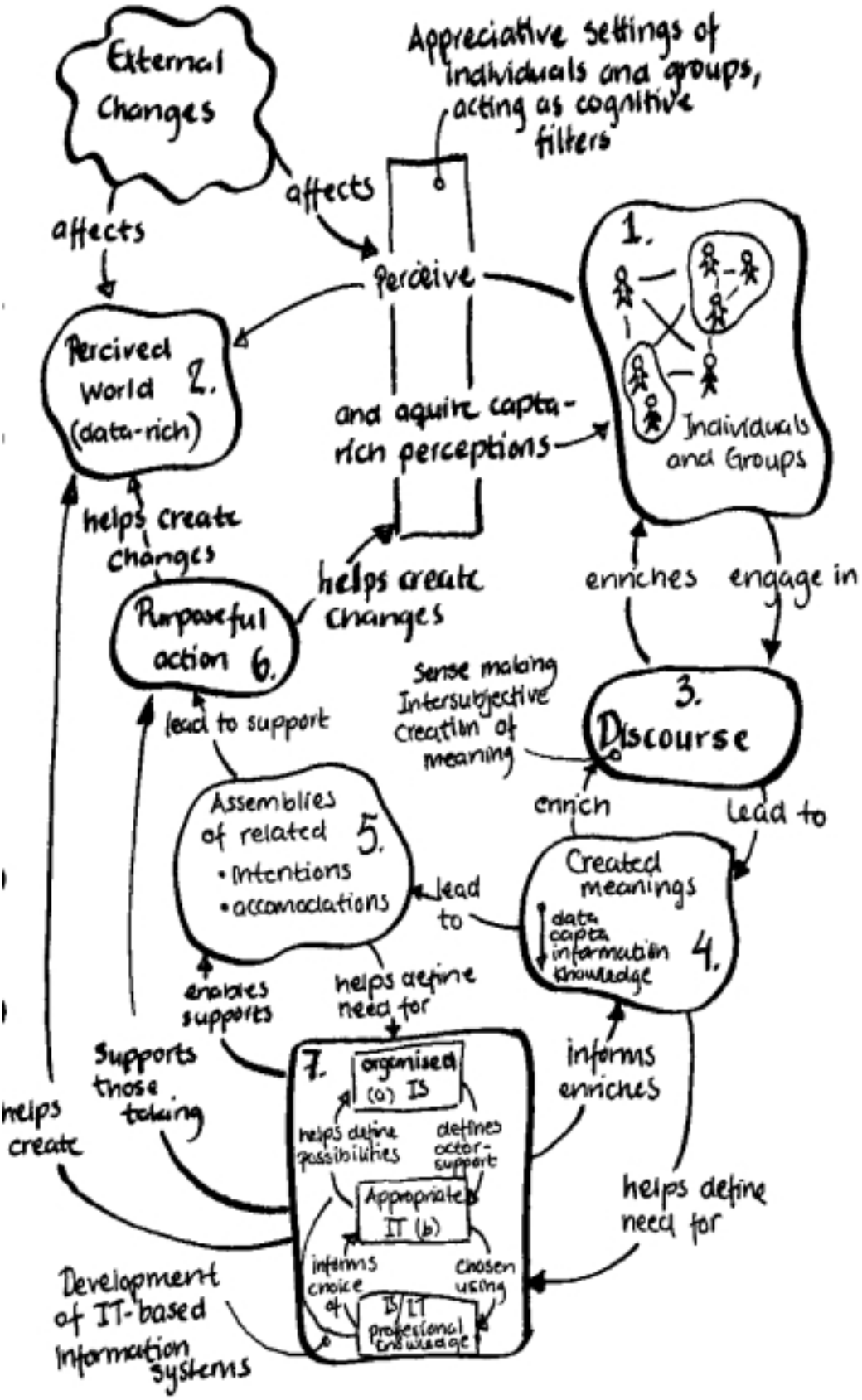

Figure 3.3 The 'processes for organization meanings' POM-model.
(After Checkland & Holwell 1998a. p. 106)

To summarize this figure and thereby make it a bit easier to grasp at first, and also to show the connection to figure 1.1. It can be conceptualized as element 7 (the IS) supporting the activities of elements 1 – 5 (the organizational context) that lead to some purposeful action to be taken (element 6).

Real life itself is always richer and more complex than any of our images of it (Weick, 1995). Thus, the POM-model (or any model in SSM) broadly represents aspects that we can observe and analyze. It is therefore important to think of the model elements as a set of connected processes, not as a particular set of structures. The process in the POM-model can encompass any way of conceptualizing organizations. (Checkland & Holwell, 1998a)

3.5 Critique of Soft Systems Methodology

We will in this section refer to and give some critique of SSM. We will concentrate on criticism that is relevant when using SSM as a methodology for systems design since this is the area of our concern.

Mingers (1992) poses a number of questions and suggestions in using SSM. Among these we found the question of CATWOE's validity to be most interesting. The Environment category (E of CATWOE) is very under-played according to Mingers. He argues that SSM emphasizes the relevant system in isolation from its context, and suggests that by giving more consideration to the environment section this could be improved. We agree with Mingers that this is a limitation of SSM. We think that the environment to the relevant system need to be further considered than it is today. The environment for organizations today is becoming more and more complex and global and this makes it very important to take the environment even more into account.

Kreher (1993) gives an answer to this question by saying that SSM does not ignore the relationships with the wider context of a system. It is instead up to the user of SSM to define the boundaries of their modeled systems. Even though it may be up to the user to draw boundaries we still believe that this is a limitation of SSM. It is said that the organization develops by its own history in interaction with the environment, but there are no suggestions of where these boundaries should be drawn however, i.e. how much of the environment should be part of the analysis.

Our interest lies within CBIS (computer based information systems) in organizations. This is a question that Checkland and Holwell (1998a) discusses when they present the POM-model as a model for discussion when designing technical IS in organizations. In this model the IS is pictured as element 7 (see

figure 3.3). Even though the POM-model can be seen as an improvement of SSM and its connection to ISD we believe that this model could be improved. To be able to design a CBIS, which support the organization, the POM-model need to be further developed.

Further, in our research we have found that the argumentation on the historical aspect and its importance in systems design is not much discussed in SSM. The historical aspect is being mentioned in the Appreciative systems model as a factor, which affects the evolvement of the organization. But, in SSM we have not been able to find any further discussion on this issue, other than it is shortly mentioned as an inspiration for Analysis Two and Three. We would like to emphasize the importance of the historical aspect and its impact on systems design. Therefore we argue that SSM need to be enhanced in this aspect. Bergvall-Kåreborn and Grahn (1996) also discuss the benefit of considering the historical aspect already in the design process.

We have also found some critique of SSM concerning the accommodation of different interests. Jackson (1991) argues that the debate in SSM can not be open and participative when there is conflict between groups that has unequal power. Some critique has also been given SSM on the issue of lack of objective criteria for reflecting on the systems design (Flood & Jackson, 1991). SSM has been criticized for only leading to conservative and regulative changes (Jackson, 1982). Checkland replies to this critique by stating that it can be used for radical changes and that the result depends on the user of SSM, not on the methodology itself. Even though these are important issues, it has not been found that they have any impact on the outcome of this thesis wherefore it will not be mentioned any further.

3.6 Summary of the Chapter

In this chapter we gave the history of SSM a short review and also a short presentation of action research which has played an important role in the development and building of SSM. This was followed by a presentation of the Appreciative systems model. This part is very important since it constitutes many of the underlying thoughts of SSM. In the next part the actual methodology of SSM as a Four-activity model was referred to in some detail. As our main interest with this thesis is how to design information systems in an organization we gave a short description of the POM-model, which is a model developed for that purpose. Finally some critique was given in regard to this.

4. Organizational Informatics

In this chapter we will give a review of the second approach to systems design in our study, namely, Organizational Informatics. We begin with a short presentation of its background and development, together with some central ideas. Thereafter the Open-natural systems model is introduced. This is the theory, which lay as a ground for the Web-model. This is followed by a description of the Web-model, which is a model for analysis of an organization and its information system. The Web-model consists of three different parts and we will present them separately. The chapter ends with some critique of OI and a summary of what has been said.

4.1 Background of Organizational Informatics

Rob Kling is a professor in Information Systems and Information Science at Indiana University in USA and he directs the Center for Social Informatics, which he founded in 1996. During the last 25 years he have examined how computer-based information systems are adopted, what interests these systems serve, and what consequences the systems have for organizational practices, decision-making, and work-life (Kling, 2000). These studies have focused on computerization within organizations, the primary setting of computer use and much of his work is therefore anchored in theories of organizations and have been conducted with a mixture of qualitative research, case-studies, surveys, facilitated benchmarking, and similar methods. (Kling, 1992, 1999; Kling & Scacchi, 1982; Kling & Leigh Star, 1997; Kling et al., 2000; Kling & Lamb, 1999) Case studies are however the most commonly used approach in OI. The term case study is perhaps a bit imprecise, but Yin (1989) characterizes it as a study, which allows an investigator to retain the holistic and meaningful characteristics of real-life events, such as organizational processes.

Social Informatics (SI) is a discipline that has been growing during the last 20 years but was first named in 1996. SI refers to the disciplinary study of the design, uses and consequences of Information and Communication Technology (ICT) that takes into account their interaction with institutional and cultural context (Kling et al., 2000). SI studies are interdisciplinary and organized within diverse fields for example; Information Systems, Anthropology, Computer Science, Sociology and Technology studies (Kling & Leigh Star, 1997).

Our area of interest, Organizational Informatics (OI) is a sub theme of SI and refers to those SI analyses bounded within organizations and includes studies of design, effective implementation, maintenance and use of computerized information- and communication systems in organizations (Kling et al., 2000).

According to Kling and Leigh Star (1997) design and implementation processes need to be relevant to the actual social dynamics of a given site of social practice, and the substance of design and implementation need to be relevant to the lives of the people they affect. Studies in OI show that ICTs do not exist in social or technological isolation. Their cultural and institutional contexts influence the ways in which they are developed, the kinds of workable configurations that are proposed, how they are implemented and used, and the range of consequences that occur for organizations and other social groupings (Kling et al., 2000). Kling use the term social design of computerized systems, or social design to characterize the joint design of both the technological characteristics of a computerized systems and the social arrangements under which it will be used (Kling, 1987).

Furthermore, Organizational Informatics is a field that is defined by its topic rather than by a family of methods. In this way, OI is similar to other fields that are defined by a problem area such as Human Computer Interaction and Software Engineering. OI differs from fields where methodologies define their foci and boundaries. OI research is empirically focused and helps interpret issues people face when they work and live with ICTs. (Kling et al., 2000)

Moreover, Kling and Leigh Star (1997) argues that Organizational Informatics differs from past practice in which computer scientists tended to focus on the development of hardware and software, and left studies of the actual uses and impacts of their systems to social scientists whose research are independent of the originators. In practice, relatively little social research has been carried out on the use and impacts of computer systems. As a result, many systems which look wonderful fail to live up to their promise when placed in real-world settings because their designers do not take account of important social relationships around system users.

According to Kling (1996) there are several reasons why studies in Organizational Informatics are important. One reason is that traditional organizational structure and practices do not stay the same as we move into the future and he believes that they who study computerization often make critical *implicit* assumptions about the way that organizations behave. He also argues that a growing league of managers and professionals believe that information technologies can drive organizational change. These same organizational visionaries find themselves struggling to identify which forms of IT to use and implement. Understanding the organizational implications of adopting information technologies is difficult for the non-technical organizational planner and IT professional alike. (Kling & Tillquist, 1998)

Finally, Kling and Leigh Star (1997) argue that, there is no single recipe for a more human centered design of Information Technology. Given that humans are so diverse, by nature human centered designing tends to be tailored, rather than mass-produced. So the analysis, which informs design, is not just about optimizing the technical capacities of the machines, but also must recognize and respect the organization into which they are being inserted. Computer design should take into account the various ways that actors and organizations are connected together with social relationships, as well as information flows and decisional authority. The goals of human centered systems design should be congruent with social sustainability as well as environmental sustainability; analysis of policy and political implications especially are important to defining a system's goals. Human centered analysis should extend to infrastructure and standards because the usability of a system depends on infrastructure configurations of all sorts.

4.2 Open-natural Systems

Open-natural system models[5] of organizations are needed to understand what kinds of infrastructure are feasible for specific work groups and work systems (Jewett & Kling, 1990, 1991; Kling, 1992). These organizational models describe organizations as coalitions of shifting interest groups that develop goals by negotiation. The structure of the coalition, its activities and its outcomes are strongly influenced by tasks, technologies and relationships with institutions, groups and people outside the focal organization according to Scott (1998).

Organizations can be viewed as *open natural systems* when participants are influenced by the social relationships they have outside their immediate workplace or organization. Organizations are systems of independent activities linking shifting coalitions of participants; the system are embedded in, dependent on continuing exchanges with and constituted by, the environment in which they operate. This view on an organization conceive that participants in an organization are concerned with preserving their autonomy and the longevity of their social unit rather than simply efficiently solving work problems regardless of its consequences for them and their colleagues. (Scott, 1998) The theory of open natural systems has its roots in general systems thinking, which was developed by von Bertalanffy (1956).

[5] One example of Open-natural systems models is the Institutional theory (DiMaggio & Powell, 1983).

One common problem according to Kling and Jewett (1995) is that analysts who facilitate social designs often use tacit models of organizational behavior. Open natural systems models of organizations does not use tacit models, instead it take explicit account of people's social behavior (such as seeking occupational security, careers, and specific kinds of economic and social rewards from work). To view organizations from this perspective provide a broader picture of the system and can influence the social design of work with computerized systems. The analyst can better account for negotiations, unwritten assumptions and traditions, politics, and power relationships between the focal group and the diverse outside groups and people with whom they interact. Open natural systems models underlie many socio-technical design projects and they can provide concepts for answering questions about when people, groups and organizations will adopt specific computer and network systems, how new social design can be implemented, how to use them, and what the key consequences of usage are.

4.3 The Web-model

The model for analysis of the organization and its IS is the Web-model, a naturalistic, open systems model. Kling has developed this model through almost 20 years of empirical studies. Web-models are based on an understanding of how people and organizations actually behave rather than upon an abstract model of how they should behave and they also examine the political interplay of coalitions in structured settings. (Kling, 1987, 1992; Kling & Scacchi, 1982; Dunlop & Kling, 1991)

According to Kling (1987, 1992) Web analysis locates computer systems and people who use them in matrix relationships with other people, organizations and technologies on which they depend. Web-models provide criteria to help analysts examine how computer systems actually work and how they can effectively be changed and sustained. Web-models view information systems as complex social objects and draw "large" social boundaries around. The boundaries around a computer-based system should embrace key actors, developers, users, regulators, maintainers, promoters, system saboteurs, clients of computer-using work groups etc. The Web-model can be described with following concepts (Kling, 1992):

- The *Ecology of participants* who influence the adoption and use of computer-based technologies.
- The *Infrastructures* for supporting system development and operation (including production lattices).

- The *History* of local computing developments and organizational commitments which structured these arrangements.

A matter of great importance in OI is the argument that narrow boundaries drawn close to the computer miss the dependencies of computerized information systems on other organizational resources and narrow boundaries miss relations with equipment vendors or outside consultants, which may also be critical. Identifying relevant infrastructure and other resources, is also part of the analysis. Web analyses help social designers include them explicitly. (Kling, 1992)

4.3.1 The Ecology of Participants

The first part of the Web-model is ecology of participants, which also is called social system and it is this part that influences the adoption and use of IT in an organization. According to Kling and Iacono (1989) Social maps are lists that indicate how a computing technology is socially organized and portrays a particular configuration of equipment, resources, practices, and control patterns in a particular setting. They combine both tangible elements, such as the distribution of equipment and intangible elements, such as skill mixes and patterns of administrative control. Since the actual capabilities of computing technologies to deliver usable information depend upon associated skills, resources, and adjunct equipment, the social map helps indicate which capabilities are accessible to whom, and when. Because it includes some intangible elements, one cannot create such a map by a simple visual inspection. One must learn about the politics and work practices of the organization through other modes of social inquiry, such as interviewing, conversation, and written documents. (Kling, 1980; Kling, 1987)

An important part of human centered designing of CBIS is articulating the values that are at stake in design processes themselves. This means examining the values of both designers and of the intended systems audiences and also being able to identify value-conflicts. This is only partly managed by user participation; it also requires ethics and values analysis for which it may be valuable to involve professionals who are skilled in analyzing social values and social change. (Kling & Leigh Star, 1997)

Further, it is argued by Kling and Iacono (1989) that the social organizations of computing which support computer based information systems are highly institutionalized in most complex organizations. The social organization of computing must be taken into account prior to the setting of realistic expectations of performance and schedules. Kling (1992) argues that a computer

system is best conceptualized as an ensemble of equipment, applications, and techniques with identifiable information processing capabilities. Each computing resource has costs and skill requirements, which are only partially identifiable. In addition to its functional capabilities as an information-processing tool, computer-based technologies are also social objects, which may be highly charged with meaning.

According to Kling (1992) social action, for example, political interests, structural constraints, and participant's definitions of their situations often influence organizational action and that social element such as these influence the kind and quality of computer-based products that organizations produce, adopt, and use. To be able to find these social relations among key participants, Kling believes that the analyst should use naturalistic open systems organizational model, such as an institutional model of social activities.

4.3.2 The Infrastructure

The second part of the Web-model, infrastructure plays a key role in social designs and all computerization efforts. Workable computing arrangements depend upon a set of supporting resources, which can be physical, technological or social. Kling calls this collection of resources the computing infrastructure. (Kling & Scacchi, 1982; Kling, 1987, 1990, 1992) The Infrastructure is the relationship between a focal resource and a supporting resource and the focal computing resource (Kling & Leigh Star, 1997). Computer-based systems are tightly coupled through the various elements of infrastructure, both horizontally and vertically through various layers. The infrastructure of computing is a central feature of systems in organizations and how the organizational relationships in which computing developments are embedded influence their relative workability for all participants. Training is only one aspect of computing infrastructure and it refers to a much richer array of resources and practices[6]. (Kling & Iacono, 1989)

Moreover, information technology can shift the infrastructure in the organization, for example the interaction of worker, communication, and process workflow. It can flatten the organizational hierarchy and enable flexible process-oriented organizational structures to be implemented. Information Technologies also extend the reach and influence of an organization outside of its traditional boundaries to establish strengthened linkages with external companies, consumer bases and electronic markets. (Kling & Tillquist, 1998)

[6] For a more extensive discussion of the concept infrastructure see Leigh Star & Ruhleder, 1996 or Peterson Bishop & Leigh Star, 1996.

One of the most important parts of the infrastructure is the network of producers and consumers around the focal computing resource which is termed the production lattice; the interdependencies in this network form the web from which the model derives its name. *The production lattice* is a social organization, which is itself embedded in a larger matrix of social and economic relations (macrostructure) and is dependent upon a local infrastructure. According to Web-models, these macrostructure's and local infrastructures direct the kind of computer-based service available at each node of the production lattice, and since they evolve over time computing developments are shaped by a set of historical commitments. (Kling & Scacchi, 1982)

4.3.3 The History

The third aspect that Kling and Iacono (1989) and Kling (1992) have identified is an explicit "historical" dimension. Many analyses of computerization discount the way that the social organization develops over time in ways that can shape its future, as well as its present. The historical dimension can be described as earlier commitments made in the organization developing and operating related computer-based technologies. However "historical" has meaning in describing the long-term development of the technical configurations of equipment, infrastructures, the social organization of computing, and the politics of computing in a particular setting. 'Historical' is not an independent and parallel category, rather it is highly interconnected with the infrastructures and the social organization.

When analysts emphasize the social and political choices that organizational actors have made over time, they are placing its institutional character in the foreground. Many of these institutional dimensions are intangible and taken-for-granted. Long after some interest groups have lost power or influence in the organization, their interests and visions may still be embedded commitments to equipment and organizational arrangements. Institutions develop a character based on the interests they have served in the past, and the world-views, which bind their participants together. Participants organize their work lives around the belief that activities, which have become routines, will persist. They come to depend on existing social and technical arrangements for working and for achieving personal goals. (Kling & Iacono, 1989)

4.4 Critique of Organizational Informatics

Henfridsson (1999) and Henfridsson et al. (1997), argue that OI as a research area depends on our ability as IS researchers to fill the notion of organization with specific content. A richer understanding of the organization - including structural as well as behavioral dimensions of the organization - can provide a basis for Organizational Informatics they claim. This is in line with the critique presented by Checkland and Holwell (1998a) who regret that Kling have not yet offered a clear-cut sharply defined model of organizations which might underpin his approach.

We agree with Henfridsson (1999) and Henfridsson et al. (1997) in part, the notion of organization need to be filled with content, this is however done by Kling through his Web-model. Checkland argues that the model is not sharp cut, and this may be so but the problem in our opinion is that there is no pictorial model. This makes it very difficult to understand and also to apply the Web-model. Kling does not describe any method or methodology of the Web-model. Kling (1996) himself also mentions this, he want to conclude with a neat method so that any analyst could readily identify the infrastructure resources, which are critical for a computer system and workable for the organization. This method could provide a satisfying presentation of the Web-model and its parts we would hope.

In our opinion there are many ideas in OI that are important for good information systems design, such as larger boundaries which gives the designer a more comprehensive picture of the situation. The theories are not presented in a method and the Web-model is not pictorially presented, which makes it very difficult to use. We do however conceive the parts of the Web-model as being able to improve the analysis phase in systems design. Finally we want to point out that it has been difficult to find criticism of OI. We do not know the reasons for this, but we think that it may have to do with the fact that this discipline was named as late as 1996, and is therefore not well known.

4.5 Summary of the Chapter

In this chapter we have given a historical review of OI and some of the characteristics that defines its approach. The second part is a description of open natural system and this was included because it gives some insight into how Kling views human life and organization in particular. This was followed by an explanation of the Web-model developed by Kling. This model should give the researcher a helping hand when drawing boundaries and examining an

organization. The model can be divided into three different parts *social, infrastructure* and *historical* and that is how we presented them in this chapter. Finally some critique of OI was given.

5. Analysis and Discussion

In this part of the thesis we present our analysis and discussion of the material found on SSM and OI. This will be conducted in three categories. We use the hierarchical framework given by van Gigch and Pipino (1986) van Gigch and le Moigne (1989) and van Gigch (1991). The framework consists of three basic levels which are; *the Epistemology of IS*, *the Science of IS*, and finally, *the Practice of IS*. These three levels constitute the discipline of Information Systems. The framework was given a fuller description in chapter two. At all levels SSM and OI are analyzed and discussed separately first, followed by a comparison.

5.1 Epistemology

We start at the top level of the model, with epistemology, which receives input from the meta-meta level in the form of ontology (assumptions about our reality). This input moulds the epistemological thoughts about what constitutes knowledge. The second type of input to the top level comes from the two lower levels and is constituted of evidence to different questions that the researcher has considered. This evidence strengthens or rejects the epistemology. The output from this level is in the form of a paradigm, which lay as a ground for the theories, and models that are discussed in section 5.2.

5.1.1 Epistemology of Soft Systems Methodology

According to Mirijamdotter (1998) SSM does not make any ontological statements about a systemic reality. Instead it uses systemic models as epistemological devices to inquire and learn about the different perceptions of reality. While Hirschheim and Klein (1989) claim that the ontology of SSM is that the reality is not given, immutable ‘out there’, but is socially constructed. It is the product of human mind. We think that these two interpretations of SSM and its ontology are in line with Checkland’s own statements. Checkland explains this through the general framework of research.

This general framework gives ground for what we interpret as the ontology as well as epistemology of SSM, namely the framework of ideas. This part of the general framework point out how the world is assumed to be like and it also shows how to acquire knowledge about it. The framework of ideas is a view that the world *not* is systemic and well ordered. Rather, it is the opposite, it assumes social reality to be problematical and complex. In SSM the understanding of reality is dependent upon the observer and what the observer chooses to focus

on. The real problem in SSM is not to find solutions, rather, it is to define the problem itself. SSM is built on *systemic* systems thinking, rather than *systematic* systems thinking. This marks the difference between soft and hard systems thinking according to Checkland and Holwell (1998a). The thinking in SSM also has the theory of the Appreciative systems model as an underlying assumption. Therefore this also can be seen as ontology. This indicates that systems thinking can be seen as both ontology and epistemology in SSM.

The concepts of ontology and epistemology in SSM are a bit confusing and difficult to analyze. This is because Checkland see systems thinking as the epistemology of SSM at the same time as we see the Appreciative systems model as an underlying assumption (ontology) to SSM. Checkland (1981) notes that SSM implies a model of social reality in the phenomenological tradition and that his work provides a basis for concrete action from an interpretative stance. Further, Hirschheim and Klein (1989) argue that the epistemology of SSM is that of anti-positivism reflecting the beliefs that the search for causal, empirical explanations for social phenomena is misguided and should be replaced with sense-making.

To summarize, we have found that the input (ontology) to meta-level in SSM is a view on reality as socially constructed and thereby ill structured and complex. We have also found that the ideas of Vickers can be seen as an underlying assumption to SSM. This input to meta-level lead to an epistemological stance of SSM that the phenomena of the world can be interpreted through a cyclic process of inquiry through the use of systems models.

5.1.2 Epistemology of Organizational Informatics

In our analysis of OI we have found that the underlying assumptions to the Web-model is that organizations can be seen as open naturalistic systems. These models can be traced back to the work of Bertalanffy and the General Systems Theory. This implies that hard system thinking is the foundation of the Web-model. Still Kling (2000) claim that he has a view on the world around us as complex, negotiated, and multivalent and that politics are central and even enabling. He adopts the position that our knowledge of reality is a social construction by human actors. We interpret the systems thinking and the perspective of a socially constructed reality as the ontology of OI and thereby as the input to the meta-level. It is contradictory though that Kling see the world as complex and multivalent, which is a soft systems thinking stance, at the same time as the Web-model is built on hard systems thinking which assumes the world to be systemic and well ordered.

In the research of OI we have not been able to find a clear statement about the epistemology of OI but we have found thoughts that can be drawn to some of the different existing paradigms. The content of Kling's work is primarily empirical in orientation. In his articles there are descriptions of a number of case studies, which are interpretative in style. In his work it is argued in favor for the interpretative stance since researchers in this field must necessarily confront the rich multivalent social relationships of work places.

This interpretative stance intends to increase the understanding of the phenomena within a specific cultural and contextual setting, and to examine the phenomena and the setting from the perspective of participants. It is emphasized by Kling (1987) that behavior within organizations is crucial for understanding the role of computerization in shaping organizations. In fact, some analyses within this approach examine computerized systems as forms of organizations rather than as easily separable entities.

To summarize, we have found that the input (ontology) to meta-level in OI is a view on reality as socially constructed and thereby complex and negotiated. We have also found that the Web model originates in hard systems thinking. This gives a contradictory picture of the ontology of OI. The epistemology of OI gives that phenomena of the world are interpreted from the perspective of participants. Our interpretation of Kling's epistemological stance is essentially the same as that of Hirschheim and Klein (1989) who claim that Kling takes an anti-positivistic stance, which is the same as an interpretative. The output of this level is a paradigm, which will give the foundation to the science of OI. From this foundation Kling develops theories and models. This will be discussed in section 5.2.2.

5.1.3 Comparing of the Epistemology of Soft System Methodology and Organizational Informatics

In order to use SSM and OI as complements to each other it is important that they have the same epistemological ground as well as ontological stance. If they have opposite views on reality and how to gain knowledge about it, it could be rather difficult, but not impossible to bring them together.

We have found that there is a resemblance between the way OI and SSM conceptualize epistemology. They both argue that the computing technology is socially embedded and that the use of the IS will be dictated by key participants. Therefore, they favor strong participation in their work. SSM and OI emphasize that organizations and social systems do not exist apart from humans, and hence can not be apprehended, characterized and measured in some objective or

universal way. It is believed however, that the understanding of the deeper structure of a phenomenon can be used to inform other settings.

According to Hirschheim and Klein (1989) Checkland and Kling are Social Relativists and this is a paradigm that seeks explanation within the realm of the individual consciousness and subjectivity, and within the frame of reference of the social actor as opposed to the observer of the action. From such a perspective social roles and institutions exists as an expression of the meanings which humans attach to their world. Social relativism is the paradigm adopted for understanding social phenomena and is primarily involved in explaining the social world from the viewpoint of the organizational agents who directly take part in the social process of reality construction. It recognizes that knowledge about human means and ends is not easily obtained because reality is exceedingly complex and elusive. There is no single reality, only different perceptions about it.

The main difference at this level is that Checkland uses the Appreciative system model by Vickers and Kling has drawn his stance from Scott and his Open natural system models. This means that their ontological stance is somewhat different. Even though both are built on systems thinking, one derives from hard and one from soft systems thinking. This indicates that it might be problematic to let them complement each other. There are however, advantages as well as drawbacks in both soft and hard systems thinking. This difference could therefore imply that they could complement each other. There is also other differences between SSM and OI, Checkland has a well-developed epistemology and is aware of the importance of this level. Checkland has devoted much energy on the debate of the knowledge of the discipline of information systems. Kling on the other hand is vague and he has hardly written anything in his work that shows what his underlying assumptions about knowledge are and how a researcher should acquire it.

To summarize, we have found that both SSM and OI have an interpretative approach grounded in systems thinking. They both see reality as socially constructed and as a product of continual social interaction. It is also recognized in SSM as well as OI that as meanings are formed, transferred and used, they are also negotiated and hence the interpretations of reality may shift over time as the circumstance changes. The fact that they agree on the first points at this level implies that it could be possible to use SSM and OI as complements to each others. They do however part in their view on systems thinking, and this is important. Their different view on systems thinking, and the contradictory picture of the ontology of OI as well as SSM is a matter for further studies.

5.2 Science

The input to this level from the meta-level gives a paradigm as a basis for those activities that helps to build theories and models. The inputs from lower level to this level are solutions to scientific problems that the researcher investigates. The output from this level is theories and models that are used at the practice level. This is discussed in section 5.3.

5.2.1 Science of Soft System Methodology

The epistemological input from meta-level with systemic systems thinking and a view that reality is socially constructed has lead to a development of the methodology of SSM as a *learning system* where *models of purposeful activity* are built on *declared worldviews*. This brings three of the four key thoughts of SSM together. The fourth key thought is that these models of purposeful activity can provide an *entry to work on IS*. Checkland and Holwell (1998a) present this aspect of SSM's use in more detail in the book *Information, Systems and Information Systems*, where the POM-model is presented. This model can be used at the third step of the learning cycle, namely the exploring of the situation.

The POM-model (figure 3.3) is used in a structured discussion where it is compared with the perceived problem situation. The aim of the discussion is to try to find accommodation about how to improve the problem situation. In the POM-model the computing technology is gathered by the organized IS, the appropriate IT and the professional knowledge. The development of IT-based information systems must however, start in the *organizational context* which will be served by the computing technology. The *social context* of the organization resides in elements one to five in the POM-model. In these elements the people of the organization, their social and political context as well as external forces that affect the organization are taken in to account. This is where the systems design process starts. The form of the POM-model and the fact that the system design process starts in the social context indicates that it is built on the ideas of figure 1.1 implying that the served system must be conceptualized before the serving system, since this is what dictates the form of the serving system.

SSM aims to bring improvements by activating the people involved in an area of social concern. This is done with the learning cycle, which is ideally never-ending. The POM-model pictures the processes of organizational meanings, and is therefore a *process* model. This model goes as output from this level to the next level where it is used in action research. This is further discussed in section 5.3.1.

5.2.2 Science of Organizational Informatics

The epistemological input from meta-level with a view that reality is socially constructed has lead to the development of the Web-model. Since systems thinking is the ontological stance in OI this gives a strong emphasis on the importance of the environment. The organization is seen as an open naturalistic system, by this Kling mean that the environment is part of what affects the organization and its activities and is therefore part of the analysis. The parts of the Web-model will be analyzed and discussed in more detail in this section.

In OI the Web-model is used to analyze and interpret the organization and the IS. There are three areas of analysis in the Web-model, *ecology of participants, infrastructure* and *history*. It is important to draw large boundaries and this is because people use computer-based systems in a social setting and the boundaries must include a good slice of their social worlds. When large boundaries are drawn like this the analysis will include the three parts of the Web-model.

The first part of the Web-model, the ecology of participants, is handled with the underlying assumption that computerized systems must be analyzed within the social contexts in which they are used. The ecology of participants must be taken into account prior to the setting of expectations on the information system. This is done with social maps. These maps indicate how a computing technology is socially organized and also gives a picture of what resources, practices and equipment a particular setting consist of. This view indicates that the ideas of figure 1.1 have been part of the development of the Web-model. This is one of the most important aspects of OI.

The second part, the infrastructure, is a key element in any computerization effort and it is characterized as the relationship between a focal resource and a supporting resource that can be physical, technological or social among other characteristics (Kling & Scacchi, 1982; Kling, 1987; Jewett & Kling, 1990, 1991). The systems analysis must characterize the computer-based technologies, the social settings as well as the social forces. The production lattice, which also is part of the infrastructure, consists of the network of producers and consumers around the focal computing resource. In OI the technological and social aspects are considered together. The fact that these aspects are interconnected and thereby affect each other is recognized in OI. That infrastructure is such a wide concept and includes these aspects is one of the Web-models advantages.

Finally, the third part, the historical dimension, has meaning in describing the long-term development of the technical configurations of equipment, the social organization of computing, and the politics of computing in a particular setting.

The historical dimension is one aspect we think is neglected in many ISD approaches. Therefore this is also a benefit of OI.

The aim with the Web-model is to reach a contemporary picture of the organization and its environment. It is therefore an *analysis* model. This model leaves this level as input to the next level where it is used in case studies. This is further discussed in section 5.3.2.

5.2.3 Comparing of the Science of Soft System Methodology and Organizational Informatics

In this section we will compare the central concepts in the organizational models that are used in each approach. In both SSM and OI the organization is the most central concept, moreover, both reject the goal-seeking model of an organization. SSM and OI advocate that the organization should be analyzed first, before any design on the information system can begin. They do however have a somewhat different model of the organization, that is, the POM-model and the Web-model.

On a level of more detail the concepts of the organizational models can be compared. In the Web-model *the ecology of participants* is analyzed with social maps. These maps indicate how a computing technology is socially organized and also gives a picture of what resources, practices and equipment a particular setting consist of. In SSM this analysis is done in Analysis One where key participants are located and Analysis Two where social roles, norms and values are mapped. Analysis One and Two are however conduced separately and are not interconnected in social maps in the same way as they are in OI. In the POM-model (figure 3.3) the computing technology is gathered by the organized IS, the appropriate IT and the professional knowledge. The development of IT based information systems must however, start in the *organizational context* which will be served by the computing technology. We think that there is a resemblance between the OI and SSM way to conceptualize these concepts. They both argue that the computing technology is socially embedded and that the use of the IS will be dictated by key participants. Parts of these concepts overlap, this implies that they have basically the same ideas on these concepts.

When it comes to the concept of *infrastructure* Kling include a set of supporting resources that can be physical, technological or social among others. Many of the parts of infrastructure reside in the resembling elements in the POM-model, e.g. the *social context* of the organization. As the infrastructure plays a key role in OI so does all elements of the POM-model. Infrastructure does however take more aspects which might influence the design of an IS into account then the

elements in the POM-model does. External changes for example is mentioned in the POM-model (in the top left corner of the figure) but is not discussed any further. As we argued in our criticism of SSM this aspect is under-played. In the concept infrastructure the external elements (environment) are discussed explicitly and are seen as one of the most important parts of the Web-model. This is a part where OI can complement SSM and thereby give a richer picture of the system. The technical aspects that also are part of the infrastructure would then automatically be included in the analysis.

Finally the *historical* dimension will be discussed here. Participants come to depend on existing social and technical arrangements, which may still reside in an organization long after some interest groups have lost power in the organization. The POM-model does not handle the historical dimension explicitly. The historical aspect has however, to do with politics and power and in element five of the POM-model accommodations between conflicting interests can be assembled. This dimension is also interwoven into SSM through Vickers Appreciative systems theory and is partly handled in Analysis three of SSM. OI complementing SSM could strengthen the analysis of the historical aspect. We argue that the historical aspect must be taken into consideration explicitly. Kling does however not give any guidance or a method for this. The inclusion of this aspect in the analysis phase would however lead to better design as we argued in our criticism of SSM.

In our critique of OI it was mentioned that Kling does not present any method or methodology. It is also a wish of Kling to conclude with a method, which would make it easier for the analyst to use the Web-model. We have found that the iterative process of SSM's learning system, which is well developed and structured, could fill this gap in OI.

To summarize we have found that part of the Web-model and POM-models can complement each other. Especially the concepts of infrastructure and history in the Web-model could enrich the analysis of the organization. This would also lead to larger boundaries and thereby a more contemporary analysis. When it comes to the social aspects, SSM and OI overlap and also this is a sign that the analysis could be strengthened according to Mingers and Gill (1997) who argue that even where methodologies do perform similar functions, using a range of approaches may yield a better result. The fact that the Web-model is a model for analysis and the POM-model is a process model indicates that they might be used at different parts of the design process. When it comes to the methodology, SSM is a well developed and structured approach well suited to fill OI with the methods it lacks. We also argue that using both SSM and OI would lead to better information systems design.

5.3 Practice

The practice of IS takes place at the lower level of our model of analysis. The input to this level comes as theories and models from the object level. The practice level is where these models are tried out in the real world. The output from this level is solutions to problems in the real world. The output is also evidence to the epistemological and scientific questions at meta-level and object-level.

5.3.1 Practice of Soft System Methodology

In this case the POM-model is the input to practice level in SSM. It is used as a tool in the analysis of the organizational processes and the IS. The area of concern is how to tackle ill-structured, messy problem situations which managers have to cope with. There is an emphasis on the organized provision of information in information systems. The practical work through action research contributes to the development of theories and models of SSM as well as to organizational problems. We have found that the practice of SSM is *prospective*, this means that it aims to contribute to developing and building systems in the real world by changing perceptions in a never ending cycle of learning through the interaction of people. Another aim with action research is to develop SSM and test its ability to solve problems.

As we described in chapter tree action research has played an important role in the development and building of SSM. The most important factor with this process is that the researcher enters real-world situations, with the aim to improve and to acquire knowledge about it. Action research is built on the view that experience leads to theory, which in turn leads to practice (experience) and this iterative process is eternal. This is also one of the key thoughts of our model of analysis (van Gigch, 1991).

To summarize, the fact that SSM is prospective has lead to the development of a process model, the POM-model that is used as a device in development work. The engagement in real world problems have led to insight on the nature of social reality which in turn have led to the development of methods and models.

5.3.2 Practice of Organizational Informatics

The input to this level in OI is the Web-model. It is used in case studies of the use, design and implementation of ICT in organizations. When studying the practical work of Kling we have found that he examines information

technologies from multiple perspectives. These studies has been conducted for over 25 years with the aim to provide empirical evidence about varied outcomes that occur when people work with ICT. Kling also tries to guide and contribute to a deeper understanding of how the use of ICT effects organizations in different ways.

Most of these studies have been conducted with case studies and this has been done in a wide range of different organizations, all of them with the ICT in focus. The practical work has contributed to the development of the Web model.

OI has a *retrospective* approach to IS research. By that we mean that the main work that has been conducted is concentrated on the consequences that IT has on organizations and on humans that use it. He investigates the affects of already implemented information systems and draw conclusions about the impact they have on work.

To summarize, the Web-model has been developed through case studies. The focus of this research is on the ICT and its consequences in organizations. There is no intention to influence or change the organizations in any way.

5.3.3 Comparing of the Practice of Soft System Methodology and Organizational Informatics

Information systems and information systems development is the area of concern for both Checkland and Kling. The main research strategy in SSM and OI are field studies as these examine humans within their social settings. They attempt to derive their constructs from the field by in-depth examination of the phenomenon of interest. Both SSM and OI are always implicated in the organization being studied, Checkland through action research and Kling in case studies. Checkland argues for the use of action research and as we mentioned earlier this means that the researcher enters a situation in the real world with an aim to change it. Kling uses case studies where he examines the effect of IT. He never discusses any intention to change the situation that he takes part in. He is more interested to find out what the effects of ICT use are.

We interpret SSM as prospective and OI as more retrospective in their way of conducting the practice of IS. We believe that SSM and OI can complement each other on this point. For us these differences in research styles can be seen as something that could complement and enhance the information systems development through a possibility to adapt to each situation. If the aim is to develop or change a situation in an organization action research might be a

better approach than a case study, which on the other hand is a better strategy if the aim is to analyze a situation.

One difference between OI and SSM is that OI has focused on studies on IS in organizations while SSM's area of concern is how to tackle management problems. Their somewhat different focus in their studies means that they can complement each other and give a more comprehensive focus.

5.4 Overall Discussion

Checkland has in his work contributed with a number of models, and SSM is a well-formulated methodology. According to van Gigch (1991) meta modeling is the process of design that is carried out at the meta-level and it defines how the process of modeling at the object level will be conducted. The fact that Checkland is so clear and aware of the meta-level contributes to the clearness of his methodology. The science (SSM) gives him tools to study problems in the real world (lower level) and this goes around and creates new problems that affects the two upper levels. This process can be seen as a never-ending cycle that brings his work forward.

Kling has not reached as far in the process of research, the further development of OI needs to be conducted at all levels. The Web-model needs a pictorial figure as well as some guidelines of how to use it in order to help information system developers. The extensive amount of practice that Kling has conducted when studying implementation, use and consequences of IS should give him an excellent ground for this work. This difference in maturity of SSM and OI can be an advantage if they are used to complement each other. The fact that OI is not as developed as SSM could mean that it is more flexible and therefore possible to adapt to SSM. A last reflection on the work of Kling is that he seems to be heading on the same journey that Checkland already has been on. Starting in the realm of hard systems thinking and for different reasons moving on to soft systems thinking.

The reflections on the process of our work are, firstly, that to come up with concepts that are similar or contradict each other in OI and SSM have been difficult. These concepts reside in different parts of their theories, which makes it more difficult to make a direct comparison.

Furthermore, our limitations may also have affected the outcome of our research. Reading other contributors to SSM and OI might have given another picture of the two approaches. Our own background and situation may also influence our interpretations of SSM and OI. Our epistemology has lead our

attention to the chosen concepts, while other aspects of course could have been important for the outcome of this work. The fact that there is a time limit on our work can also mean that we have missed important issues in our analysis.

Moreover, our considerations of the texts of Checkland and Kling are not enough to fully conclude if SSM and OI can complement each other in a real case. Actual usage of the two approaches is necessary in our opinion. This could guide the researcher to gain experience and thereby be able to judge strengths and weaknesses of each approach. Therefore we emphasize the need for a case study to follow up our work.

6. Conclusions

The purpose of this thesis is to find out if using SSM and OI as complements to each other can strengthen the analysis and design phase in information systems design. The problem today as we see it is that there is too much focus on data and technology. Our argument in this thesis is that ISD must start within the organization.

SSM, which is a methodology for analysis of processes within the organization, is the first approach. SSM has however not considered the technical aspects to any extent and has therefore often been combined with some other technical tool in the ISD process. Lately the POM-model has been presented, and this is step towards a solution on the lack of technical aspects, our argument is however that the POM-model need to be further developed and strengthened. The second approach, OI, also has its starting point within the organization and is focused on studies of how cultural and organizational context affects the design, implementation and consequences of use of IS. The question is if these approaches could complement each other and thereby strengthen each other in the analysis and design of information systems.

Our results show that SSM and OI can complement each other and this will give the designer a fuller methodology to use in the analysis and design work. SSM and OI share the same epistemology in most parts, an important fact that makes their complementing of each other easier. Both have a view on reality as socially constructed and this leads to the use of interpretative research methods. Moreover, systems thinking give a view on reality in both OI and SSM while it also is used as a way to acquire knowledge about this reality in SSM. The main difference between SSM and OI is that their views are grounded in different types of systems thinking (hard and soft). This is a fact, which can make their complementing of each other complicated.

Their models complement each other with important concepts. OI contributes with a perspective on infrastructure and historical aspects while SSM has a more developed methodology. This lay ground for a possibility to use them as complements to each other and to reach an enhanced analysis and design process in the information systems development process. The models have different purposes however and this is an important issue to consider.

At the practical level different research styles are used, SSM uses action research while OI mostly uses case studies in some form. This means that their complementing of each other leaves the designer with some different approaches to use and it makes it possible to adapt to the special occasion. SSM and OI are focused on different aspects within system design. OI is more focused on IS and

its affects on organizations while SSM is more focused on methods for change. This gives opportunity to connect them together and each of the approaches contributes with aspects that are most central for them. Both these issues can however be a hindrance for them to complement each other.

The importance of a theoretical framework for the designer has been mentioned in this thesis and SSM and OI complementing each other give the information systems developer an approach that explicitly takes the organization and its context into account. It also gives a theoretical framework as a foundation for the design process. This means that the challenge of creating useful, workable systems for organizations is grounded in a socially as well as technically focused model.

Finally, the fact that both Checkland and Kling argue for an analysis of the organization before starting with the design of the technical information system is one of the most important facts that points out that the ground for them complementing each other is existing. The organization must be conceptualized before the technical system. Checkland calls this the law of conceptualization. Kling concludes this with a point that the designer will need refined skills in organizational analysis.

6.1 Further Research

In our analysis we have found a couple of points where SSM and OI have different views or concepts for the same thing. These differences can be seen as points where they actually can complement each other. There are also differences, which could be of such a matter that it would make it more difficult or even impossible to use them as complements to each other. Therefore, they will be pointed out here as matters for further research.

The first point and probably the most important is the difference at meta-level. The discussions on paradigms and incommensurability are an important matter and should not be left at this point. The fact that SSM and OI have partly different views on reality and how to gain knowledge about it, needs to be considered in a deeper analysis.

The result of our work is an anticipation that SSM and OI can complement each other and thereby strengthen the analysis and design phase of information systems design. If and how they should actually be combined is however a matter for further studies. Moreover, our suggestion that the methodology of SSM could fill OI is an issue for further studies.

The purpose of the Web-model is different than the purpose of the POM-model, that is, one is a model for analysis while the other is a process model. We argue that this means that they could be used at different stages in the design process, but this is however a suggestion that need to be further looked into.

SSM and OI have different focus in their studies. SSM was originally focused on management problems while OI has had it focus on the technical IS in the organization. This means that both have been focused on the organization but in different ways. This is also a point where they can complement and strengthen each other but, how this should be done need to be considered further.

Finally, our reflection on Kling's journey towards soft systems thinking is an issue of importance. If our interpretation on this point is correct, this has an important effect on SSM and OI complementing each other. Therefore, this is an issue that needs to be looked into.

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