Hannakaisa Isomäki

The Prevailing Conceptions of the Human Being in Information Systems Development: Systems Designers' Reflections

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ACADEMIC DISSERTATION

To be presented, with the permission of the Faculty of Information Sciences of the University of Tampere, for public discussion in the Paavo Koli Auditorium on May 31st, 2002, at 12 noon.

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Electronic dissertation
Acta Universitatis Tamperensis 188
ISBN 951-44-5388-3
ISSN 1456-954X
http://acta.uta.fi

ISBN 951-44-5360-3
ISSN 1457-2060

Tampereen yliopistopaino Oy
Tampere 2002

Isomäki, Hannakaisa (2002), **The Prevailing Conceptions of the Human Being in Information Systems Development: Systems Designers' Reflections**
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Abstract

The goal of human-centred information systems development (ISD) is to adjust computerised information systems (IS) to meet human characteristics and action. This perspective is in this study referred to as the humanisation of IS. Traditionally, the prevailing argument has been that the humanisation of IS can be best achieved by utilising human-centred ISD methodologies. In this study it is argued that it is the prevailing conceptions of IS designers of the user that are more fundamental. Even if the designers are to use a human-centred methodology the designers' intentions and design activity will be directed by their conceptions about the nature of those people that will interact with the system.

This dissertation redefines the conception of the human being in information systems, and investigates the nature and comprehensiveness of IS designers' conceptions of the human being as a user of an IS. Two particular standpoints are taken in the study. First, the user is defined as a human being. This means that users are conceptualised according to their fundamental constituents as humans rather than in terms of different instrumental tasks and purposes which people accomplish with the aid of IS. Second, IS designers' conceptions of humans as users of an IS are seen as knowledge that reflects IS designers' competence in humanising IS. Competence is here seen as constituted by the meaning that users take on for the designers in their experience, which, in turn, reflect partial or more comprehensive notions of people indicating qualitatively different levels of competence.

An interpretatively oriented approach referred to as phenomenography was adopted in this study. By drawing on in-depth interviews with 20 Finnish IS designers, 18 qualitatively different conceptions of the human being were categorised from the IS designers' descriptions. These conceptions are not only varied in their conceptualisations of the different human qualities, but also constitute a hierarchy of competence. This hierarchy can be drawn up in terms of three forms of thought: the separatist, functional, and holistic forms of thought. The separatist form of thought provides designers predominantly with technical perspectives and a capacity to objectify matters. The functional form of thought focuses on external task information and task productivity, nevertheless, with the help of positive emotions. The holistic form of thought provides designers with competence in human-centred ISD, although without revealing all aspects of the richness of the human condition.

The empirical results suggest that only few of the Finnish IS designers have the potential to contribute to the humanisation of IS.

Keywords: human-centred ISD, information system, conception of the human being, IS designers, competence, forms of thought, interpretive IS research, phenomenography

Acknowledgements

The nature of the relationship between humans and technology has been a fascinating question for me since the years 1989-1991. During that period, besides studying, I worked as a conference secretary and a member of the organising committee of the IFIP TC8 conference "*Collaborative work, Social Communications, and Information Technology*". The discussions amongst the solid IS academics on the committee, Professor Kalle Lyytinen, Professor Pentti Kerola, Pasi Kuvaja, and Esa Auramäki, opened up a captivating new perspective for my inquisitive mind: human action investigated in productive interaction with the world for the purpose of developing computerised IS. Six years later, in August 1997, I was able to take a leave of absence from my work as a planning officer for information technology programmes in the Continuing Education Centre at the Unversity of Jyväskylä, and join Professor Pertti Järvinen's IS research seminar as a doctoral student.

This dissertation has taken four and a half years of work and required a considerable amount of delving into IS, HCI, philosophy, and behavioural science literature. Great many hours were also spent in collecting and analysing data, as well as writing up the study. I owe my deepest gratitude to my supervisor, Professor Pertti Järvinen, who gave me the fullest support in my work while rigorously training me as a researcher. Of particular importance to me has been Professor Järvinen's kind but determined way of pushing me out of 'the lonely researcher's study' in order to discuss my work with researchers, both in his seminar and in other national, as well as international, academic gatherings.

I wish to express my warmest thanks to the reviewers of this thesis, Associate Professor Ellen Christiaanse (University of Amsterdam), and Dr Lucas Introna (University of Lancaster), as well as Professor Markku I. Nurminen (University of Turku) for the time they dedicated to reviewing and commenting on my dissertation. Their insightful comments are invaluable.

I have had the privilege to work under Professor Jouko Kari's leadership in the UCRET –project (User's Cognitive Resources Evoking Technology) funded by the Academy of Finland's Information Research Programme. Professor Kari created the working atmosphere and conditions that enabled his group to carry on multi-disciplinary work. I have had particular support and encouragement from Professor Päivi Häkkinen and Professor Marja Vehviläinen. Professor Häkkinen has also offered her competent insights into questions of computer-supported collaborative learning. Professor Vehviläinen gave me her time and eminent advice to while introducing the socio-cultural perspective on IS, and, together with Dr Päivi Eriksson guided me in scientific writing. The support of the UCRET-project has been important; in particular, co-writing with Dr Miika Marttunen offered me an opportunity for further practice in orthodox scientific writing. Lecturer Glyn Hughes has provided valuable help with my language, and taught me how to write in English.

During the preparation of this thesis I have had valuable feedback from many people of consequence in scientific seminars and conferences. The IRIS conference is an important arena for novice IS PhD students: I wish to thank Dr Eric Stolterman and the anonymous reviewers for their comments on my initial writings. In Professor Järvinen's research seminars I have had interesting discussions with many IS researchers and professionals, Professor Pentti Kerola, Professor Mikko Ruohonen, Professor Karl-Heinz Kautz, Dr Andrew Basden, Dr Tarja Tiainen, Dr Lauri Forsman, Antti Arvela, Marcus Gustafsson, Jorma Holopainen,

and Pekka Ketola, to name a few. The seminars organised within the Academy of Finland's Information Research Programme have also provided me with essential ingredients for learning. Especially I would like to thank Dr Tuula Heiskanen, Professor Jaakko Virkkunen, Professor Riitta Smeds, and Dr Riitta Lavikka for their comments on my work.

Further, I was privileged to receive some most enlightening guidance during the ECIS Doctoral Consortium in Bled, Slovenia, in June 2001. I am very grateful particularly to Professor Detmar Straub and Dr Lucas Introna, who guided our small group, but also to Professor Allen Lee, Professor Kalle Lyytinen, Dr Chris Sauer, Dr Angeliki Poulymenakou, Associate Professor Jan Pries-Hejep, and Professor Klaus Pohl for their insightful instruction and discussions. I would also like to thank the anonymous reviewers of the Weatherhead School of Management at the Case Western Reserve University for presenting and supporting my PhD proposal to the Doctoral Consortium. It was a great pleasure to be able to share the experience of being an 'international' IS doctoral student worth training with Anna Nöteberg, Helle Damborg-Frederiksen, Erica Wagner, Sandy Chong, Mark Thompson, Emilio Mosse, Cameron Guthrie, and others in Bled.

Several colleagues and friends have supported and encouraged me during the course of this work. Some of them I would like to mention by name. In addition to Professor Järvinen, my search for potential respondents for the study was helped by Professor Ari Jaaksi, Dr Tarja Tiainen, Markku Karjalainen, Eero Lähteenmäki, Ari Ilkka, and Merita Petäjä. My warmest thanks to the IS designers who gave their time for the interviews. The final word processing efforts were imposed on this thesis while I was working as a senior assistant at the Department of Computer Science and Information Systems at the University of Jyväskylä. At the time, the co-instructors of the Project Management course during the 2001-2002 academic year - Professor Pasi Tyrväinen, Eero Tourunen, Esa Auramäki, Marjaana Suihkonen, Tero Vartiainen, Tero Päivärinta, Janne Kaipala, and Jari Järvinen - shared their thoughts and feelings with me on the nature and evaluation of IS project work. Many exhilarating moments were also spent over a cup of coffee: my special thanks to Tero Vartiainen, Marjaana Suihkonen, Dr Eleni Berki and Samuli Pekkola for keeping up my spirits. A friend in Tampere, Tarja Tiainen, offered her continuous support and companionship and was also of great help in arranging the practical matters related to the final phase of completing this thesis. Merita Petäjä, a dear friend since the 1980's, has shed light on my different concerns with her words of wisdom. Paula Rantamaa has shared my feelings about research work.

The funding for this work was provided by the Academy of Finland. The Department of Teacher Training of the University of Jyväskylä, the Department of Computer Science of the University of Tampere, and the Department of Computer Science and Information Systems of the University of Jyväskylä have offered good working conditions.

Finally, I want to express my deep gratitude to my family. This work may never have been undertaken without the 'human-centred' example of my late father Matti Isomäki, a doctor of medicine. His unconditional dedication to work for human well-being, particularly as a cancer researcher, has most obviously guided the actions of his offspring: my brother Pirkka's predominant concern is how to make world trade fair, and my own dedication becomes evident in this thesis. My late mother, author Inari Isomäki, emphasised the value of human thought, especially critical thinking. My greatest regret is that I have not been able to share my ideas concerning the humanisation of IS with my parents.

The support and love of my family - my husband Timo and children Johanna and Kimmo - have been and are the driving force in my life. I feel especially privileged to live

with a husband who usually understands me in a monopluralistic manner. My aunts and uncles - Sirkka-Leena and Jorma, Pentti, Kirsti and Ilkka-Juhani, Jyrki, Kerttu and Reino -, and my cousins, have acted as a caring family for many years. I dedicate this work to all of these extremely valued human beings - my family.

Jyväskylä, May 2002

Hannakaisa Isomäki

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“As far as we know, the human being is the only creature that is a problem to itself”

Ahlman 1953

PART I: INTRODUCTION AND INTEREST AREA

1 Introduction

During the past decade the change towards an information society has been effectively implemented throughout the industrialised world with the aid of information technology (Webster, F. 1995). An information society can be described as a global network built on information technology. The nature and qualities of this network are conditioned to a great extent by computerised information systems (IS), which connect humans and information technology. This connection is usually accomplished by designers whose expertise is in developing IS (Hirschheim et al. 1995). Therefore, due to the nature of IS, which condition and mediate human action in contemporary information society, the way that IS designers develop systems is of utmost importance.

An essential task of information systems development (ISD) – a process consisting of various tasks such as feasibility study, requirements analysis, logical, physical, and program design, as well as implementation (e.g., Beynon-Davies et al. 1999, Friedman and Cornford 1989, 178) – is to provide tools for human beings to exploit the technical infrastructure for various purposes. Recent development of information and communication technologies (ICT) provides IS designers with new technical potentialities to build systems for various purposes. Especially the emergence of ubiquitous computing and wearable computers supported by wireless technologies and distributed interfaces have promoted the birth of totally new kinds of views of IS (e.g., Paulos and Canny 1997, Bergqvist et al. 1999, Fällman 1999, Stanton 2001). While applications of ICT increasingly pervade human life, the nature of IS is changing, especially with respect to the human being. IS cannot exclusively be understood along the boundaries and operations of organisations. In addition to work-related activities, people use new technologies for increasingly diverse purposes, such as organising their domestic affairs, for finding information and services, playing games, and for staying in touch with their friends and relatives. Therefore, at this time an adequate way to perceive IS is to examine them in social and behavioural contexts. That is to say, IS should be seen as constructed for mediating and supporting human behaviour, as is often the case in approaches known as human-centred ISD (e.g., Nurminen 1986, Eason 1988, Greenbaum and Kyng 1991, Preece 1994, Ramey et al. 1996, Norman 1998). Then the most important task of ISD is to adjust IS to meet human characteristics and behaviour, i.e., humanise IS. *On a general level,*

the interest area of this dissertation can be located in the human-centred information systems development, which aims at the humanisation of computerised information systems.

The humanisation of IS is essential for at least two reasons. First, the way IS are adjusted to humans and their activities defines the quality of ICT companies' IS innovations in terms of people's acceptance. This is evident in that if people do not find new commercial products useful, attractive and desirable, the product in question fails to be an innovation. Beyer and Holtzblatt (1996, 1998) assert that in order to invent a real 'market-winner', the ICT firms need to meet with their designs the aspirations of the potential users of new IS. They argue that these aspirations are acknowledged by creating visions of the way that people prefer to behave within their daily activities, and then inventing new more useful and attractive activity practices. In this way the main point in creating innovative ICT applications is to first gain an insight into a new activity practice; only after this is it possible to generate systems design from that knowledge which reflects the ways people behave.

Second, taking human characteristics and behaviour into account in ISD is a question of value-sensitive design (see Friedman, B. 1997). Then human qualities should be taken into account in ISD in order to promote human life and well-being. This is important, because people adapt to their environments over time. In the current information society, where ICT applications pervade all aspects of human life, people interact with technology in a recurrent and ongoing manner. If the applications that humans use are not designed in a human-centred way, they are likely to cause deficiencies with respect to the convenient use of those systems. More far-reaching behavioural impacts of this ongoing usage of IS may be anticipated on the basis of research into human development. According to these studies, human development occurs during childhood and adolescence (e.g., Bronfenbrenner 1979, Pulkkinen 1996) as well as during later phases in life (Gibson and Levin 1975, Erikson et al. 1986), in a deep and diverse interaction between individuals and their environments. As the environment becomes more and more technologically intensive, the developing individuals are getting more technological responses to adapt to during the ongoing and recurrent situations of IS use. This increased human dependency on IS strengthens the need for the humanisation of IS.

Traditionally, the humanisation of IS has been pursued by developing new methodologies and approaches and ethical standards for ISD. It is then implied that the underlying assumptions, conceptual structure, techniques, and the whole formalised process of ISD methodologies (cf. Tolvanen 1998), and normative IS designers' ethical standards (cf. Berleur and Brunnstein 1996) are the best means for the humanisation of IS. However, these formalised guidelines reflect only the theories espoused in the field of ISD (cf. Argyris and Schön 1978), or canonical practices in contemporary ICT companies (Brown and Duguid 1991). In this way these traditional viewpoints on the process of ISD do not reflect the actual way that IS are developed in the practice of ISD.

Although systems development is a complex process which needs to be supported with different tools, the dominant way of considering the goals of ISD through conceptual structures in formal documents, such as the ISD methodologies and codes of ethics, ignores IS designers as active, creative, and, particularly, thinking creatures whose vision and subsequent actions actually make up IS applications. Yet ISD is understood as knowledge work: it is an intellectual and personal process which takes its form and consequences according to the conceptions of the performers of the process (e.g., Mathiassen 1998). With respect to the humanisation of IS, the primary concern in this study is how the human being is seen in the professional artistry of ISD by IS designers. Of essential importance is also the

nature of their insight into the human characteristics and behaviour that are essential with respect to the IS-user relationship. However, recent IS literature does not include empirical studies concerning IS designers' conceptions of the human being. Instead, a number of studies focus on clarifying the reasons why IS still suffer from user rejection (see Sauer 1994). In addition, descriptions of what constitutes the IS discipline embrace user-centred issues, such as user attitudes and user support, but totally lack studies of IS designers' conceptualisations or intellectual frames of reference concerning humans and their qualities (see, e.g., Barki et al. 1993). It seems that even the growth of interpretive studies in the field of IS (Walsham 1995) has not promoted the search for the meanings that IS designers associate to those humans that they make systems for. Therefore, ***the specific research question of this study is: what are IS designers' conceptions of the human being as a user of computerised information systems?***

There are two particular standpoints in this study. First, the user is defined as a human being. This means that users are understood in terms of the nature of the human being instead of the traditional task- or role-related view. That is to say, humans are conceptualised according to the fundamental constituents of people rather than in terms of different instrumental tasks and purposes which people accomplish with the aid of IS. People and their behaviour are here seen in terms of indispensable human constituents, which intertwine the accomplishment of instrumental roles and tasks, thus having an essential influence on IS usage adherent to such roles and tasks. This is because while people use IS for some particular purpose, they act as human beings, thus acting in accordance with their fundamental constituents. In addition, understanding humans exclusively in accordance with roles and purposes implies that people can be defined in a given system in terms of division of labour or some other instrumental task, and thus, humans are reduced to something that exists only in relation to particular instrumental needs and purposes (von Wright 1984, Buber 1993, Tuomi 2001, 37). In this study the underlying assumption concerning humans is in accordance with what are seen as the indispensable essentials of people. These fundamentals are seen to have behavioural implications for the IS-user relationship, and inevitably shape the task-related usage of IS significantly.

Second, the IS designers' conceptions are seen as primary tools for human-centred ISD. This viewpoint is in accordance with the current emphasis on the meaning of knowledge and expertise as key resources in contemporary IT companies (e.g., Nonaka and Takeuchi 1995). Then IS designers' understandings are considered as intellectual capital that can be put to use to create wealth, in particular by producing new innovative products (Quinn 1992). Because producing new products of high quality is based on human competence (Sandberg 2000), IS designers' conceptions of the human being as a user of an IS are seen as knowledge that reflects IS designers' intellectual competence in humanising IS. This standpoint emphasises IS designers as creative and intellectually innovative humans, who apply the ISD methodologies according to their own thinking while developing IS for people. Moreover, the designers' intellectual capital is not similar in every individual designer but there is qualitative variation within their thinking. Their thinking varies both with respect to the content of their conceptualisations and in regard to the comprehensiveness of their thoughts.

In this dissertation the study of IS designers' conceptions of the human being as a user of IS proceeds as follows. First, the background of the research setting is characterised. The necessity of this study is explained, on the one hand, by highlighting the historical perspective of ISD methodologies and other actions that have previously been taken in order to promote the humanisation of IS, and on the other hand, by noting growing human-centred concerns

within IS research and practice. Second, the theoretical assumptions underlying and informing this study are discussed. The current situation concerning the conceptualisations of humans' fundamental constituents in ISD is described by criticising prior analyses of the underlying assumptions of the human being within the IS schools of thought. The assumptions informing this study are presented by outlining a theoretical framework which acknowledges the human being as a whole, and also, by making an ontological assumption, which relates the human being as a whole to the form and functions of IS. Further, a pilot study, which aimed at facilitating method selection, is reported. An interpretive method referred to as phenomenography is explained, and the subsequent procedures of data collection and analysis are described.

The IS designers' conceptions of the human being as a user of an IS result in three hierarchical and distinctive but associated forms of thought consisting of 18 conceptions that, surprisingly, reveal both context-centred and human-centred understandings of the human being. The context-centred conceptions indicate an indirect understanding of the human being. Then humans are seen through other facets of an IS, its environments, or through the objectives of ISD. The human-centred conceptions denote a direct understanding of the human being and adduce explicit human features in the IS designers' conceptualisations. The resulting forms of thought indicate three different levels of intellectual competence in conceptualising humans as users of IS. These forms of thought are further discussed in pursuit of generalisation by relating the results to ideas and concepts that originate from prior research. Finally, the contributions as well as the conclusions of this study are presented.

PART II: BACKGROUND AND FOCUS OF THE STUDY

In this chapter I describe ISD from the point of view of the humanisation of IS. This refers to a human-centred view of IS which also implies that the most important objective of ISD is to adapt the applications of ICT to suit human characteristics and behaviour. In so doing, I discuss ISD methodologies, training and administrative actions aiming to improve human-centred focus on ISD, and IS designers' ethical codes as traditional strategies for humanising IS. The current need for humanisation is discussed in regard to human-centred concerns pointed out by IS researchers, and is seen in an implied runaway problem in the IS practice. These issues are described as a historical background, and in regard to their potentials, for the humanisation of IS. Finally, I describe the focus of this study and restate the research question.

2 The humanisation of computerised information systems

As noted above, computerised information systems (IS) combine human action and information and communication technology (ICT). This connection is usually accomplished by information system designers whose expertise is in developing IS for people (Denning 2001). The development of IS shapes human action in several respects. As Hirschheim et al. (1995, 15) point out, IS development (ISD) is a change process taken with respect to object systems in a set of environments by a development group to achieve or maintain some desirable objectives (Figure 1).

Object systems that the IS designers observe with an intention of change during the process of ISD are comprised of a collection of humans, processes, data, models, technology and partly formalised language which all together form a cohesive structure that serves some particular purposes (Hirschheim et al. 1995, 11). Marttiin (1998) highlights that object systems are perceptions of the target of change, which may vary among the members of the development group. In this study the human being is seen as the most essential facet of an object system and, respectively, the human being is simultaneously referred to as a part of an information system and a user of an IS. The development of IS is situated in different environments which are traditionally considered as being formed by labour, economy, technology, and applications (Hirschheim et al. 1995). Often the process of ISD is justified by

new technologies. However, in ISD there usually are multiple objectives that are marked by the intentions of the participants in the process (Lyytinen 1987).

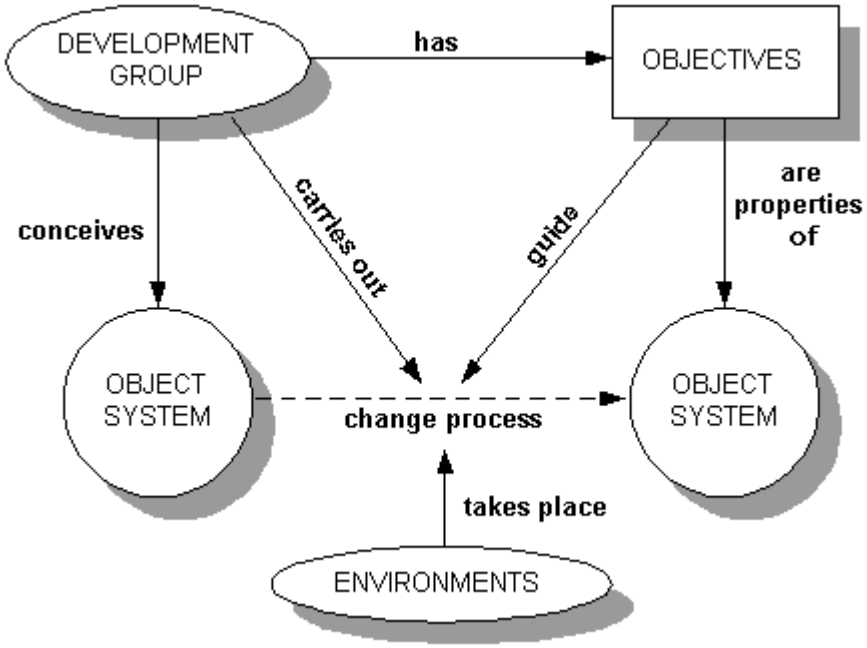

FIGURE 1. Information systems development (Hirschheim et al. 1995).

The consequences of the process of ISD and its outcome, i.e., an IS, are seen to emerge from the dynamic interaction of humans and IS (Markus and Robey 1988; Karsten 2000, 19-42). Consequently, the nature of the relationship between IS and human beings as users of those systems is regarded as essential. For this reason, the way IS designers substantiate and put into practice the relationship between people and IS is of utmost importance. The way IS designers take into account the actions and characteristics of humans in the development of IS is seen as important in order to make systems that are adjusted to human action. In this way the relationship between IS and people is accomplished from a human-centred perspective, i.e., the different kinds of bonds between IS and users are substantiated from the viewpoint of active human beings. This perspective is referred to in this study as the humanisation of IS.

This is not a new concern. One of the earliest references in the 1970's to the humanisation of IS is that of Sterling (1974). He argued that IS should not be abstracted from the people to whom they relate nor from the settings people create. The dehumanisation of IS should be prevented by taking into account 'the human condition' within ISD. The human characteristics that should be taken into account were a sense of dignity, individual needs and a need to be treated with consideration and courtesy. Sterling maintains that despite the overriding importance of a human's dignity and humanity, little is known in terms of scientific species about the operational meaning of these concepts or the antecedent conditions that enhance or diminish them. However, the humanisation of computer-based information systems was regarded as being of utmost importance and thus Sterling isolates broad categories of design features that may reveal humanising or dehumanising qualities of

IS. These features are grouped into five categories: procedures for dealing with users, procedures for dealing with 'exceptions' inherent in human behaviour, procedures for dealing with information, the problem of privacy, and guidelines for systems design with ethical implications. Under each category Sterling lists a number of specific design criteria which ought to be considered, in order to promote the humanisation of IS.

The first category includes recommendations for the procedures of the application. The language of the system should be easy to understand, and the transactions with the system should be courteous. The speed of computing is considered important: systems which mediate allocation of services or goods ought to be designed in such a way that action is taken as rapidly as possible, and the system in general ought to respond quickly to the user. In addition, the system ought to relieve the user of unnecessary tasks or chores, and it ought to provide for a human information interface, i.e., reassurance should be provided for individuals in vulnerable positions such as the unemployed or the sick or handicapped. The second set of guidelines concerns procedures for dealing with 'exceptions', which refer to individual behavioural exceptions from a normative bureaucratic procedure. In short, the system ought to recognise as much as possible that affected individuals differ in many personal characteristics and needs, and that conditions may arise which require that some be accorded different treatment from that provided to others. The system must also allow for alternatives in input and processing of information, and in general give individual choices on how to deal with the system.

The third category of design principles consists of action of the system with respect to information. The system should include provisions to permit individuals to inspect information about themselves and to correct errors. Also provisions for evaluating information that is stored in the system should exist, and humans should be able to add information which they consider important. In addition, systems should clearly make known what information is stored in them and what use will be made of that information. In the fourth category Sterling (1974) gives two essential design principles to deal with the problem of privacy: the designer of a system should evaluate all procedures with respect to both privacy and humane requirements, and the decision to merge information from different files and systems should never occur automatically. Finally, the fifth category depicts guidelines for systems design with ethical implications, i.e., a set of ethical principles is suggested for managers and systems designers to follow: the system ought not to trick or to deceive a citizen, a customer, an applicant, a participant, or any other person affected by a system.

These above-depicted guidelines mirror well the early considerations of how to humanise IS. The main emphasis is on the interaction between the individual user and the system and its functional features with respect to temporal action, individual behavioural differences, possibility to correct errors, and handling information. The ethical aspects include protection of humans against misuse of information concerning themselves as well as issues of privacy. Most clearly, however, the tendency towards increasingly human-centred IS development is seen in the trajectory of ISD methodologies and approaches. In the course of time, different approaches have been developed to include conceptual structures that foster human features in various ways in regard to IS. The purpose of these approaches is to facilitate the work of IS designers. In the following I briefly describe the traditional strategies in regard to the humanisation of IS.

2.1 Traditional strategies for humanising IS

The recurrent period of focusing attention on human issues within IS and their development has its origins at the very outset of computing. The trajectories of different ideas concerning IS development methodologies and approaches are ever-increasingly geared towards a deeper understanding of the human being as a user of computerised information systems. To illustrate this, in the following I present a brief overview of the most significant strategies or ideas aiming at the humanisation of IS since the 1950's. Just like all action involving IS and people, also the strategies of humanising IS have been shaped within the interaction between humans and constantly evolving information technology. Nevertheless, since the focus in this study is on the human side of the IS-user relationship, I shall overlook the technological aspects and discuss the following approaches, methodologies and actions with respect to their contribution to the human-centred view of ISD.

2.1.1 The beginning: structured methods

According to Pain and al. (1993), the first ISD methods which were used in the 1950's consisted mainly of programming, accompanied by limited discussions with users about the inputs, outputs and the necessary calculations. At the time, the choices of human-computer interaction were obviously limited in that input was carried out via punch cards, data was stored on magnetic tape, and output was printed on paper. However, as user expectations increased and technology developed, IS became more complex. The tasks of systems analysis and design, including ascertaining users' requirements, designing data structures and screen layouts, became necessary along with programming. Consequently, methods for controlling as well as managing the actual process of ISD and the numbers of people engaged also became a necessity. This led in the 1960's to several proposals for structured systems development standards, usually referred to as ISD methodologies, such as IBM's Vienna development method (VDM) and the British government's Structured systems analysis and design method (SSADM). The idea of design is, firstly, to characterise the situation in terms of identifiable objects with well defined properties; secondly, to find general rules that apply to situations in terms of those objects and properties; and finally, to apply the rules logically to the situation of concern and draw conclusions about what should be done (Winograd and Flores 1986, 15). In a similar sense, structured methods were later developed further to cope with the increased complexity of the analysis and predefined formats for describing and filing the numerous details that are collected during systems development, beginning with descriptions of the problem and ending with detailed program specifications and user documentation. The most common forms of these methodologies originate in the works of Gane and Sarson, DeMarco and Yourdon (Hirschheim et al. 1995, 239) as well as Jackson (Greenbaum and Kyng 1991, 8).

The benefits and the deficits of structured methods were soon exposed. A fair amount of criticism has been directed towards this way of building IS, often referred to as the rationalistic tradition. The main premise of the criticisms is that the formal objective worldview that is embedded in the procedures of the rationalistic design tradition alienates IS designers from

the actual nature of the 'object systems'. This occurs particularly with respect to humans (Bødker and Greenbaum 1993). Thus, structured methods are considered to hamper humanised ISD (e.g. Greenbaum and Kyng 1991, Pain et al. 1993). In addition, within these traditional systems development methodologies, the users have little or no role in the design process and thereby had no involvement in the development projects until some training was provided prior to operation (Smith 1997, 80). Moreover, the use of these methodologies also often resulted in systems that were sub-optimal in that rather independent systems were designed for interdependent activities (Smith 1997, 118).

However, the structured methodologies promoted the human-centred view of ISD. The significance of this tradition in regard to the humanisation of IS lies in that their use made visible the genuine nature of human action, which does not in every respect conform with a formalised and objective world view. In addition, the disappointments and failures experienced related to the use of structured methods triggered new efforts in developing more human-centred methodologies, as is pointed out in the following.

2.1.2 Prototyping and evolutionary approaches

As Hirschheim and al. (1995, 34-35) state, in the late 1970's new user-related problems arose. Due to the increased pace within business and other organisational action users could no longer wait years for their IS to be developed, nor could they wait that long to find out whether the system met their needs or not. Another serious problem was that the communication gap between IS designers and users continued to grow as computerised information systems geared IS professionals' attention on increasingly complex applications. In this situation, new technological tools were applied to ISD in such a way that users could experiment with the system under development so as to get 'hands-on' experience of what the final system would be like. This is the initial human-centred idea behind evolutionary systems development and prototyping. Through prototyping, users could tell much earlier whether the system meets their needs. The communication between IS designers and users was also seen to be improved. Prototyping allowed users who may previously have had difficulties in formulating and articulating their requirements to better specify their demands. In addition, the flexibility of prototyping allowed IS professionals and users an opportunity to pay more attention to other issues than just technological ones, such as work design and ergonomic or usability aspects (Hirschheim et al. 1995, 36).

However, experiences with prototyping also revealed some problems within the approach. Friedman and Cornford (1989, 293-295) put forward three problems regarding users. First, the effects of prototyping are to some extent limited. The technique of prototyping is usually restricted to developing only a part of users' working environment and the broader organisational context may be ignored. The second problem is quite the opposite of the first problem: prototyping tips the balance of power too far towards users since they are allowed to decide on the design solely from their own point of view. In this way prototyping may orient the process of ISD in favour of users to the detriment of broader organisational issues, such as efficient resource allocation or other strategic aims of top managers. Third, prototyping may be misused to manipulate users into co-operating with systems whose effect will be unsatisfactory or even deskilling. In spite of these problems, prototyping initiated the transition towards evolutionary and dynamic systems development methods which emphasise

user empowerment and participation throughout the process of ISD, such as rapid application development (Beynon-Davies et al. 1999). With respect to the humanisation of IS, the main impact of prototyping is that it led IS designers to be confronted with the consequences of their designs on users (Friedman and Cornford 1989, 293). In this way to perceive, understand, analyse and (re)design the IS-user relationship from the point of view of the human being became an essential task of IS designers.

2.1.3 The socio-technical approach

At the turn of the 1970's and 1980's a significant transition towards human-centred systems development commenced along with new methodologies. Perhaps the best known human-centred design method, termed as ETHICS, was introduced by Enid Mumford (Mumford 1983). ETHICS is based on the socio-technical systems theory and is often regarded as the foundation and predecessor of current human-centred methodologies. With respect to humanisation of IS a significant aspect is that the 'object system' is seen to include both social and technical features. Hirschheim and al. (1995, 251) state that this idea is due to Mumford's observation that much more could be accomplished in order to meet social requirements if they were considered at a phase when design was not yet fixed. Consequently, the design team was divided into two parts and in this way both the social and the technical design objectives were paid explicit attention to. In addition, ETHICS emphasised users' participation in the design process and job satisfaction was regarded as an ultimate goal of ISD.

According to Nurminen (1986, 88), it is assumed within ETHICS that job satisfaction is fulfilled when an employee's own expectations and the demands directed at him or her sufficiently correspond. This correspondence brings about commitment to the work situation. Then the employee is seen to establish five different kinds of engagements referred to as 'fits' with the employer. The knowledge fit means that the employee is prepared to use his or her knowledge and skills for the benefit of the employer. The psychological fit signifies that the employee is able to trust that his or her well-being is taken care of as well as that his or her work is adequately appreciated, challenging and involves responsibility. The efficiency fit denotes that the employee strives to fulfil the productivity and quality demands as well as accepts the rules and control actions inherent to the work. The task-structure fit indicates that the work task is broad enough and offers employees an opportunity to actualise themselves in conformity with their abilities. The last engagement, the ethical fit, refers to the employee's possibility to act and be respected as a valued human being and that he or she should have adequate social contacts in work. Based on these principles the procedures employed in ETHICS essentially place importance on the analysis of the needs of business efficiency, effectiveness, job satisfaction and future change. These factors are then moulded into objectives that are addressed by the two components of design: technical and social (Smith 1997, 134).

However, this division of an IS into two separate systems is also regarded as the weakness of the socio-technical approach: if the social part of the whole of a system is separated the remaining nature of the system is technical. Accordingly, the pitfall in the use of ETHICS is that the technical design objectives are the primary concern and the social objectives are neglected (Nurminen 1986, 90). ETHICS is also undeveloped in that it

addresses human characteristics in an inexact manner. Although the ‘fits’ clearly involve several different human characteristics (cognitive, emotional, volitive, social and ethical) they are all termed social features. Ehn (1988, 268-269) has also presented some criticism of the early socio-technical approach for not being truly participative or democratic, and being managerialist. In addition, Pain et al. (1993) argue that the early approaches take too simplistic a view of job satisfaction, skill and the impact of technology.

Nevertheless, the socio-technical approach is very significant with respect to the humanisation of IS in that it addresses IS as social systems and makes a serious attempt to offer means for building bonds between the social and technical system. Moreover, the socio-technical approach obviously broadened IS research and practice intellectually and gave rise to new delineations, such as IS are technical systems with social implications or even social systems only technically implemented (Hirschheim et al. 1995, 36).

2.1.4 Understanding human activity systems

Another major contribution to the human-centred perspective was proposed in the early 1980's by Peter Checkland (1981), whose SSM (Soft Systems Thinking) methodology introduced the concepts of human activity systems and multi-perspectives concerning ISD. Checkland contends that design related to human activity requires cultural analysis concerning human behaviour. Then the IS designers should identify both the roles - either institutionally or behaviourally defined - and norms that describe expected behaviour as well as values inherent in the problem situation (Smith 1997, 132).

The basic idea is that the term ‘system’ is used as a tool for expressing different views or holons of the real world. These holons are turned into a rich picture by the aid of cultural analysis, which is parallel to logic-based analysis. Cultural analysis is used to study a problem situation and it attempts to identify roles that are either institutionally or behaviourally defined, norms that depict expected behaviour and values that are local to a situation and denote organisational performance. Political analysis deals with managing relations between different interests and identifying how power is expressed within the organisation. Within the logic-based analysis the holons are then described by developing a root definition and further specified as to conceptual models. These procedures of SSM can be used at the early stages (analysis) of the system’s life cycle but they do not apply to systems design (Smith 1997, 130-133). Checkland’s method differs from traditional methods in that it does not prescribe specific tools and techniques but a general problem-formulating approach.

Soft Systems Methodology is remarkable in regard to humanisation of IS in that it provides IS designers with such a framework that does not force or lead systems designers to a certain fixed solution, but rather assists them to contemplate and understand the problem situation and human activity within it (Hirschheim et al. 1995, 243). In this way SSM emphasises IS designers’ profound understanding of human action within the object system. This initiative has also led to the development of other ISD approaches which put emphasis on IS designers’ deep insight and reflection concerning human action, such as Multiview2 (Avison et al. 1998), the Professional work practice approach (Mathiassen 1998), and Multi-modal systems design (Bergvall-Kåreborn 2000).

A more recent perspective on human activity systems is the application of activity theory in the study of IS (Kuutti 1997). The core idea of this application is that activity theory

offers means to study individuals' actions in a particular context. This activity is not direct one but mediated by various artifacts, such as signs, procedures and instruments. In addition, this mediated activity is a historically developing phenomenon and culturally mediated. This means that the relationships between the main components of an activity system are situation-bound and have developed historically in the course of a particular cultural process. In this way humans and their activity are examined as a social and cultural process.

2.1.5 End-user computing

Again in the mid 1980's a new strategy for user relation problems was promoted. A more accurate fit between humans and IS was pursued by increasing the users' independence and encouraging end-user computing (EUC). According to Friedman and Cornford (1989, 279-282), the general idea was to provide the users with a programming environment which allows them to tailor a system according to their own needs. The purpose was to increase degrees of flexibility in computer use, often on the following scale. Within the lowest degree, the users are provided with systems in which choice is built into the system but is not programmable to users. A more flexible manner is to implement systems in which choices can be programmed, stored and reused by users. Very flexible ways increased users' control over either the choice of parameters or over operations. The most independent level was to give the users total control over operations and parameters of the system.

End-user computing, however, did not remove either the IS-user relation problem or the need for professional IS staff. While EUC allows users to shape IS according to their own needs, it can lead users to spend more time on developing their IS than on doing their actual work with the system. In addition, end-user computing requires good skills in computing, which is not necessary for all users. The greatest disadvantage of EUC is often seen from the perspective of the organisation as a whole. Uncontrolled end-user computing may lead to wasted resources as well as numerous maintenance and compatibility problems (Friedman and Cornford 1989, 238).

The potential of developing end-user computing as a strategy to improve IS-user relations seems also to have decreased due to the lack of a distinct and commonly accepted definition of end-users. Cotterman and Kumar (1989) pointed out this problem already in the late 1980's and suggested a taxonomy designed to provide a common base for understanding and classifying end-users in organisations. However, nowadays the term EUC is regarded almost as useless due to its several controversial meanings within IS literature and consequently the term's inadequacy to specify its meaning in modern knowledge work environments (Forsman 1998, 150-157). The advantage of EUC in regard to the human-centred view is that end-user computing encouraged users to shape computer systems according to their own liking. In so doing they also acquired skills in computing while the development of IS remained a professional task.

2.1.6 Participative design

Undoubtedly the most noteworthy strategy for humanising IS which has its origins in the

socio-technical approach is user involvement in ISD, i.e., approaches known as co-operative, collaborative, participatory or participative design. During the 1980's – and also later - numerous detailed classifications of user participation in ISD have been proposed. The European views are in general comprised of the distinction between 'weak' consultative participation and 'real' influence over IS design whereas the American analyses are more likely to focus on personality conflicts and differences in cognitive styles between users and IS designers (Friedman and Cornford 1989, 274). A special branch within the European views are the approaches often referred to as Scandinavian. According to Bjerknes and Bratteteig (1995), the most common reasons for user involvement in Scandinavian approaches are, first, improving the knowledge upon which IS are built; second, enabling future users of the system to develop realistic expectations as well as reducing resistance to change; and third, increasing work place democracy by giving the members of an organisation the right to participate in decisions that are likely to affect their work. In addition to enhancing work place and working life democracy inherent to IS, attention is particularly paid to individuals and groups in their working situations.

Typical of participative design is that methods often termed design-by-doing including mock-up prototyping are applied and developed because traditional formal systems development techniques were often found to be too abstract and thus not appropriate tools for communication between IS experts and users (e.g., Ehn 1988, 117). The nature of co-operation is also seen as crucial. Greenbaum and Kyng (1991) emphasise that user participation should be authentic and full, aiming at enhancing workplace skills rather than degrading or rationalising them. In a similar vein, Bødker and Grønbæk (1991) contend that co-operative prototyping is an ongoing mutual learning process involving IS designers and users.

The emphasis on work situations prominent in participatory design approaches has brought forth different variations of IS methodologies which often draw on ethnography. Ramey and al. (1996), for instance, describe a practice-oriented application of ethnography in studying users as members of a distinct professional culture. The phases of their approach aim at extracting the actions, goals of actions and the values that animate them from a 'stream of behaviour'. By iteratively sampling behaviour and confirming its interpretation with the future users, they build a model of the situation. The advantage in drawing on ethnography is that it facilitates capturing tacit knowledge inherent in human activity or, as Ramey and al. (1996) depict it, the mundane, the subliminal, and the subattentional. Understanding humans within mundane work practice is emphasised also in a well-known methodology termed Contextual Design, which was developed in the Digital Equipment Corporation. This method also derives its origins from ethnography but is supplemented by psychological principles concerning, for instance, managing the interpersonal dynamics of an interview and shortening the time needed in observing a long process (Beyer and Holtzblatt 1996, 1998). Another variant of traditional ethnography suited to swift industrial design is known as rapid ethnography, suggested by Norman (1998). It is an observational technique for going to the prospective users of a particular product and observing the activities they perform, their interactions, and the subcultural features within their work, learning and play. Rapid ethnography is regarded as critical especially to the invention of new product concepts and classes (Norman 1998, 195).

Altough user involvement is highly regarded within the IS literature, it has not always been found very successful in the practice of ISD. For example, Newman and Noble (1990)

depict numerous problems during participative systems development, such as user resistance, knowledge gap between the IS designers and users, and lack of a positive climate of trust. Sutter (1999) argues that excessive user involvement slows down the IS effort and often too many user committees just blur the focus and unnecessarily expand the requirements. Moreover, King (1995) ascertains that in practice user participation may sometimes be absent. However, there are several contributions made by participative approaches to the humanisation of IS. First, the focus of IS designers' reflection within ISD becomes clearly geared towards humans and their action whereas, for example, in prototyping the focus was on software although redesigned in accordance with users' feedback. Second, the nature of human beings was seen in a broader sense than before. Human behaviour is understood in terms of social interactions, e.g., the rituals, ceremonies, norms and symbols both consciously and unconsciously present in everyday life. Third, power relations were explicitly addressed by the Scandinavian approaches, which emphasised that users should be in control of their own work. In this way human action in the context of ISD is reflected in relation to the actions of society.

2.1.7 Integrating issues of human-computer interaction into ISD

Several new methodologies and standards of the kind mentioned above have appeared during the 1990's. Often they are termed human-centred development or usability engineering which aims at combining knowledge and methods from the field of human-computer interaction (HCI) in the process of ISD or software engineering. For example, Nielsen's (1993) model for usability engineering emphasises in the predesign phase that designers should know the users and define their individual characteristics, current and desired tasks besides performing functional analysis. Based on this predesign, the actual design is carried out as iterative processes employing both heuristic analysis and a variety of participatory design methods.

The usability engineering life cycle developed by Mayhew (1999) follows much the same guidelines. She splits the ISD process into four phases and indicates the appropriate points for the usability design tasks relative to the ordinary development tasks. Mayhew's approach stresses that the typical ISD tasks must be supplemented with knowledge concerning users, such as user profiles and contextual task analyses aiming at usability goal setting in the requirements phase. In addition, mock-ups and prototyping are applied within iteratively conducted design. Quite similar is also the International Standardization Organization's (ISO) standard for human-centred design processes for interactive systems (ISO 1999), which emphasises active involvement of users and a clear understanding of both user and task requirements in the early phases of design. According to this method, simulations and user tests are applied iteratively within design. These kinds of approaches are currently been developed also in the Finnish IS industry in order to improve continuous usability engineering (e.g., Ketola 2000). A common idea that underpins these methodologies is that IS should be considered in terms of their usability in addition to the system's utility (Nielsen 1993).

Ehn and Löwgren (1997) delineate the evolution of HCI and ISD as being consolidated as an approach referred to as Design for quality-in-use. They assert that the evolution of the usability concept in HCI, and the methodological evolution in the field of ISD have yielded a

move from an exclusively rationalistic and objective perspective to the inclusion of interpretive social and subjective aspects. In other words, the traditional rationalistic way of constructing IS, and the tradition of experimental psychology in HCI, have evolved towards a holistic approach that combines methods of Contextual design and Participatory design, and have further developed into interaction design, which requires a particular design ability. This ability refers to competence to study IS in use from three different standpoints: structure, function and form. The structure of a system is its material or medial aspects, i.e., the technology in terms of hardware and software. The structural aspects are objective in that they are inherent in the construction of the IS, and less dependent on context and human interpretation. The functional aspects of a system concern its actual, contextual purpose and utilisation. Different users have different purposes for and usage of a system. Functional aspects include organisational performance and functions beyond the simple utilities of the system. The form of a system expresses the human experience of using the system. Form is not necessarily a property of the system, but rather a relation between system and user. Designing for quality-in-use emphasises that all the three aspects constitute competence in current ISD (Ehn and Löwgren 1997, 311).

2.1.8 Administrative actions and training

Solutions to user relation problems were pursued also by means of administrative actions and training. As Friedman and Cornford (1989, 255) point out, these attempts included separation of analysts from programmers, establishing user support centres as well as bringing the IS experts close to the users by decentralising the IS functions in organisations. In addition, the knowledge and skill bases of the IS experts were changed by conducting job rotation and increasing knowledge of user environments, i.e., functions performed by user departments and business (Friedman and Cornford 1989, 271-302). In this way the IS professionals were brought closer to the users both physically in the workplaces and also in skill. The aim of these procedures was to achieve improvements in the IS-user relationship.

2.1.9 Ethical concerns

In addition to the above mentioned strategies the humanisation of IS is promoted by discussions reflecting ethical concerns in ISD. The contemporary discussions of computer ethics concern both academic researchers and IS professionals in companies (Eriksson et al. 1999). These discussions assume an official form in the IS professionals' codes of ethics, which indicate norms for performance in the IS designers' professional activity. Two most central manifestations of IS professionals' codes of ethics have been worked on and published by the Association of Computing Machinery (ACM 1992) and the International Federation on Information Processing (IFIP 1990). These codes of ethics bring forward stances widely shared by IS designers and also researchers. Additionally, the majority of the industrial countries have produced their own codes of ethics for ISD (cf. Berleur and Brunnstein 1996).

These codes pay a considerable amount of attention to standpoints concerning human well-being. The ACM code of ethics stresses that a fundamental aim of computing

professionals is to minimise negative consequences of computing systems, including threats to health and safety. In addition to a safe social environment, human well-being includes a safe natural environment. The values of equality, tolerance and respect for others are looked upon as essential in nature. Especially, discrimination on the basis of race, sex, religion, age, disability, national origin, or other such factors is considered as an explicit violation of ACM policy. In a similar vein, the IFIP code of ethics binds the IT professionals to advance international human welfare and the quality of life for citizens of all nations. These improvements aim at morally desirable goals such as personal development, physical safety, personal dignity and human fulfilment in computerised workplaces. Particular threats to health are poorly designed human-machine interfaces, which are seen to cause stress symptoms. It is also regarded as important that current system users, potential users and other persons whose lives may be affected by a system must have their needs assessed and incorporated in the statement of IS' requirements. In this way IS designers have affirmed their obligation to continually humanise information technology.

As a critical view of the implications for the humanisation of IS it can be stated that the codes of ethics are formal documents that professional organisations themselves produce in order to make known their stance and policy on ethical issues within a profession. As such, they express the desired status of things – 'what ought to be' – but do not offer explicit guidance for achieving the desired goals. Unfortunately, explications of ethically valid intentions do not furnish a guarantee for the actual realisation of human-friendly information technology. In addition, the construction of IS professionals' codes of ethics has been considered as a response to the need for professionalisation – for fulfilling the characteristics of a profession - rather than as a reaction to runaway problems in the field (Adam 1999).

2.2 Current need for the humanisation of IS

As depicted above, the humanisation of IS has been pursued in the course of time by developing methodologies and approaches for ISD, with the aid of administrative actions and training, and by constructing norms and codes for ethically oriented activity among the IS designers. Nevertheless, in spite of the above mentioned efforts, the humanisation of IS is still an important issue. The requirement for IS designers to understand human characteristics and behaviour can be seen in various contexts within contemporary IS research and practice.

Kling (1996), for example, contends that a computer science of the 21st century will be strong in areas that rest on the social foundations of computerisation as well as in areas that rest on mathematical and engineering foundations and, respectively, skills in social analysis are also equally important to computer specialists. Gill (1996), in turn, claims that the key question of the 21st century is how to design systems which serve the needs and aspirations of people in society. Iivari (1997) states that both IS practitioners and researchers are increasingly concerned with how satisfied users are with IS and in this sense the quality of IS is a central concern in ISD. Similarly, understanding software quality as consisting also of users' experience of it is considered essential (Tervonen and Kerola 1997). In a same vein, Winograd (1995) argues that creating complex software necessitates the development of design environments which facilitate IS designers' tasks of satisfying users' cognitive needs

and also helping them to deal with the aesthetic, practical, and social properties of the software.

Further, the recent development of ICT has impacts on the nature of IS which intertwine computer technology and human beings. Particularly the emergence of ubiquitous computing and wearable computers supported by wireless ICT and distributed interfaces has promoted the birth of totally new kinds of views concerning IS (e.g., Paulos and Canny 1997, Bergqvist et al. 1999, Stanton 2001). While the applications of ICT increasingly pervade all aspects of human life, the nature of IS is changing especially with respect to the human being. IS cannot exclusively be understood along the fixed boundaries within the structure and operations of organisations. In addition to work-related activities, people use the applications of ICT for various purposes, such as organising their domestic affairs, for finding information and services, and for staying in touch with their friends and relatives. Consequently, the way IS designers understand the human behaviour is an important piece of knowledge within contemporary ICT-based IS innovations. This is because people do not accept new systems, especially commercial products, if they do not find them useful, desirable or attractive. Therefore, in order to invent a real 'market-winner', the IS designers need to meet with their designs the aspirations of the potential users of ICT applications. According to Beyer and Holtzblatt (1998), this is done by creating knowledge of the way that people behave within their daily activities and then inventing new, more useful and attractive activity practices. The main point in creating innovative applications of ICT is to first gain an insight into a new activity practice which is attractive to people. Only after this is it possible to generate systems design from the knowledge that reflects the ways people behave. This means that in order to get their systems designed, implemented, and successfully sold IS designers are obliged to understand human behaviour and characteristics.

Moreover, understanding human characteristics and behaviour is a question of value-sensitive design (see Friedman, B. 1997). Then the human characteristics should be taken into account in ISD in order to foster human life and well-being, as it is stated in the IS professional's codes of ethics. This is important because people adapt to their environments over time. In this current situation, where ICT-based applications are pervading almost all aspects of human life, people interact with technology in a recurrent and ongoing manner. If the applications that people use are not designed in a human-centred manner, they are likely to cause deficiencies with respect to convenient use of systems. More far-reaching behavioural impacts of this ongoing use of technology may be anticipated on the basis of the theories of human development. This standpoint is essential because human development occurs and is influenced by the interactions that individuals experience with the world. This happens during both childhood and adolescence (e.g., Bronfenbrenner 1979, Piaget 1985, Pulkkinen 1996) as well as in later phases of the human life span (e.g., Gibson and Levin 1975, Erikson et al. 1986). It is evident that human development occurs in a deep and diverse interaction between an individual and her environment. As the environment is becoming more and more technologically intensive, the developing individual is getting more technological responses to adapt to during the ongoing and recurrent situations of IS use; for example, when the everyday communication in the bank, in the market hall, or in the school occurs via ICT applications and not in a face-to-face situation. This increased human dependency on IS strengthens the need for IS research and design that concentrate on the nature of the human being in order to avoid harmful consequences of the use of IS.

In addition to the above ethically shaded concern, problems in the IS-user relationship are of growing concern due to low systems success rates. Recent problems have been presented by Smith (1997, 9), who states that *Scientific American* reported that three-quarters of all large systems are 'operating failures' that either do not function as intended or are not used at all. Noteworthy also is that this statement indicates that the failure is not technical in nature because the systems are in operation but rather due to utility or usability problems, or maybe even both. Furthermore, *Computing* reported that companies in the United Kingdom spend over 1 billion pounds per year on software inappropriate to their needs (Smith 1997, 9). A summary of survey results indicating levels of failure for a range of IS signifies remarkable economic losses due to abandoned and rejected systems that do not meet requirements (Sauer 1994). It seems that often IS investments do not meet their performance objectives. It is also worth noticing that the reasons for this are seldom purely technical in origin.

Besides the above-depicted concerns emerging within the IS community, the humanisation of IS has achieved political attention, too. The European Commission has presented a comprehensive case by designating user-friendliness in the current information society as one of the main aims of research and development activity in the near future. This requirement for software that is easy to use is also stated in the EU directive (Smith 1997, 44).

To conclude, in this current societal situation, IS should be designed in a human-centred manner that promotes the humanisation of IS. This means that the properties of IS should be adjusted to human characteristics and behaviour. Then the central design issues are derived from knowledge that reflects the nature of the human being. In this way the needs and aspirations of potential users of IS are being met in a sustainable manner that aims to avoid harming human life and well-being. For these reasons, the way IS designers actualise the relation between humans and IS needs to be paid attention to. In the next section I present the viewpoint adopted in this study as well as restate the research question in regard to the humanisation of IS.

2.3 The focus of this study

As shown above, for the moment understanding human characteristics and designing systems in conformity with them is an essential goal for the development of IS. Thus, the humanisation of IS is a central demand for current IS professionals in their work. A core capability of contemporary IS designers is to understand and analyse humans and their behaviour as well as interact with them in mutual understanding during the ISD process in order to build and disseminate humanised IS. This central skill is being supported by an ever-increasing amount of different ISD approaches and methodologies. Respectively, the prevailing strategy of humanising IS rely on the nature of ISD approaches and methodologies. IS professionals are supposed to build human-centred systems by using the methodologies as means to an end; that is, the use of methodologies as tools for humanisation leads IS designers to achieve a human-centred goal.

Another formal strategy concerning the humanisation of IS is the construction of IS professionals' codes of ethics. These codes are formal documents that professional organisations, such as the ACM and IFIP, produce for themselves in order to make known their stance and policy on ethical issues within the profession (Airaksinen 1991). A code of

ethics indicates norms for corporate performance in a certain profession. In this way, a code of ethics yields an espoused theory or a canonical stance concerning professional performance (Argyris and Schön 1978, Brown and Duguid 1991), which the organisation wishes to project to the outside world and to its members. In other words, the code of ethics expresses the desired status of things ('what ought to be'). In this sense, the codes of ethics set by different professional organisational members also form an espoused 'ethical' theory. However, the code of ethics – as well as the ISD methodologies - as an espoused theory indicate only a formal description of an establishment's action and in order to 'get the whole picture' within a certain profession, it is necessary to consider the actual assumptions of the organisational members, i.e. the theory-in-use (Argyris and Schön 1978, cf. also Brown and Duguid 1991).

The point of view adopted in this study differs from the above-depicted views concerning IS designers ways to humanise IS. Although systems design is a time-consuming and complex process which needs to be supported with different tools, the dominant way of considering the goals of ISD through conceptual structures in formal documents - such as the ISD methodologies and codes of ethics - ignores the IS professionals as active, creative and thinking creatures who are the actual builders of IS. In this study the development of IS is understood as knowledge work. It is an intellectual and personal process which takes its form according to the conceptions or mental models of the performers of the process. Therefore, instead of concentrating primarily on the nature of the IS approaches and methodologies, my viewpoint in this study concerns IS professionals themselves; particularly their perceptions and conceptualisations of humans. This kind of point of view is stressed also by Maddison and al. (1983), who ascertain that IS professionals are supposed to apply the methodologies according to their own thinking, not just blindly follow the steps and rules of the methods. It has also been found that contemporary IS professionals still do so: they do not use methodologies as such but apply them or parts of them innovatively according to the demands of the design in question (Avison and Fitzgerald 1994). Moreover, in the early 1980's the researchers of the Danish MARS project found that the more experienced the IS professionals are, the less they follow documented methodologies in their work. This was the case even if the organisation had a specific method of its own as a development standard (Hirschheim et al. 1995, 129). According to Ciborra (1996), this kind of improvisation or *bricolage* plays a central role within innovative organisational action. It is evident in particular with respect to human-centred design. Unlike the more traditional methods, human-centred design is not a static method. Instead, it is a dynamic approach which requires the designers to reflect upon new design issues in novel situations with respect to human beings (Greenbaum and Kyng 1991, Pain et al. 1993). IS designers should be able to open their minds and to go beyond the territory of general professional knowledge - they must engage in reflections to create the necessary new insights into the situation at hand (Mathiassen 1998). Then the most important tool for ISD is the IS designers' thought and insight.

The viewpoint in this study is also in accordance with the current emphasis on the meaning of knowledge and expertise as key resources in contemporary IT companies (e.g., Nonaka and Takeuchi 1995). Here IS designers' understandings are considered as intellectual capital that can be put to use to create wealth, in particular by producing new innovative products (Quinn 1992). Then designers' knowledge is seen as human capital that signifies knowledge, skills and capabilities as enabling people to act in new ways. Kogut and Zander (1992) refer to this kind of knowledge as procedural knowledge or craft knowledge mirroring

the know-how, practices, and accumulated expertise of practitioners within a particular profession.

In the following subsection the research question is restated and discussed as the focus of this study.

2.3.1 The research question restated

With respect to the humanisation of IS the primary concern is how the human being is seen in the contemporary professional artistry of ISD by IS designers. An essential concern is what is their insight on the human characteristics that are essential with respect to the IS-user relationship. Consequently, the aim and principal question of this study is: ***what are IS designers' conceptions of the human being as a user of computer-based information systems?***

The research problem conveys a particular standpoint, according to which the user is defined as a human being. This means that users are understood in terms of the fundamental nature of the human being instead of the traditional task- or role-related view. The traditional way to understand users is to specify them by different tasks or roles they have in relation to an information system (e.g., Cotterman and Kumar 1989, Iivari et al. 1998). Further, Friedman and Cornford (1989, 183-187) argue that a simple classification distinguishing system builders, users, managers and representatives of end users is insufficient, and present several classifications of user definitions that are based on organisational tasks or roles. Moreover, Swanson (1988) defines users as either key managers or key intermediaries. Then the key manager is defined as the user who is a potential dominant user of the system, i.e., whose information utilisation needs will be sufficient to establish the success of the system. The key intermediary is the individual who supports the key manager and other managers in their uses of the system. The main premise for understanding users is their organisational position and task range, which is seen to yield different information inputs and outputs for systems design.

These traditional views totally lack any consideration of human characteristics and behaviour. People are seen merely as performers of particular work tasks, but no attention is paid to human characteristics or behaviour while performing particular work tasks. It is assumed that IS designers will end up with successful systems designs by just concentrating on organisational functions and how these functions are distributed among the work tasks within the organisations. No understanding of the very nature of the human being is regarded as necessary. In this study the focus is on human characteristics and behaviour (Figure 2). This means that users are predominantly seen as acting according to the basic features of the human being while performing particular tasks with IS. It is assumed that in order to fully understand the use context in ISD, users should be understood in terms of human characteristics and behaviour in regard to various tasks that people perform with IS. That is to say, in addition to using IS as tools for particular tasks, people are at the same time acting according to the nature of human beings. Therefore, in the next section, the fundamental human characteristics are discussed and a framework for delineating these features is presented. These delineations serve as theoretical underpinnings in this study.

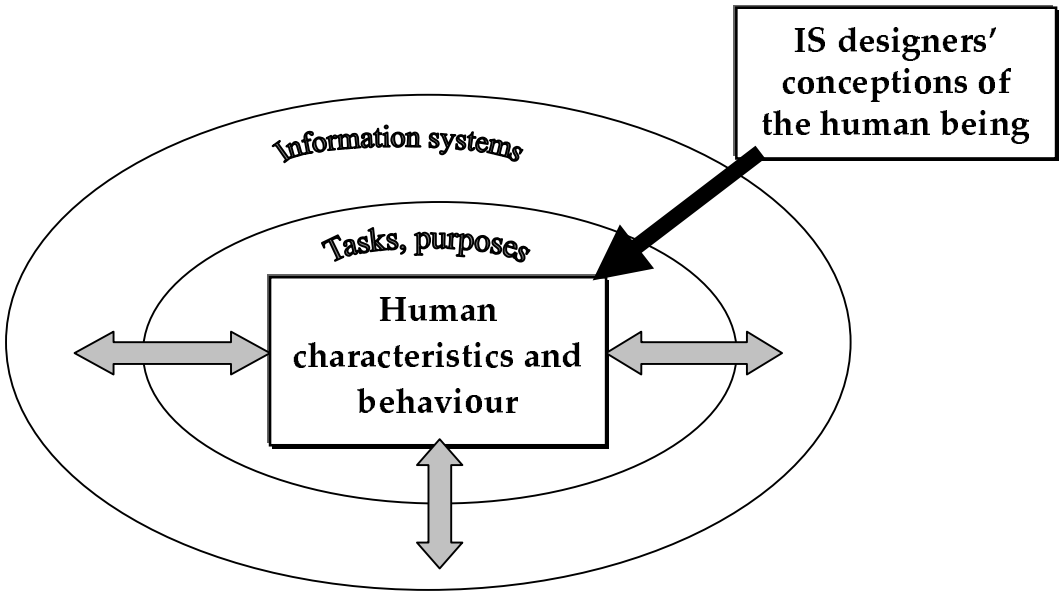

FIGURE 2. The focus of this study.

PART III: THEORETICAL UNDERPINNINGS AND METHOD

In this chapter I delineate the theoretical underpinnings of this study. These refer both to an a priori conceptualisation of the human being in the context of IS and to the method imposed within this study. First I develop a framework that serves as a reflection ground in studying IS designers' conceptions of the human being as a user of an IS. This framework is also discussed in regard to the tacit and explicit interactions that occur between humans and IS when people are using such systems.

In addition to outlining the nature of the human being in this study, this chapter deals with issues that aim at adequate method selection. Therefore, some problems inherent in the earlier studies of IS designers' conceptions of the human being are discussed, and a pilot study is described. Subsequently, an interpretive approach referred to as phenomenography is examined. Finally, the research process is described from an empirical point of view highlighting the procedures for choosing respondents, data collection and analysis.

3 Conceptualising the human being

The research problem in this study concerns the IS designers' conceptions of the human being as a user of computerised information systems. The viewpoint conveyed in the research question also reveals a particular orientation in the researcher's mind. When delineating the point of view in this study I, as a researcher, became entangled with assumptions of the nature of the phenomenon investigated (cf. Hirsjärvi et al. 1982, 130). In fact, since the focus of this study concerns the nature of the human being, the a priori assumptions that I have formed of the nature of the human being play a particular role: appearing to me as the 'true' nature of the human being, these assumptions act as a reflection ground for my inquiry.

This means that the theoretical assumptions that I develop in this section serve as part of my reciprocal reflections between the data and these assumptions while endeavouring to understand the IS designers' conceptions (Glaser and Strauss 1967). These assumptions have also facilitated the shaping of the research problem and thus contribute to the establishment of a delineated focus in this study (Eisenhardt 1989). However, my intention is not to be constrained by these assumptions, but to use them as a conceptual framework that represents the main dimensions to be reflected upon in regard to IS designers' understandings (Miles and Huberman 1994). For this reason, the conceptualisation of the human being described in this section is a theoretical underpinning which informs the study but does not act as a theory that

is being tested. Rather, the a priori assumptions of the nature of the human being serves both as an initial guide to design and data collection as well as a reflection ground during data collection and analysis (Eisenhardt 1989, Walsham 1995).

Additionally, these conceptualisations need to be explicated in order to make my a priori assumptions visible. Within interpretive studies, the researcher may be seen to act as an instrument due to the nature of the paradigm which encourages subjective interpretations (Walsham 1995). Then it is inevitable that the researcher's theoretical (and personal) orientations play a central role and may thus appear to bias in the collection and analysis of data. By depicting my theoretical delineations concerning the human being in this section I aim at making my orientation visible. In this way it is also possible to evaluate whether the a priori framework leads to biases in the study. This line of thinking is in accordance with Schultze (2000), who considers that a particular genre of confessional writing is essential in interpretive studies, particularly in ethnography. My application of confessional writing that becomes evident in this study is a way to reveal how the subsequent reciprocal interaction between data and my a priori theoretical delineations built up in the study; particularly, how IS designers' conceptualisations of the human being are interlaced with my conceptualisation of the human being.

In what follows I first discuss the conception of the human being and present a framework for delineating the nature of the human being. I also express my subsequent predisposition regarding what is the nature of the human being in regard to IS. Second, I depict what a conception is and how it is constructed according to the method adopted in this study. In this way the theoretical underpinnings in this study are comprised of both an a priori delineation concerning the content of the conceptions under study and a theoretical position concerning the nature and construction of people's conceptions.

3.1 The conception of the human being

Understanding human characteristics and behaviour refers both to the conceptualisation of the basic nature of the human being and its implications for scientific as well as everyday comprehensions of people and their behaviour. Although an individual's conceptualisation of the human being is an entity which may be comprised of assumptions concerning the basic nature of humans, scientifically defined knowledge as well as everyday beliefs, norms and values (Wilenius 1978; Rauhala 1983, 13), the different aspects of the conception of the human being are often defined as separate but yet associated concepts. In the context of this study, this means that the empirical inquiry concerning IS designers' understandings of the human being rests both on the basic assumptions of the human being and on the academic body of knowledge describing IS practice. This kind of procedure is in conformity with an approach that aims at defining the conceptual foundations of IS by drawing on a relevant discipline (Davis 2000).

The fundamental assumptions concerning the basic nature of the human being are beyond the reach of empirical science and thus primarily a philosophical question (e.g., Ropo 1985, 4). According to Rauhala (1983, 8), humans exist regardless of empirical studies and cannot thus be defined only by empirical research. For example, the basic principles of human blood circulation were found and defined by William Harvey in 1628. Only after this could

blood circulation become an object for empirical studies although it cannot be rationally claimed that humans did not have blood circulation before the year 1628. Thus, the clarification of the essence of the human being is primarily based on rational philosophical thought, i.e., ontological analysis. Consequently, scientific as well as workday activities directed towards people as, for example, in developing IS for people, need to be consciously based on an overall conception of the human being which is comprised of the essential human abilities, characteristics, qualities and potentials (cf. Wilenius 1978). The result of an ontological analysis is called the conception of human being (e.g., Lehtovaara 1994).

The concepts used in ontological analyses regarding the human being are usually not appropriate for empirical inquiries. Often these concepts are indefinite and impossible to operationalise or verify scientifically by the means of science (Ropo 1985, 4). For this reason, it is necessary to specify the human being in terms of different sciences. The human being defined as a result of scientific studies is called the image of the human being (Rauhala 1983, 14). This specification also brings about several separate images of the human being based on different disciplines in contrast to philosophical anthropology which attempts to define the human being as a whole. However, the conception and the image of the human being are associated with each other in many ways. Rauhala (1983, 14-16) argues that before applying scientific methods to a problem involving people it is necessary to form a preparatory conception of the human being in order to know what is the object of the research activities and what are the limitations of the inquiry. In addition, analyses concerning the conception of the human being may help to reorientate empirical research appropriately, and vice versa, new knowledge concerning the image of the human being may help to redefine the conception of the human being. Lehtovaara (1994, 53) also points out that this two-fold definition of the human being refers to the differences within the ways of acquiring knowledge (research methods) in philosophical and empirical studies. Thus, the concepts ‘conception of the human being’ and ‘image of the human being’ are not separate terms but two different aspects of the same concept which stimulate each other by their different ways of acquiring information.

In accordance with the nature of scientific research, workday activities also underlie anticipated assumptions about the human being. According to Wilenius (1987), individuals’ relationship to their fellow-creatures and society is based both on a general view of the human being and on a view of those people with whom they daily interact. People also perceive other people through a particular conception of the human being and easily reject perceptions that do not fit into this view. This particular conception is comprised of various elements, such as theoretical information about the human being, contents of unconscious experiences, impacts of cultural legacy as well as different beliefs, ideologies and values (Rauhala 1983, 13). Therefore, the everyday conception of the human being may include ingredients of the philosophical conception and scientific image of the human being in addition to people’s views based on their everyday thinking and experiences.

Even though the human being is a highly multifaceted phenomenon, it is common that people form their view of it by emphasising only a few human characteristics that seem essential to them (Wilenius 1978). In this respect, it seems necessary to outline the essence of people with the aid of a construct that enables a broad approach to the conceptualisation of humans. In addition, this construct should form a theoretically valid perspective to ensure a well-defined focus in reflecting the nature of the human being (Eisenhardt 1989, Ahonen 1994). Therefore, in order to clarify the multiplicity of the human being and thus the possible numerous foci of the features that IS designers’ conceptions of the human being may hold, in

the following I shall first discuss the manner in which the human being has been understood within ISD, and second, describe the basic human modes of being which are included in a conceptual framework delineating the multifaceted nature of the human being.

3.2 The image of the human being in ISD

The image of the human being is an inherent element in the theoretical models of information systems development, i.e., ISD methodologies. Avison et al. (1998), for example, regard IS methodologies as useful frameworks that can be drawn on during the process of information system definition and development in order to recognise the needs of computer artefacts, organisations and individuals. Furthermore, as pointed out before, Hirschheim et al. (1995,15) state that ISD is a change process taken with respect to object systems in a set of environments by a development group to achieve or maintain some objectives. The object systems are comprised of phenomena perceived by the members of the development group. Often the object systems are such by nature that they include human beings, e.g., different organisations or parts of the new global information infrastructure like digital libraries or electronic commerce. Hirschheim and al. (1995, 15) maintain that the IS development group's perception of the object systems and their change as well as the analysis, synthesis, evaluation and implementations of object system changes is conditioned and guided by a systems development methodology.

In the same vein, Checkland (1981) argues that ISD should be seen as a form of enquiry which consists of three components: an intellectual framework, a methodology, and an application area. The first factor, the intellectual framework, consists of the ideas that people use to make sense of the world. This refers to the underpinning assumptions that guide and constrain the enquiry. Assumptions concerning the nature of the human being are one element of the intellectual framework. The second factor, the methodology, is an operationalisation of the intellectual framework into a set of guidelines for investigation that require particular methods and techniques for building the system. The third factor, the application area, is some part of the real world (Avison and Fitzgerald 1994). As a consequence, the way the human being is seen in ISD is dependent on the IS designers' view of the human being and their operationalisation of the image of the human being included in the systems development approaches or methodologies. Therefore, in order to understand the IS designers' views of the human being as a user of an IS, an a priori view of the image of the human being which is expressed in the theoretical models of ISD needs to be recognised. In addition, according to Iivari (1991), this image of the human being is of practical relevance because it is mediated to practice through the development of ISD methodologies, methods, techniques and tools representing a certain point-of-view adopted by IS professionals, and also through training of IS designers.

Iivari (1991) has analysed the image of the human being within the seven major schools of thought in ISD: software engineering, database management, management information systems, decision support systems, implementation research, the sociotechnical approach, and the infological approach. He used 14 widely known textbooks published predominantly during the 1980's as manifestations of the paradigms analysed. From the point of view of analysing the image of the human being this particular moment of time appears to be fruitful

because during the 1980's a significant amount of work was carried out in order to satisfy the users (Friedman and Cornford 1989). Therefore, it would seem logical that the textbooks comprised of ISD methodologies developed and published during that decade would include conceptualisations of the human being as user. However, based on the analysis of the textbooks, Iivari (1991) concludes that it is not possible to identify any clear, dominant views concerning the image of the human being.

To complete the paradigmatic analysis of the ISD approaches and methodologies, Iivari and al. (1998) investigated five additional approaches, i.e., the interactionist approach, the speech-act based approach, the soft systems methodology approach, the trade unionist approach, and the professional work practice approach. These approaches were chosen because they are considered to contrast with the dominant ISD tradition and thus complement the previous analysis. Well-known written descriptions of the different approaches, e.g., articles, books and case descriptions, were used as data. The text-analysis was carried out through a conceptual structure which was based on the same paradigmatic framework developed and used by Iivari (1991) in the previous analysis concerning the seven major schools of thought in ISD. As a starting point for their analysis Iivari et al. (1998, 172) state that they acknowledge human beings "*in their different roles of IS development and IS use*". In other words, the image of human being they looked for concerned the users but also the IS professionals as well as other people involved in the development and/or use of IS.

The conceptual structure in the framework for analysis defines the human being in relation to the distinction between determinism and voluntarism presented by Burrell and Morgan (1979). According to a deterministic view humans and their activities are completely determined by the situation or environment, whereas a voluntarist view regards people as completely autonomous and free-willed (Burrell and Morgan 1979, 6). In addition, this dimension is related to McGregor's frequently cited distinction between Theory X and Theory Y (McGregor 1960). As Iivari (1991) points out, Theory X is based on three presumptions concerning human nature: "*the average human being has an inherent dislike of work and will avoid it if he can*", consequently, "*most people must be coerced, controlled, directed, threatened with punishment to get them to put forth adequate effort toward the achievement of organisational objectives*" and "*the average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, wants security above all.*" In contrast, Theory Y assumes that "*the average human being does not inherently dislike work*", "*will exercise self-direction and self-control in the service of objectives to which he is committed*", and "*learns, under proper conditions, not only to accept but to seek responsibility*" as well as "*has the capacity to exercise a relatively high degree of imagination, ingenuity, and creativity.*"

The framework used in the two analyses comprises of a conceptual structure with both philosophically and empirically manifested concepts and thus provides possibilities for a profound analysis. However, the scope of the framework is narrow with respect to the different basic human modes of being: the deterministic-voluntarist -dimension regards will as the only essential characteristic concerning the human being. Incorporated with the assumptions of Theory X-Theory Y, the notion of will as the only essential human mode of being implies a conceptualisation according to which human will is the key feature in exercising an effect on human performance in organisations. Moreover, since the basic idea in McGregor's theory is that the human qualities in workers are comprised of managers' conceptions of their employees and that these notions tend to become self-fulfilling

prophesies in organisations (Bolman and Deal 1997, 105), the interaction between the management and employees is seen as one-directional: people adjust and express their human qualities (either consistent with Theory X or Theory Y) in work according to the management's assumptions. As a consequence, when applying McGregor's theory, the human being is seen in a deterministic way, i.e., defined by the environment. If the framework is intended to indicate that the philosophical distinction determines the interpretation of the empirical distinction, e.g., with voluntarism turning the uni-directionality suggested by McGregor's theory into interaction, the framework still does not explicate in a broad sense what are the qualities or basic modes of being that can be found in humans as users of computer based information systems. The paradigmatic analysis by Iivari and al. (1998) resulted predominantly in different positions on the deterministic-voluntarist dimension. In the case of the interactionist approach the authors saw that human beings were not addressed enough to allow any clear conclusions whereas within other approaches, such as the speech act based approach, soft systems methodology, trade unionist approach and professional work practices approach, the image of the human being was defined as voluntarist with a few social or deterministic constraints in some cases.

According to Davis (2000), a promising ontology for a human-centred approach is presented by Nurminen (1986,1988). He describes the nature of different schools of thought concerning IS development by cultivating and abstracting the different perspectives into three ideal types: the systems-theoretical, the socio-technical, and the humanistic perspectives. The systems-theoretical perspective reserves no special position for humans, which are either excluded from the system or defined as one part of it. In the first case, the nature of the human being is irrelevant because the system does not concern people. In the second case, humans are defined as one element of the system, i.e., as a cog in the machine. The image of the human being embedded in the systems-theoretical perspective is, according to Nurminen (1988, 55-56), passive and mechanistic. The socio-technical perspective suggests that the human being is a part of both social and technical systems. The difference between the technical and the social system is often described by McGregor's (1960) ideal types X and Y, and the socio-technical stance emphasises the Theory Y type of personality. Then human activity is usually seen as an alleged ability to work as a member of a self-steering group and thus the image of the human being is focused on active and free-willed participation. However, participation remains desirable only if it results in some degree of integration with the technical system. Nurminen (1988, 104) compares the user influence on this kind of participation to allowing production line workers to affect the design of the production process as long as production is based on the assembly line.

The humanistic perspective generated by Nurminen (1986) challenges the two above-mentioned approaches with respect to human-centredness. This ideal type is called the Human-scale Information System (HIS) and its basic assumption is that all the functions performed by the system are acts of humans. This means that IS cannot be separated from human's work (the inseparability postulate) and the acts of people and computers are different by nature (act-orientation). Therefore, the traditional integrated socio-technical IS structure is an inadequate basis for building IS. HIS assumes that the starting-point for developing IS is the acts of the human being and not the technical system. IS are seen as tools for different human actions and thus do not have any other value than the one determined by their use. The human being is seen as a worker who is able to take responsibility for and control of his/her work, and possesses an internal motivation for working (Nurminen 1986, 145). The three

different perspectives are supposed to follow each other chronologically: the systems-theoretical perspective is the first and oldest approach and the HIS ideal type is the newest (Nurminen 1986, 20). The HIS model is close to an existential conception of the human being which sees humans inseparable from their environments, as beings-in-the-world. No theory or model can depict or frame humans because they should be conceived as free beings who are responsible for their existence. An innate motivation is the ground for human activity, not any external cause. In this way this stance rejects causality and thus positivism, determinism and materialism (Hall and Lindzey 1978, 318-325). However, the HIS model regards humans solely as workers, and does not define human qualities or analyse the distinction between human characteristics and work tasks.

Based on the above-described analyses it seems that the image of the human being is predominantly non-existent in the theoretical models of ISD. This consideration is supported by the fact that there are a number of analyses accomplished concerning the ontological assumptions of different factors in ISD but in some cases the essence of the human being is excluded from the factors analysed (e.g., Hirschheim and Klein 1989, Hirschheim et al. 1995). Yet, in some cases, the image is seen as voluntarist. Nurminen's ideal type Human-Scale Information System is the only model which assumes that characteristics typical of the human being are the starting point for developing IS. Nevertheless, the HIS model does not explicitly focus on human characteristics that reflect human features which are essential in regard to the humanisation of IS. In my view, all the above-mentioned perspectives leave open the question what the human characteristics are that the assumed self-steering activity and voluntarist participation are supposed to bring about in the development situations both to be experienced and analysed by the IS designers and thus to shape IS, or how the beings-in-the-world are influenced by the IS. The attempts of Iivari (1991) and Iivari et al. (1998) to incorporate an empirical theory into their theoretical framework for adjustment of the analysis unfortunately did not make the situation any clearer. Nevertheless, this may partly be due to the above-mentioned restrictions that McGregor's theory conveys to the investigation.

It can be concluded that, according to the above depicted analyses, the theoretical models of ISD do not sufficiently support the IS designers in analysing the human characteristics in the users involved in ISD. This stresses the importance of the IS designers' conceptions of the human being as central factors in the humanisation of IS. It also seems evident that the fundamental human characteristics need to be developed out of analyses that provide a more comprehensive view of the human being. In what follows I develop a theoretical underpinning for this study concerning these fundamental human characteristics.

3.3 A framework for outlining the nature of the human being

A comprehensive explanation for the human being as a whole is being pursued by researchers in the field of philosophical anthropology. In the course of time, philosophers have presented several different conceptions or models of the human being (e.g., Nash 1968, Laine 1994, Laine and Kuhmonen 1995). Generally the various conceptions of the human being can be seen as different combinations of two main elements: the first element refers to the number of the human modes of being, and the second to the basic structure of those modes of being

(Perttula 1998, 16). These two elements form the basis for a conceptual framework for outlining the multiplicity of the human being as a whole (Figure 3).

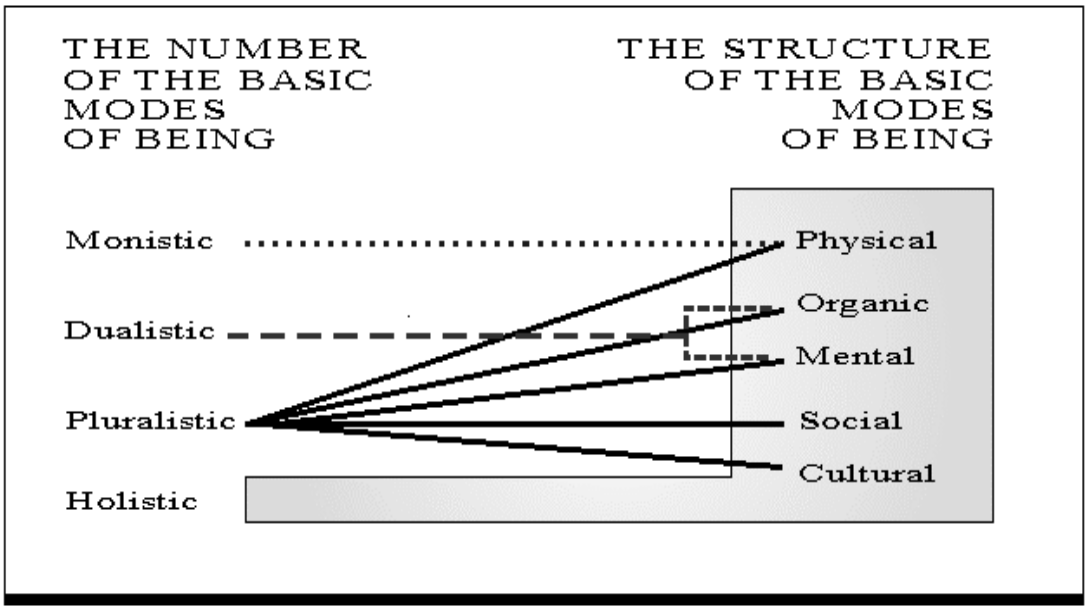

FIGURE 3. A conceptual framework for outlining the nature of the human being.

According to the first element, Rauhala (1983, 19) states that the most common way is to distinguish monistic, dualistic, pluralistic and monopluralistic or holistic models of the human being. Monistic conceptions are based on the idea that the human being consists of only one basic mode of being. In general this one mode is matter. Dualistic models consider that, in order to understand the human being two different modes of being must be presupposed. Usually these two modes of being are mind and body. There are big differences within the dualistic conceptions regarding the relationship between mind and body. The contrast is sharpest between the so-called Cartesian dichotomy, which assumes that mind and body are totally detached from each other, and a contemporary form of dualism which regards mind and body as two aspects of the same phenomenon. Different conceptions based on a two-aspectual interpretation of the human being are quite common (Rauhala 1983, 19).

In the pluralistic conceptions it is presupposed that the human is actualised as many kinds of subsystems which have their own structure and thus also relative independence (e.g. vision system, digestion system, memory system and emotional system). The current multidisciplinary research concerning humans is in a way based on a pluralistic view: often research concerning people is focused on a certain subsystem in a particular context, for example, human information processing in requirements analysis (Barnard and May 1993) or, development of trust in virtual teams (Järvenpää et al. 1998). A limitation of the pluralistic conceptions is the difficulty in gathering dissimilarity and stating arguments for the human being as a whole. An attempt has been made to solve this limitation within the monopluralistic conceptions which assume that the human being is actualised in more than two modes of being and these modes are fundamentally different. Without the simultaneous existence of all of the modes it is not possible to consider a creature as a human being.

Therefore, each of the modes presupposes the other in order to exist by itself. Thus, they cannot be reduced from one mode of being to another but need to be understood as a whole (Rauhala 1983, 19-21).

The second element, the basic structure of the modes of being, refers to the different basic qualities of the human being. With respect to these basic qualities Wilenius (1978, 10-14) states that the human being can be seen as a physical system, as an organic system, as a mental-psychical system and both as a social and cultural creature.

Physical system denotes that the structure (e.g., bones and muscular system) and movements of people can be explained, for example, by the laws of mechanics. From this point of view the human being is a mechanism which operates without including any other human feature in its action. According to the organic (biological-chemical) system the human being is a living creature whose structure of organic matter and action are prescribed, on the one hand, by heredity and, on the other hand, by living environment. A special feature of the human biological system is a well-developed central nervous system. A conception that regards humans as biological systems is that of Porra (1996) who applies a systems theoretical point of view and suggests that humans are primarily organic systems which form colonies and co-evolve with computer-based information systems. The co-evolution results in a new species "*Compu sapiens*". Porra's reasoning is based on a naturalistic notion of the human being as a primarily organic being whose social behaviour can be reduced in biological features (cf. Laine and Kuhmonen 1995, 22). This stance has acquired more public acknowledgement also through the development of biotechnology. Some researchers even claim that humans have specific genes for different behaviour types such as, for example, conformism and resentment (Hirsjärvi 1982, 23).

The human being as a mental-psychical creature is a being with unconsciousness, consciousness and self-consciousness. This characteristic is essential only to humans. Ahlman (1953, 7), for example, states that *"as far as we know, the human being is the only creature that is a problem to itself."* A classical way of delineating consciousness activities is to separate thought, emotions and will. Correspondingly, a common way of conceptualising humans is to build the usually underlying definition of the human being on the basis of thinking and other consciousness activities. Wilenius (1987, 24) distinguishes intellectualistic, emotionalist, and voluntarist conceptions of the human being. Ropo (1985, 5) states that in the course of the different epochs a common characteristic included the conception of the human being has been the appreciation of intellectual abilities, particularly possessing knowledge and talent. Frequently also the modern notion of the human being is intellectually emphasised: people are conceived of as primarily perceiving and thinking creatures who plan their actions and circumstances. Different notions concerning human intellect serve also a basis for several disciplines within information systems and computer sciences, for example, artificial intelligence (Nurminen 1989). In addition, as shown before, the majority of usability approaches stress the process view over human cognition (e.g., Barnard and May 1993).

The emotionalist view stresses emotions, e.g., in the writings of Jean Jacques Rousseau the idea that feeling should precede thinking is a recurrent statement (Nash 1968, 261). Logically, the voluntarist stance regards will as an essential feature, for example, Friedrich Nietzsche regarded will as being above thinking (Wilenius 1987, 24). Dewey's notion of the reflective human being is quite generally known as a conception of the human being that attempts to integrate the different consciousness activities and action by synthesising many of the dualisms of the traditional philosophy; the reflective behaviour that Dewey argued for is

characterised by a synthesis of the dualisms of science and morals, ends and means, thought and action (Nash 1968, 358). Dewey's ideas has been conveyed to ISD, for example, by the employment of Schön's (1983, 1987) theory of the reflective practitioner (e.g., Heiskanen and Newman 1997).

Further, according to Wilenius (1978, 13), the social and cultural are also structures of the human basic modes of being. Then the human being is seen in a particular relationship to its environment. Essential in being a social creature is that the human being is able to develop particularly its human qualities (e.g., upright position, language, way of thinking and behaving) only in a human environment. It is also inherent in individuals to search for community with other people. Furthermore, humans are able to earn their living only in co-operation with other fellow-creatures. For example, even Robinson Crusoe needed skills learned in a human community to stay alive on an uninhabited island where he longed also for a human companion. In other words, social is a quality of an individual but the nature of this characteristic leads humans to create diverse interactive human networks and social structures. Since IS are often seen either as technical systems with social implications or social systems only technically implemented (Hirschheim et al. 1995, 36), perhaps the most common notion of the human being underlying ISD is a conception based on a view of the social dimension of humans which assumes that individuals are determined by their relationships to their social environment. In conformity with traditional Marxian philosophy, these basic relationships are the relationship between an individual and work, between an individual and objective reality, and the relationship between an individual and society (Hirsjärvi 1982, 88). This means that, for example, the essence of human consciousness can be understood only by deriving it from the practical interaction of the subject (individual) and object (e.g., work, objective reality or society) in question (Hirsjärvi 1982, 89).

A more recent stance is expressed by postmodernism, which assumes that people are not determined by instincts, laws, needs, or systems. Instead, human behaviour is open-ended, changing, and creative. Both human nature and knowledge are being created and laid down in the very acts of people's living. This means also that human behaviour can only be understood by 'reading' the broader context of life and history within which the behaviour occurs. Thereby the post-modern stance rejects psychodynamic instincts and unconscious minds, behaviouristic laws of learning and conditioning, humanistic needs and growth potentials, as well as cognitive structures and processes (Slife and Williams 1995, 54). Instead, humans become shaped according to their living environments, in particular in their social relationships.

The human being defined as a cultural creature emphasises the creative relationship between people and their material and mental environments. Ever since beginning to use simple tools and make fire humankind has in a relatively short time created an immensely diverse mental and material culture. According to Wilenius (1978, 19-23), the cultural features of the human being are truthfulness, ethicalness, aestheticalness and religiousness. This definition is close to the traditional Western meaning of the term culture which, according to Hofstede (1997, 5), refers to "refinement of the mind" or "civilization" as signifying the higher spiritual features of humans. This definition of the cultural mode of being leaves out the social mode of being. Yet these two modes are often seen as intertwined in delineations which apprehend the cultural mode as manifested in social life as symbols, heroes, rituals, and values (Denzin 1992, Hofstede 1997).

However, when outlining the conception of the human being as different combinations of the basic structures and a number of the human modes of being, it should also be noticed that the nature of the above mentioned basic structures seems to vary depending on the origins of the definition of the structure in question. For instance, there are different stances towards the nature of human cognition. In addition, in some cases the relationship between the different structures seems to some extent to be hierarchical: the 'upper' presupposes the 'lower', e.g., thought assumes brains, and cultural presumes social. It has also been suggested that with some features of the structures humans can control other features. For instance, Immanuel Kant argued that people are able to control their will with their thought (Wilenius 1987, 17). Some specificity to the extremely multifaceted nature of the human being may be gained by considering the basic human modes of being in a particular context. Therefore, in the following section I discuss the human basic modes of being especially in regard to an IS.

3.4 An ontological assumption of the human being in regard to IS

Where the nature of the human being is delineated in the context of IS, the human being is seen as an actor. This is inherent in the term 'user', which refers to a human being who uses computers. It is also in accordance with the tool perspective of computer artifacts: people use IS as tools for something they consider worth doing. Thus, the basic human modes of being are understood as active elements through which the human being is relating to IS. According to this active view, the different basic modes of being each contribute to some extent to a continuum of an active process within which the human being as a whole is active with the system.

From a monistic point of view this active process is understood in regard to the physical mode of being. Then human activity is seen as mechanistic functioning, not involving any other active human characteristics than the trajectories of the human limbs. According to a dualistic perspective, human activity is seen as comprised of two basic modes of being. That is to say, human behaviour is understood according to the functioning of only two modes of being.

From a pluralistic viewpoint human activity can be approached from the point of view of different subsystems. The mental mode of being in action may be seen as human information processing that consists of brain functions, attention, perception and thought activity (Anderson 2000). In a similar manner, an emotional experience may be seen as a continuum of neural, sensorimotor, affective and cognitive processes (Izard 1993). Respectively, the social mode of being may be seen as action that has interconnected tacit and explicit elements (Schön 1987, 255-256**;** Nonaka, Toyama and Konno 2000). The salience of the tacit dimension in the social mode of being is evident also in the aim of sociological cultural studies, which attempt to unravel the ideological meanings that are coded into the taken-for-granted meanings diffused in everyday life (Denzin 1992, 34).

This underlines three notable characteristics in human action. First, the hierarchicalness of the basic human modes of being is also active by nature: within human action the different modes interact with each other. Second, in human action there are both conscious or explicit and unconscious or tacit dimensions which both contribute to human behaviour. Third, the tacit and explicit dimensions are intertwined in the basic human modes of being. This is

because people are not conscious of all the aspects in their own behaviour within their life situations. For instance, in a social situation where a person is facing another person and is recognising his or her face, the immediate perception of the face is succeeded by recognition of memories - visually and through other senses - connected to the face. Only then can the conscious experience arise (Tranel and Damasio 1985), and the social situation may be shaped in accordance with the meaning that this recognition evokes in the experiencing individual and his or her social relations. Therefore, it seems that in order to understand the active human being as a whole, we need to pay attention to both the interacting basic human modes of being and their tacit as well as explicit features in human behaviour. This requires a holistic perspective on the human being in regard to an IS.

From a more holistic point of view the very nature of human action may be seen as the different basic modes of being each contributing to some extent to a continuum of an active process within which the human being as a whole is active in regard to an information system. As mentioned above, this active process may include both tacit and explicit dimensions. This kind of stance may be illustrated with the help of studies that draw on the works of two philosophers, John Dewey and Michel Polanyi. For instance, Cook and Brown (1999) describe human knowledge creation by building on Dewey's concept 'productive inquiry'. Human knowledge creation is then seen to occur within two intertwined elements: knowledge and knowing, which include the tacit and explicit dimensions in human action. In addition, Cook and Brown (1999) offer conceptual means in transcending the subject-object dualism in regard to the IS-user relationship by defining part of human action involving static human features and another part as consisting of affordances that emerge dynamically in an interaction.

Productive inquiry is that aspect of any activity where humans are deliberately (though not always consciously) seeking what they need, in order to do what they want to do, for instance, with a computer. It is not a haphazard, random search; it is informed or 'disciplined' by the use of theories, rules of thumb, concepts, and the like, which Dewey understood as knowledge and as tools for productive inquiry. For example, knowledge may be understood as referring to the goal or purpose of the use of a computer. Using knowledge in productive inquiry gives an inquiry a systematic or disciplined character. In addition, knowledge is one of the possible outcomes of productive inquiry: another end result of engaging in the situated and dynamic activity of productive inquiry is the production of abstract and static knowledge, which then can be used as a tool for further knowing, including knowing in the mode of productive inquiry. Cook and Brown (1999) ascertain that knowledge by itself cannot enable knowing. As a tool, knowledge disciplines knowing, but does not enable it any more than possession of a hammer enables its skilful use. In other words, when people as whole human beings are engaged in a task, such as goal-oriented use of computers, they are engaged in a process within which the conscious goal of that task intertwines more or less tacitly with the basic human modes of being.

However, according to Cook and Brown (1999) knowing should not be confused with 'tacit knowledge', which is a tool for aid to action, not a part of action itself: e.g., everyone who can ride a bike can be said to know tacitly which way to turn to avoid a fall, whether or not they are at that moment actually riding a bike. Knowing requires present activity, whereas tacit knowledge does not. Knowing makes use of tacit knowledge as a tool for action but tacit knowledge alone does not enable action. The activity itself is a form of knowing: knowing is that aspect of action that does epistemic work - including doing things we know how to do,

and (through productive inquiry) producing what we need, in order to do something we want to do, which can include producing new knowledge. Therefore, when people are engaged in using computers, the way that they get informed by the system should be understood in terms of the activity of the intertwining basic human modes of being. Moreover, because the use of computers is a recurrent activity, this process of being informed should be seen as interaction between the human being and an IS (Figure 4).

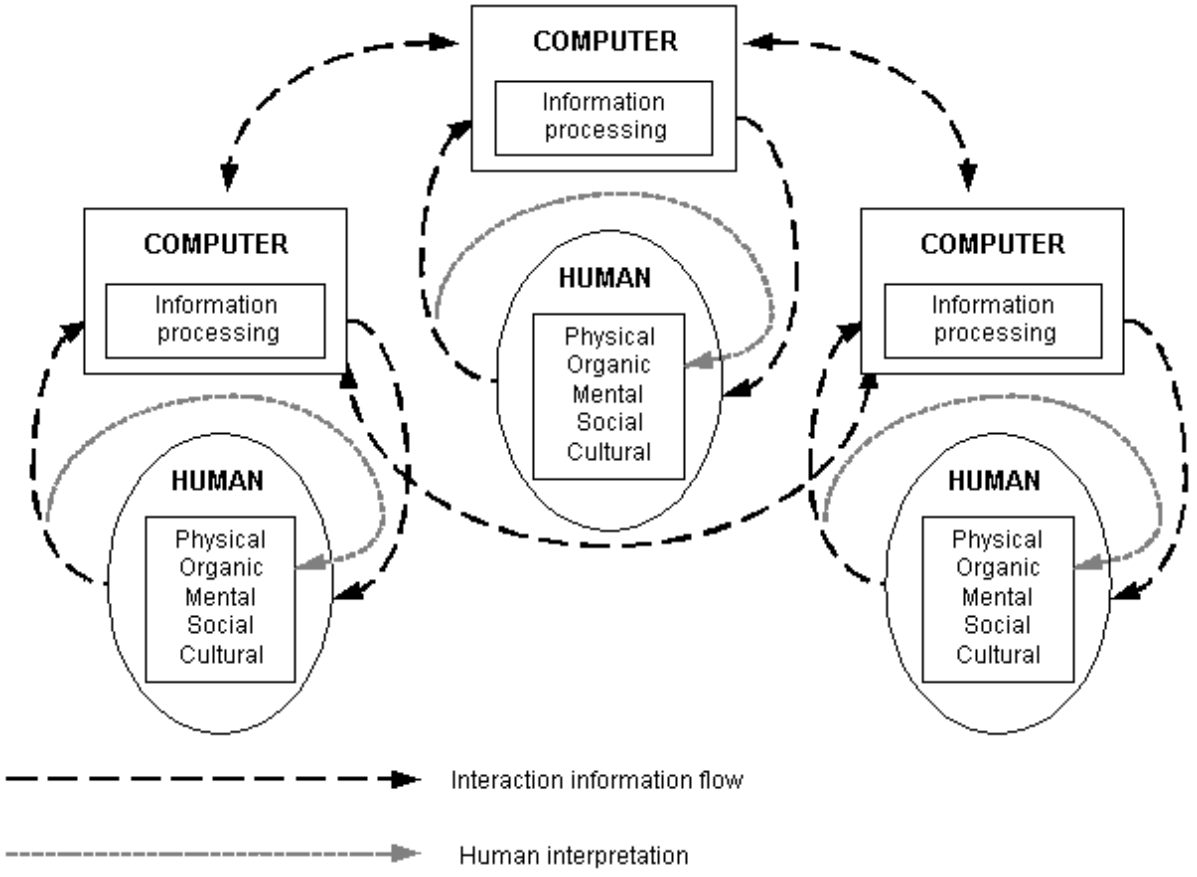

FIGURE 4. Interactions between humans and IS.

According to Cook and Brown (1999), knowing, since it is an aspect of action, is about interaction with the social and physical world. When people act, they either give shape to the physical world or they affect the social world or both. They are also affected themselves by this interaction. Therefore, knowing does not focus on what we possess in our heads, it focuses on our interactions with the things of the social and physical world. It can be said that knowledge is about possession whereas knowing is about the relation between the knowers and the world. In order to interact with the world effectively people need to honour it. One cannot make reliable objects through the haphazard use of, for example, clay or steel or software; objects give way when design pushes them beyond the constraints of their materials and capabilities. Knowledge also helps us honour the world in our interactions with it: knowing as an aspect of action can make use of knowledge as a tool. In doing so, the

knowledge about the world disciplines our interaction with the world, just as the use of a pair of pliers gives particular form to how we interact with a bolt. Thus, knowing is to interact with and honour the world using knowledge as a tool. In a similar manner, IS designers are assumed to use their insight into the human characteristics in regard to the humanisation of IS, i.e., when adjusting the systems according to the users' characteristics and behaviour. Also for this reason, IS science should provide the IS professionals disciplined knowledge about the human being.

Within a holistic perspective, when the basic human modes of being are intertwined with each other, a view of human behaviour may be provided with the help of the concept 'affordance'. Cook and Brown (1999) define their understanding of the characteristics of 'interaction with the world', which are at the centre of knowing, with the help of the concept of 'dynamic affordance'. Dynamic affordance refers to the sense of affordance which is reflected within the interaction of people and everyday objects, such as IS. That is to say, certain properties of everyday objects (e.g. software) arise solely in context of interaction (e.g. electronic commerce) with the world. Likewise, the bits of knowledge that members of a team may possess are a property of that social context, and become facilities or frustrations within interaction. The facilities and frustrations within this dynamic interaction are the dimensions of dynamic affordance. This is particularly true of objects that are the product of human design: what they afford may give rise to shape and fluidity (facilities) or incoherence and clumsiness (frustrations) in human activities.

Schön (1987) considers dynamic affordance as an aspect of knowing-in-action which is regarded as dynamic activity within which an individual is acquiring a sense of doing something successfully or fluently. With reference to Polanyi, Schön (1987, 23) argues that when asked to explore a table with their hands, people perceive from fingertip sensations the qualities of the table. In a similar manner, when people use a stick to probe a hole in a stone wall, they focus on the qualities of the hole that are apprehended through the tacit impression felt from the stick. The idea here is that to become skilful in the use of a tool is to adapt, directly and without intermediate reasoning, to the qualities and characteristics of the materials that we apprehend through the tacit sensations of the tool at hand.

However, dynamic affordance is not just a question of perception or tacit sensation gained through hands but of relationships between characteristics of the world and issues of inherent concern to people, such as the basic human modes of being. These modes of being can be understood as static characteristics in that they are inherent in all individuals. Usually they provide humans with the ability and need to be physical, organic, intellectual, emotional, social, and cultural creatures with their own will. However, the actual behavioural implications of the basic human modes of being emerge within the interaction between humans and IS. In other words, there is a sense of affordance that lies beyond the inherently static human characteristics, which deserves to be understood in its own right, and in particular with respect to the basic human modes of being. In this way dynamic affordance also offers a conceptual means to transcend the subject-object dualism in the IS-user relationship. The static characteristics of humans and technology take on a new form within their intertwining activity, which is shaped according to, on the one hand, the affordances and constraints that the human modes of being provide, and, on the other hand, the affordances and constraints embedded in the features of an IS.

As Cook and Brown (1999) point out, dynamic affordance has both an intuitive sense and a particular conceptual sense. Both senses can be seen in the bicycle riding example. Intu-

itively, most of us understand that learning to ride requires 'getting a feel' for what it is like to stay in balance, and we recognise that we need to get on a bike to acquire that knowledge. So, the activity of riding around dynamically affords the acquisition of the required knowledge. Conceptually, dynamic affordance lies in the real and subtle interaction between the rider and the bike in motion. In the activity of riding, shifting our weight against the gyroscopic force of the wheels 'dynamically affords' learning to stay upright; it also dynamically affords the enactment of that skill once acquired. These are things that we can learn and do only when we are in dynamic interaction with bicycle wheels in motion. In a similar manner, there are things that people do only in their interactions with the world, such as particular skill-related behaviour in a certain work task either performed with a computer or not. Without the dynamic affordance of that interaction there is no successful action in those situations. This dynamic character is an essential element of the conceptual sense of dynamic affordance. It is a question of interacting fluently and successfully with objects in our world.

In a nutshell, dynamic affordance puts emphasis on the behaviour that emerges from the basic human modes of being within interaction of humans and the world. Because this emerging behaviour is an implication of the (static) basic human modes of being, it is important to consider this behaviour as a design issue in ISD. This aspect of dynamic affordance is also in accordance with the emergent perspective of IS: the consequences of the use of IS is seen to emerge within the very particular interaction between humans and the system at hand (cf. Markus and Robey 1988). From a human-centred perspective, the interaction between humans and IS is emerging as fluid and coherent when the system affords users to act in conformity with their basic modes of being. Consequently, understanding human action requires insight into the different basic human modes of being and their implications within the dynamic affordances that occur between humans and IS as well as users and IS designers during the process of ISD.

In addition to outlining the nature of the human being in the above mentioned way, this chapter concerns issues that aim at adequate method selection. Therefore, some problem inherent in the earlier studies of IS designers conceptions of the human being are briefly discussed in the following section.

3.5 Prior studies of IS designers' conceptions of the human being

To study ISD from the perspective of systems designers' views of users is not a new attempt. The systems designers' inadequate view of the user has been stated to be one reason for the behavioural problems often experienced while implementing IS (Bostrom and Heinen 1977, Dagwell and Weber 1983). Also the lack of knowledge of human needs and motivation on the part of the systems designers' has been claimed to cause IS implementation failures (Hawgood, Land and Mumford 1978). Further, Hedberg and Mumford (1975) have defined the nature of the view of human being held by systems designers as an essential factor in the IS design process.

Methodologically these earlier studies concerning IS designers' view of the user are quite consistent. With the exception of Bostrom and Heinen's (1977) theoretical paper, the preceding studies were all surveys. The data collection was carried out primarily by questionnaires but interviews were also used. Data were analysed with the aid of statistical tests.

Usually the theory involved was Theory X - Theory Y (McGregor 1960). In other words, the nature of the human being in these studies was defined in accordance with McGregor's theory. Based on these prior studies, it seems that often they confronted methodological problems. For instance, Dagwell and Weber (1983), who replicated and also extended the study of Hedberg and Mumford (1975), found that the use of the questionnaire based on Theory X – Theory Y resulted in conclusions that are not clear cut. Thus, as suggested by Dagwell and Weber, further studies that concerning IS designers' views of users should embrace methodological improvements.

In these earlier studies, the content of the concept "view" has not often been defined consistently and thus the meaning of the concept remains somewhat ambiguous. Hedberg and Mumford (1975) use the term 'user model' and discuss it as a value that IS designers hold. The systems designers' view of the user is also included in some studies as one of the targets of value choices during the ISD process (Kumar and Welke 1984, Kumar and Bjørn-Andersen 1990) and is therefore also defined as a value in these studies. Dagwell and Weber (1983) in their replication study rely on Hedberg-Mumford's definition of the concept but also refer to Kling (1980): *"...we know very little about the perceptions that computer specialists have of the users they serve and the ways in which they translate these perceptions into concrete designs"*. The term perception is usually defined as one phase of the human information processing and, according to the tradition of cognitive psychology, it involves information rather than values (e.g., Neisser 1976). Bostrom and Heinen (1977), in turn, define systems designers' assumptions of people as one of the system designers' implicit theories or frames of reference. Further, Orlikowski and Gash (1994) thoroughly discuss their definition of the IS designers' views. They elaborate the concept 'frame of reference' by comparing it to the concept 'schema' (Neisser 1976), 'shared cognitive structures' or 'cognitive maps' (Eden 1992), 'frames' (Goffman 1974), 'interpretative frames' (Bartunek and Moch 1987), 'thought worlds' (Dougherty 1992), 'interpretative schemes' (Giddens 1984), 'scripts' (Gioia 1986), 'paradigms' (Kuhn 1970), and 'mental models' (Argyris and Schön 1978). They end up by defining their own meaning for the concept 'frames' as a general concept of shared cognitive structures. However, Orlikowski and Gash defined the IS designers' views as shared cognitive structures in general, not especially in regard to the human being. Thus, their work does not align the nature of conceptions in detail, for instance, from where conceptions derive their origins.

To summarise, the earlier studies concerning IS designers conceptions of the human being are to some extent ambiguous with respect to the assumed nature of conceptions. In addition, the assumed nature of the human being has been predominantly operationalised from McGregor's (1960) Theory X – Theory Y, which is, as mentioned earlier, considered as insufficient for understanding humans in the context of contemporary IS and their development. Also, studies embracing statistical methods have failed to produce consistent results concerning IS designers views of users. Therefore, further attention should be paid both to the nature of conceptions, and respectively, to the selection of a suitable methodology.

4 Pilot Study

In this section I describe a pilot study which was conducted in order to find an appropriate method for studying IS designers' conceptions of the human being as a user of an IS. Because the object of research is considered as subjective and descriptive by nature, a qualitative research strategy is considered. This choice is favoured also by the circumstance discussed in the previous chapter; namely that the conception of the human being is a concept which is not distinctively enough definable for empirical operationalisation, and thus is not adequately usable as such. Rather, it is relativistic by nature in the sense that it needs to be defined within the discipline or point-of-view in question. In this case, this relativistic conception of the human being - the image of the human being in ISD - does not provide a sufficient basis for operationalisation (cf. Chapter 3). It also seems evident that only one (empirical) theory concerning human characteristics and behaviour with respect to IS (e.g., McGregor's Theory X- Theory Y) does not offer a sufficiently broad basis for acquiring knowledge regarding the IS designers' view of the human being. Further, a theory-testing approach does not serve the purpose of this study because the interest is to reveal IS designers' genuine opinions. By offering predefined alternative answers to the designers, some assumptions of a particular theoretical view could be tested, but this procedure would not capture the spontaneous conceptions – i.e., theories-in-use - of the respondents. By contrast, it can be said that in this study the object of research is the respondents' operationalisation of the concept in question.

These above-mentioned reasons suggest that the appropriate manner to find an answer to the research question is consistent with the assumptions and procedures employed in qualitative research. However, the range of qualitative research approaches that could serve the purposes of this study is extensive (cf. Glaser and Strauss 1967, Yin 1984, Tesch 1990, Patton 1990, Nissen et al. 1991, Gilbert 1993, Gall et al. 1996, Järvinen 1999). At this initial stage of the study I was also mildly unsure about the role of my a priori assumptions in regard to the qualitative paradigm. In particular, I pondered whether my theoretical predisposition concerning the content of the conceptions under study was too constraining in regard to the IS designers' ideas. Therefore, I conducted a pilot study in order to facilitate the imposing of a suitable method.

The most common function of a pilot study is to facilitate the consideration of the question types that are appropriate for the inquiry in question (Järvinen and Järvinen 1996, 61). In particular, a pilot study offers insights for altering both question wording, order and issues (Arber 1993). In general, a pilot study helps investigators to refine their data collection plans with respect to both the content of the data and the procedures to be followed (Yin 1984, 74). Further, Fielding (1993) argues that a pilot study is useful also for the benefit of the researcher in order to gain experience in qualitative interviewing concerning the topic in question. In addition to these above-mentioned reasons, I conducted a pilot study in order to impose a method which would offer theoretical delineations in accordance with the focus of this study. Then theoretical scaffolding would be needed in order to study IS designers conceptions' as knowledge which reflects their intellectual competence as knowledge workers. In the following subsections I depict the pilot study: first, the selection of a pilot respondent, second, the data collection methods, and third, the analysis and results of the pilot inquiry.

4.1 Selecting a pilot respondent

A pilot subject may be chosen for several reasons. Yin (1984, 74) states that the subjects may be selected because the informants in the pilot site are unusually congenial and accessible, or the site is geographically convenient, or it may have an unusual amount of documentation and data. Moreover, Plummer (1995) distinguishes two ways researchers have selected respondents within ideographic research: the pragmatic and the formal procedure. The former is largely dependent upon chance, whereby the participant is not selected but emerges from some wider research. The latter tries to establish theoretical or methodological criteria for selection. A common application of the formal criteria is a major choice between three kinds of persons: the marginal person, the great person, and the common person.

The marginal person differs from the standardised expectations, i.e., stereotype, of an individual belonging to a certain social group. Thus, this kind of person's opinions often highlight the deviation of norms within a particular group. The great person refers to globally famous individuals such as Hitler, Mother Theresa, Bill Gates or Jorma Ollila, whose opinions undeniably have a much wider bearing on the age in which they live than those of the common person. In a way this kind of people are marginal, too, but unlike the marginal person, the great person is in some way of utmost historical and cultural importance. In the common or ordinary person there appears little that is extraordinary. Often they have to some extent similar features to other people belonging to a certain group and in that way may be called as stereotypes. The ordinary person seems to come closest to providing a source for generalisations to a wider population of similar persons (Plummer 1995).

In pilot studies, one single case is regarded as a sufficient sample for tentative information gathering (Grönfors 1982, 37; Franklin, Allison and Gorman 1997). The pilot interviewee was chosen due to congeniality, accessibility and information richness. In addition, he represents well a stereotype of a reflective IS practitioner. He has a Masters degree in IS and computer science and had also five years of working experience of computer service, designing and training in IT companies as well as of a university. At the time of the pilot interview he was working as a managing director and designer in a small software house which produced database applications, multimedia and Internet applications. When I contacted him, he agreed to be a pilot interviewee concerning his conception about the human being as a user of an IS. The pilot inquiries were carried out in the respondent's office.

4.2 Collecting pilot data

In qualitative research, the data may be acquired by a variety of methods but an interview is the most commonly used (Fielding 1993). Among the different interview types, the non-standardised or focussed interview is often regarded as best fulfilling the essence of qualitative studies (Järvinen and Järvinen 1996, 103). Within these types of interviews, the interviewers outline some topics which they want the respondent to talk about. This list of topics is supplemented with detailed probe questions during the interview (Fielding 1993). In addition to interviews, the thinking-aloud method has been found appropriate in order to reveal IS professionals' conceptualisations (e.g., Vihmalo 1987, Häkkinen 1996). Thinking-

aloud questions request an expert to report the contents of conscious awareness during the solution of a domain problem and thus reveal the way the expert is taking into account certain topics in his or her work processes (Wood 1997). Consequently, the method for data collection in the pilot study consisted of two parts (Appendix 1).

The first part was a focussed interview with open-ended questions. Since research is intentional by nature (Giorgi 1988), the topics of the interview that I outlined in advance expressed my intentions to clarify the respondent's views on humans, their characteristics and behaviour with respect to IS. Correspondingly, by agreeing to discuss his view of the human being as a user of an IS, the respondent indicated his intentions to clarify this view. The interview concerned the respondent's working experience and current work as well as his stance towards ISD methodologies. The purpose of these topics was to focus on IS development as a context and clarify the features of the possible conception of the human being that the respondent may have adopted when learning and using ISD methodologies. The subsequent topics were the nature of the humans for whom the respondent was designing systems and the factors that he considered important in terms of user satisfaction. In addition, I planned some probe questions before the interview in order to elaborate the topics and also to avoid misdirected probing (Fielding 1993, 137). In general, the style of the interview was non-directive. All the questions in the pilot interview were so-called opening questions in order to get the interviewee to express his considerations of the user spontaneously using those words and terms that are relevant to him. As an interviewer, I tried to avoid the pitfalls of qualitative interviewing, such as over-rationalisation, a condescending or deferential demeanour, and tried also to recognise the possible over-politeness of the respondent without being too self-conscious (Fielding 1993, 138-139).

The second part of the method of inquiry in the pilot study was a design task involving a thinking-aloud task. The assignment consisted of three steps, which I gave to the respondent both orally and on paper. First, the respondent was requested to think about the way he is working when designing a system and writing down the work process on paper. Second, the respondent was asked to write down in every work phase the things that he usually considered important regarding the user. Third, he marked * or + beside the factors that he considered to be most important among the user-related issues he was asked to ponder in the previous phase. In addition, I asked the respondent to remember to think aloud through the whole task. The verbal description was taped during the assignment and transcribed later along with the taped interview. In the following I describe the analysis and results of both the interview and the thinking-aloud task.

4.3 Results of the interview: *"There are different firms and organisations"*

Already during the interview I noticed that the topics that the respondent brought up did not entirely meet with my a priori assumptions of the human being as a user of an IS. The impression that the respondent's and my conceptions of human factors in ISD differed significantly from each other was confirmed during the analysis. In particular, I had expected that after the first topics concerning the respondent's work the discussion would smoothly move on to those human features that the interviewee considered as important design issues. My expectation had been to hear some kind of remarks which in some way depict those

human characteristics that the respondent had noticed in people when they either take part in IS design, e.g., explore the prototypes, or when they learn to use IS. For example, "it is easier to make the user requirements with people who clearly express what they think when accomplishing a certain task", or "left-handed people tend to prefer pop-up menus", or "it seems that two different media types are optimal for presenting a central piece of information in multimedia applications to people who use telephone and computer simultaneously".

Moreover, I even thought that perhaps the firm had developed reusable user models for different types of people or human characteristics, and the respondent would talk about the design premises of those models. However, despite that the interviewee acted very reflectively and collaboratively, concepts or expressions that would have been naturally elaborated into a discussion about the essence or characteristics of the human being were scarce during the interview. Instead of describing people in human terms, the respondent considered the human being as equivalent to a firm:

> Interviewer: *"Would you briefly describe those human beings for whom you are building software?"*
> Respondent: *"Well , humans are very different, there are different firms and organisations , there are very big factories as clients and there are human beings in the departments, and on the other hand, there are quite small firms, which practically are one person, so that there is kind of a lot of variation*[1]*"*

The respondent depicted humans through the characteristics of firms. To my initial view, the above quotation reveals an irrational belief concerning the human being. This is because a conception in this study concerns the nature of knowledge in terms of qualitative differences within professionals' thinking, and thus the basic tenets with respect to the essence of knowledge have to be considered. A knowledgeable way to define a phenomenon is to describe that particular phenomenon in accordance with the characteristics that belong to the intension of the concept that depicts that particular phenomenon (Järvinen and Järvinen 1996, 15). As pointed out earlier, in this study the characteristics of the human being are not seen as equivalent to the features of a firm. That is to say, they are ontologically different and cannot thus be equated. In addition, a firm or an organisation are human creations, created as means to an end for a particular purpose (e.g., to earn a living). They need to be designed by humans whereas the basic human modes of being are beyond human design and have to be taken as for granted. Firms and organisations are not equivalent to human characteristics but an instrumental implication of the social basic human mode of being with respect to the human-created means to act together in order to achieve a particular purpose. In other words, their etymology is different. Therefore, the only characteristics that are part of the intension of the concept human being are features that depict humans and their behaviour as such, without conceptualising humans as existing only for some particular purpose (cf. von Wright 1984, Buber 1993). Respectively, within a human-centred approach to IS development, the various human characteristics should be taken into account when building IS for people.

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[1] The meaning of the transcription symbols in the interview quotations: , = short pause (0-3 seconds) in the speech . = pause (4-7 seconds) (...) = long pause (over 7 seconds). I have translated the quotations from Finnish to English and they are language checked.

Besides considering humans as firms, the interviewee focussed his reflection on characteristics of the software that he was constructing. People are interesting to him only as clients who might possibly purchase his company's products:

> Interviewer: *"When you are building an application, do you think that you are doing it for an organisation or for human beings?"*
> Respondent*: "Undeniably, it sometimes comes to mind that you're doing it for an organisation, that the client may also have a big name and so you're in some sense doing it specially for the organisation. And on the other hand, there is the point of view also that the systems are being made for the clients of that organisation because there may often be the fact underlying that one wants to make a good, showy application for the organisation and when the organisation uses it with its clients, so the clients maybe get to know us as a supplier."*

This answer above is also a reference to an example of a sign that the respondent is being over polite towards the researcher. The respondent refers to his view as an option (*there is the point of view also*), to something which the respondent probably assumes that the researcher would like to hear. It seems that the respondent wanted to be polite in terms of accepting the perspective implied by some factor concerning the interview - such as the theme of the interview, the respondent's impression of the researcher as a moral philosopher fighting for human rights (cf. Kling 1996) or the direct questioning technique (Fielding 1993) - but only to some extent because he still expressed his own view. In addition, this may also be a question of social acceptability because the sacredness of human life is one of the most fundamental values in contemporary Western societies (Hirsjärvi 1984) and thus the 'right' choice would be to give answers that emphasise consideration of humans. However, this indicates that during the interview there may exist some factors that allure the respondents to give answers that they anticipate the interviewer wants to hear. When aiming at more specific descriptions of humans, a usual characteristic of humans that the respondent depicted was the organisational position or the work role of an individual or a particular group:

> *"I think there are departmental secretaries with whom we are often in contact in these bigger environments, and on the other hand, there are these computer people, information systems designers and other computer support personnel, and if we think of the situation where the planning of these kind of systems is begun and the ideas taken forward, so then there comes these departmental managers with whom we generally are in contact so that we can sell the idea of the system, and very much there are these kind of groups of users who then actually exploit the system."*

In these kinds of descriptions humans are seen through a variety of job titles. People differ in terms of work contents or organisational positions expressed by job titles of different groups of people. This indicates that they are not perceived as human beings but performers of certain work procedures, which in this case reflect the respondent's intention to get the organisation to adopt the computerised information system. However, the description of the content of work and an individual's organisational position do not describe the way people

actually act while performing their work (cf. Brown and Duguid 1991). The job titles indicate certain positions, which include different procedures for work and are specified by people in organisations, but cannot define the human characteristics without incorporated descriptions of human behaviour and characteristics adherent to the job titles or procedures in question. The respondent described humans only in superficial objective work-related terms. Thus, the essence of the human being is excluded and the interviewee's focus of reflection is on formal attributes that depict particular work-related positions. In these kinds of situations during the interview I, as a interviewer, contemplated to what extent I should try to lead my interlocutor to redirect his focus of reflection towards the object of research in human terms. Nevertheless, the interviewee's conception of the topic has to be respected: in order to obtain valid data the respondent is (implicitly) supposed to define the accurate interpretations of the themes discussed.

4.4 Results of the thinking-aloud assignment: *"Then in between we a little listen also to the clients' views'"*

The design task with the thinking-aloud method resulted in data in which the interviewee predominantly discusses technology while sketching the manner his company builds IS from initiation to delivery. The sketch is illustrated in Figure 5 below.

First, he specified the task he was depicting as concerning a new ISD project during which an application is developed for the first time. The development project that he sketched consisted of different phases, which were to some extent performed in a dynamic manner, with iteration between and within phases (cf. Beynon-Davies et al. 1999). In the first phase, the functions of a client organisation are defined as the basis for the development process. The initiating impulse for the development process is a functional problem experienced by the client. Respectively, the central design issue is the functions that the application should perform.

In the second phase, the main concern is a choice regarding the form and structure of the application: whether to build a multimedia or a database application. At this point, users are involved with the ISD process as deliverers of material and information concerning the client organisation. These people differ according to their job titles, which also determine the way of communication. The quotation also shows that the communication involves technical or business terms, not terms referring to human characteristics as the human basic modes of being:

> *"There is a difference that when you are building a database application then you deal with IS professionals but when you're building a multimedia application then there are more communications and marketing people involved and this effects the planning so that you in a way communicate differently with these people. With IS professionals you can use technical terms but with communications and marketing people you must speak in terms of marketing and the firm's image."*

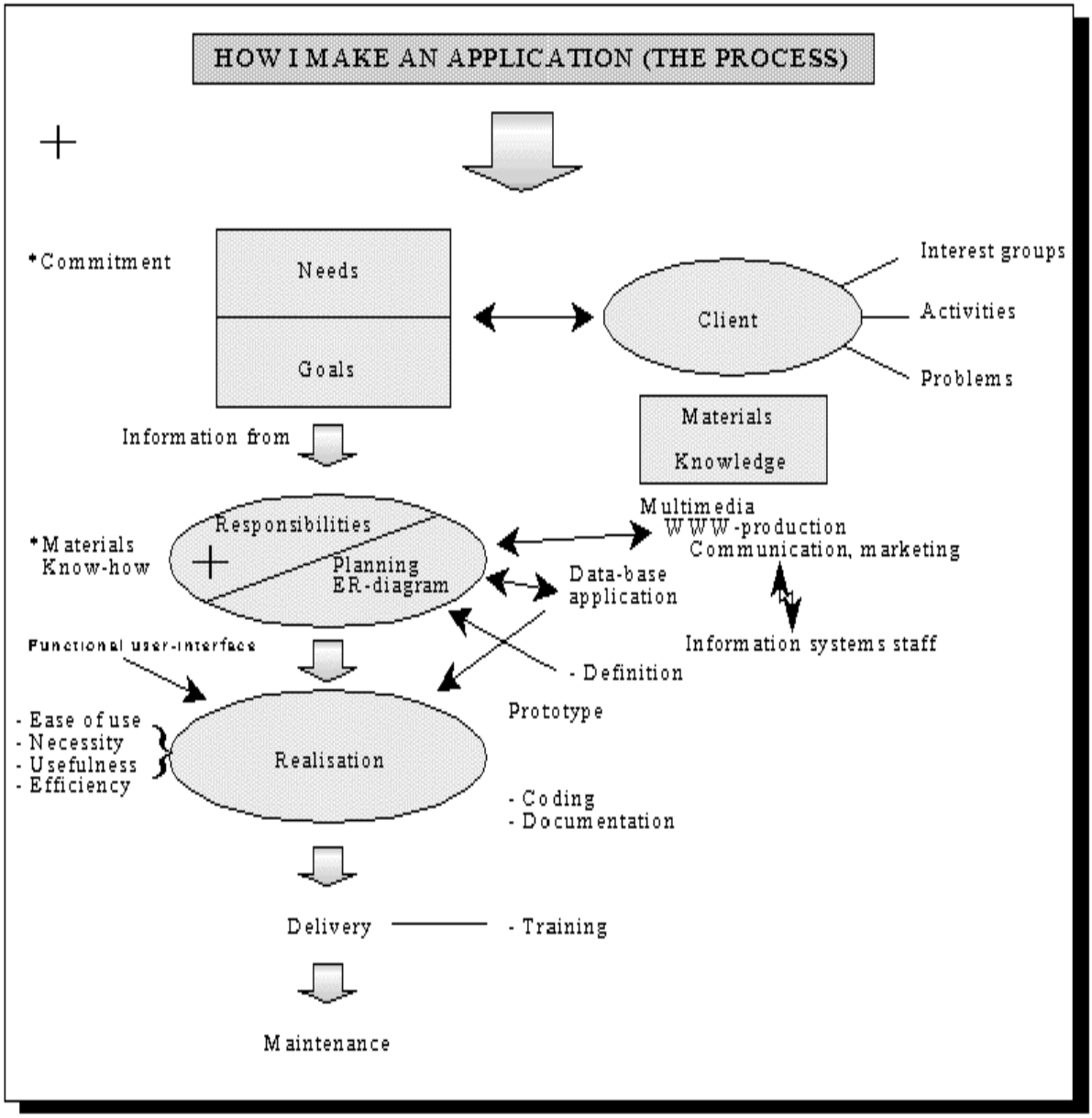

FIGURE 5. The designer's sketch resulting from the thinking-aloud assignment.

In the third phase, the respondent's description of the ISD process proceeded to technical and logical systems design with an emphasis on issues concerning modeling (ER-diagrams), programming, prototyping and documentation. The design of the user interface was the only task which concerned users with respect to the actual design of the system. Despite a short remark that the system should be easy to use, the respondent neither elaborated on the meaning of usability nor depicted any actual testing aimed at validating the systems usability. Instead, in the respondent's words, he and his colleagues *"get some basic information into the interface and then in between we a little listen also to the clients' views'."* In addition, it remained unclear whether the respondent described end-users or IS professionals when referring to the clients' views. However, the respondent made a big distinction between the IS professionals and other employees. He felt that the technical staff

in their client organisations was more like companions and technical advisors to them, whereas other employees involved in building multimedia applications were important only as suppliers of audio-visual material. The responsible developers of the system were the respondent and his colleagues:

> *"Often these technical people are sort of companions in the building, so that you get information from them concerning the client organisation's systems, and hints how to build it* [the system] *technically, but then in the multimedia area the responsibility for the design is by far our own."*

In the fourth phase, the respondent described the implementation of the completed system. Then the central concern was how the system is delivered to the client. Users were involved in training, the aim of which was to teach the users to use the ready-made system. In the respondent's descriptions of training the main issue was the way that the training situation was organised. In particular, how many have attended training and into how large groups the users were divided. No observations on human characteristics, such as how people learn or get socially organised by themselves, were raised in the descriptions concerning training:

> *"In connection with the delivery of the system, we train users to use it. In bigger companies we have invited about ten persons to attend, and in one or two groups the users have then explored the system running on a few machines… on the other hand, we have trained also just one person in a company to act as a so-called key person, who then trains other people to use the system."*

In the fifth phase, the maintenance of the system was depicted. Then the respondent's focus was the content of maintenance contracts in terms of their company's business practices.

Finally, the interviewee marked the most important factors regarding the user into the sketched ISD process. These factors emphasise emotion-related characteristics of the human being: commitment at the beginning of the process and responsibility during the design of the application. The latter was seen as especially important concerning the delivery of information and material from the users to the designers but, however, not with respect to facilitating interactions and cooperative design with the users. Moreover, the respondent did not describe the way commitment is important and how it should be included in the process of ISD in terms of users' behavioural features, such as open communication, maintaining a shared vision or solving problems effectively (Abrahamsson 1999). It seems that the respondent was not able to recognise the human features that are characteristic of behaviour indicating commitment or responsibility.

As a whole, the development process described by the respondent resembles a traditional ISD project in which descriptions and prototypes are developed by IS professionals on their own utilising users only as suppliers of information concerning the use domain (Bødker and Grønbæk 1996).

4.5 Conclusions of the pilot study

The analysis of the data of the pilot inquiry indicated that the IS designer's conception of the human being may include irrational beliefs, characterisations based on organisational positions or work roles with no behavioural contents, and expectations of commitment and responsibility. In addition, an active involvement of users in the phases of the ISD process is not seen as necessary. It may also be concluded that it seems that IS designers do not easily focus on human characteristics as design issues or as factors influencing the nature of interaction between designers and users. However, the purpose of the pilot study was to gather information concerning the research method. From this point of view, the pilot study offers several clues for methodical considerations, especially for data collection.

First, it is evident that the IS designer's ways of conceptualising humans differs significantly from the researcher's assumption about the human being. This is problematic because qualitative methods usually emphasise that the basis for qualitative inquiry is in data-driven analysis (e.g., Glaser and Strauss 1967). This means that the researcher should derive the results of the study by inferring in accordance with the meanings in the data, with no a priori assumptions (Boland 1985). However, in a case where a researcher does not find the meanings in the data relevant or meaningful with respect to the topic of the study at hand, the role of strictly data-driven analysis becomes questionable. Yet the purpose of this study is to find the actual conceptions of IS designers, and not to test any theoretical definitions of the human being, nor to suggest that the researcher should adopt the viewpoint of IS designers. Rather, the researcher should be able to understand the conceptions of the respondents' while keeping her own predisposition as an underpinning reflection ground for conducting the study. It seems that an appropriate research method for the purpose of this study allows the examination of the meanings in the data both as such and with respect to another notion that is meaningful from the point of view of the focus of the study.

Second, it is concluded that the IS designer did not easily describe humans and their characteristics. Instead, he tended to concentrate on the technical issues of IS development. For these reasons, data collection should be carried out in a way that facilitates the IS designers descriptions of humans. It is obvious that data should be gathered in an interactive manner in order to elaborate on the respondents' expressions. An interactive data collection method may also include questioning that promotes the interviewees' reflection on the topics that emerge during data collection. This kind of procedure also ensures that a researcher has an opportunity both to elaborate on statements that remain obscure and to validate her understanding of the respondents' expressions.

Third, it seems that IS designers get a better grip on their thoughts concerning humans as users when reflecting upon their work. This is because the interview results did not promote expressions on human characteristics as descriptively as the thinking-aloud assignment. Thus, the data collection method should be anchored in the IS designers' work. Yet the respondents should be facilitated in their reflections by offering the process of ISD as a context.

Fourth, it is obvious that the overall content of the data resulting from the pilot inquiries is not sufficiently descriptive in regard to human IS-related characteristics and behaviour. The pilot respondent regarded humans as equal by meaning to firms. Although the results of the pilot study may have some bearing on the practice of ISD, further data collection should

include a varying set of concepts referring to human beings. In addition to the concepts that are commonly used in the practice of ISD, concepts that may act as reminders of human factors and human beings should be used.

Finally, the pilot study proved that my worry about being constrained by my own predisposition to an extent that would hamper data collection was unnecessary. In my experience, both during the overlapping situations of data collection and analysis I was able to select my words and ideas according to the respondent's replies and general willingness to talk. Nevertheless, the discrepancy in our orientations raised the need to employ a method that would support investigating both the implicit 'hidden' meanings as well as the explicit meanings. The only possible source for interviewer bias that became obvious was that during the pilot interview there appeared some signs of over-politeness on the respondent's side. These kind of problems may be avoided by using projective information gathering techniques, such as indirect questioning (Fielding 1993).

With the aid of the results of the pilot study, I imposed a research method referred to as phenomenography. In the next section I describe the features of this interpretative approach.

5 Method

This study merges with the principles of phenomenography, which is a qualitatively oriented method of empirical research for investigating people's different conceptions of the surrounding world (Marton 1981, Tesch 1990, 49; Gall et al. 1996, 603-604; Järvinen and Järvinen 1996, 59-60; Marton and Booth 1997, Järvinen 1999, 47-49). Phenomenography is understood as a member of the phenomenological family of research traditions (Marton and Booth 1997). Yet it has adopted features also from other research traditions. For this reason, a common way to present the nature of phenomenography is to highlight its basic tenets by discussing it in relation to its theoretical backgrounds (e.g., Gröhn 1992, Häkkinen, K. 1996, Marton and Booth 1997).

In the following I first discuss phenomenography's theoretical roots, which originate from Piaget's work concerning the development of human thought, Gestalt psychology and the tradition of Russian psychology as well as phenomenology. In this way phenomenography is given a position within the numerous approaches in the tradition of qualitative research. Secondly, I describe the principles of phenomenography and how they facilitate this study. In addition, the principles that are based on the theoretical origins clarify the way phenomenography focuses this study on the object of research: they indicate what a 'conception' is, how it is formed and what are the theoretical grounds for qualitative differences within people's conceptions. In addition, the principles of the approach provide a basis for the required procedures in this study, such as data collection and analysis procedures. Finally, I depict the research process from an empirical point of view: the final data collection procedure, the respondents, interviews, and analysis of the data.

5.1 The roots of phenomenography

Phenomenography is a qualitatively oriented method of empirical research for investigating people's conceptions of the surrounding world. The aim of phenomenography is to describe, analyse and understand different conceptualisations. It depicts those qualitatively different ways in which humans experience different features of reality. A prompt to the development of phenomenographical research approach was given in the late 1970's by professor Marton's research group at the University of Göteborg (Järvinen and Järvinen 1996, 59). Although phenomenography was at first developed in order to obtain new knowledge about learning, in particular why some people learn better than others (Marton and Booth 1997), it has been developed further and is nowadays used to study a range of issues, including approaches to learning, understanding scientific phenomena learned in school, or understanding general issues in society unrelated to educational systems (Bowden 1994, Gall et al. 1996, 604). The theoretical grounds of phenomenography have been developed with respect to the following research traditions: Piaget's work on the development of human cognition, Gestalt psychology, the tradition of Russian psychology, and phenomenology (Häkkinen, K. 1996, 6-12).

Marton (1981, 191) emphasises the meaning of Jean Piaget's work for the development of phenomenography, especially his descriptions of children's qualitatively different conceptions of various aspects of their reality. The primary aim of these descriptions was to clarify the development of knowledge in terms of different forms of thought that reflect various aspects of reality. However, according to Marton (1981, 191), there was a gradual tendency in Piaget's research towards, on the one hand, focusing on the general similarities between the various aspects in children's conceptions, and on the other hand, towards considering these similarities as psychologically real entities. This trend forms a shift in which the child rather than the child's conceptualisation of the world has become thematic in Piaget's work**.** In other words, he has moved gradually from describing the child's conceptualisations to investigating the similarities in children's thought as psychologically formal entities that reflect different developmental stages of cognition. Through this shift the research object in Piaget's studies changed from the conceptualisations of certain phenomena to general behavioural features in terms of the formal development stages of thought. This change has been criticised by phenomenographists due to the omission of context in Piaget's studies concerning the stages of the development of human thought (Häkkinen, K. 1996, 7).

In developing phenomenography, Marton (1981, 192) argued that Piaget's theory concerning the development of human thought includes contradictions with respect to the relation of concept understanding and the formal developmental stages of thought. According to Piaget's theory, there is a general structure of ability in understanding different concepts and contents, and thus it can be assumed that behaviour is uniform when grasping structurally similar tasks. Since several studies indicate that the conceptualisation within a certain task depends on both the content of the task and the contextual features attached to it (Gröhn 1992), the starting-point in phenomenography is that conceptualisations are not detachable either from their context or the content of the task. However, the strongest contrast between phenomenography and Piagetian psychology is that when Piaget combines the development of thought into general logical forms, the phenomenographists concentrate on the content of the object of thought that is being considered by particular humans (Häkkinen, K. 1996, 8).

Another theory underlying the development of phenomenography is Gestalt psychology. Some similar points of contact also exist between phenomenography and the Russian tradition of psychology (Gröhn 1992). Within Gestalt psychology the qualitatively different features of conceptions have been one object of research. A particularly influential body of knowledge for phenomenographists has been produced by Frederick Bartlett, who studied how people adopt new knowledge, an 'effort after meaning', an occurrence in which the human being tries to form a meaningful entity for herself from a complex bulk of information. When learning new concepts and seeking meanings for them the human being tends to simplify the contents being learned and cut down the number of details. In seeking meanings the human being makes use also of her previous knowledge, beliefs and experiences. At the same time she is building and expanding a store of knowledge and experiences which Bartlett calls a schema. In other words, the human being adopts new knowledge in a constructivist manner, which means that an individual's previous knowledge and experiences contribute to the meaning given to new information. In this way the human being's expectations concerning the nature of reality influence the way she understands the surrounding world. This subjective manner of individual construction of meanings explains for its part how different humans may understand the same phenomenon in different ways (Gröhn 1992).

Further, according to Gröhn (1992), Bartlett's theory of individual construction of meanings adheres closely to the separation of pattern and background used in Gestalt psychology. According to this notion, in a problem-solving situation an individual always grasps part of the information as an object and another part of the information as a background. The human ability to perceive an object and a background in several different ways indicates that human consciousness has no permanent content. The human consciousness is permanent only in the sense that an individual is able to change the way of perceiving the object and the background (Häkkinen, K. 1996, 8). In addition to the similarities, Bartlett's studies differ from phenomenography by giving greater emphasis to the functional features of thought than to the content and structure of thought, which are considered more essential in phenomenography (Gröhn 1992). The research within Gestalt psychology led phenomenographists to define that awareness is considered as layered: some things make up the core and are the objects of focal awareness while other things belong to the fields surrounding the core. Yet other things remain on the fringe that extends indefinitely beyond conscious awareness (Marton and Booth 1997, 123).

Gröhn (1992) maintains that common to the Russian tradition of psychology, such as the work of Vygotsky and Luria, and phenomenography is that they both lay stress on the relativity of the construction of meanings. In addition, they both emphasise understanding human action as relative functional entities. Phenomenography differs from the Russian tradition of psychology in that the latter stresses language as an objectively given prerequisite and a collective basic view, whereas the former concentrates more on the content of thought and individual construction of meaning as a basis for adopting knowledge. A general dissimilarity from studies within Gestalt and the Russian tradition of psychology is that phenomenography emphasises more the internal points-of-view of thought and the qualitative divergences of a certain content of thought (Häkkinen, K. 1996, 9).

Moreover, phenomenography bears a resemblance to phenomenology. As Boland (1985) points out, phenomenology is interested in the methodical study of consciousness in order to understand the essence of experience concerning phenomena. The search for the

essence of phenomena involves the search for meaning. Thus, phenomenology is concerned with the structures of meaning. According to phenomenology, essences are not verified empirically but are grasped through intuition. The intuition of essence is the end result of a repeated process of purifying experience and bracketing away presuppositions concerning the phenomenon in question. Each of this kind of 'reductions' brings one closer to objectivity, and the end point of repeated reductions approaches pure objectivity. Often the relation between phenomenography and phenomenology is expressed by depicting the disparities or contradictions concerning the approaches (e.g., Gröhn 1992, Uljens 1992). The most significant contrasts between phenomenology and phenomenography are the following. First, they adopt different stances towards theoretical and empirical research and also differ in regard to their objects of research. Second, the role of presuppositions in research is dissimilar. Third, they stress the clarification of experience differently. Fourth, their orientations towards a pre-reflective consciousness are not similar. The fifth discrepancy is that the two approaches serve different purposes.

In regard to the first difference, Uljens (1992) establishes that phenomenology is a philosophy suitable for more theoretically oriented research whereas phenomenography is an empirical research approach interested in the analysis of empirical data, which reflects people's conceptions of the phenomenon in question. This indicates also that phenomenological analysis concerns the immediate experience of a researcher regarding a certain phenomenon, whereas phenomeno-graphy is oriented towards analysing other people's experiences. Philosophers engage in examining their own experience, whereas phenomenographers investigate other people's experiences. Thus, phenomenology and phenomenography are different with respect to their objects of research (Marton and Booth 1997, 116). Phenomenography employs a perspective known as the second-order perspective, which refers to an orientation towards people's conceptions (Figure 6).

According to the second-order perspective the investigation is oriented towards human beings' views of the surrounding world, whereas the first-order perspective is focussed on the surrounding world (Järvinen and Järvinen 1996, 60). Because the individual construction of meaning requires giving meaning to this phenomenon, phenomenography is also in this sense interpretive: the aspects of reality are not seen as objective facts that the researcher is able to describe but need to be given meaning by the human beings investigated. In this way phenomenography incorporates the intentional notion of interpretive research which assumes that in order to understand the meaning of human action, it is necessary to understand the subjective consciousness or intent of the actors (see Säljö 1994, Schwandt 2000). This perspective of phenomenography is in accordance with the object of research in this study.

The second difference between phenomenology and phenomenography is, according to Marton (1984), that especially Husserl's phenomenology aims to be an alternative to empirical research. A phenomenologist strives to free herself from presuppositions with the aid of phenomenological reduction and in this way filter from an experience its objective essence (Boland 1985). The reduction is referred to as a suspension of judgement which may be depicted as 'bracketing', an attempt to put both common sense and scientific knowledge concerning the phenomenon in question into parentheses (Järvinen 1999, 124). By contrast, for a phenomenographist it is impossible to approach empirical data without presuppositions because empirical research is always guided by a particular knowledge interest: when we became interested in a particular topic, we also became interested in it in a certain way

(Giorgi 1988). Thus, phenomenographists consider that the Husserlian concept ‘pure mind’ cannot be applied to empirical research as such (Uljens 1993).

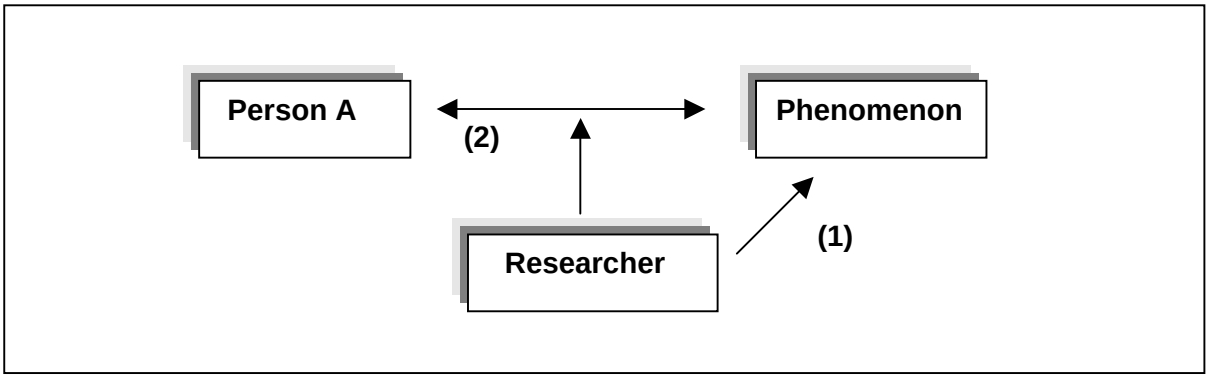

FIGURE 6. The second-order perspective (2) and the first-order perspective (1).

In this sense, phenomenology and phenomenography are different in terms of the logic of inference. While the predominant mode of inference in phenomenology is inductive logic (Grönfors 1982, 27), the basic assumptions concerning phenomenography imply conduct that is consistent with abductive logic. Typical of research that follows inductive logic is to proceed from empirical data towards the discovery of theory without a priori assumptions concerning the phenomenon under study (Glaser and Strauss 1967; Järvinen 1999, 41). Phenomenography closer to a procedure known as abductive logic, which is based on an assumption that theory creation is possible only when a particular guiding principle supports reasoning from empirical data towards theory (Peirce 1958, 95-98; Grönfors 1982, 33-37). The guiding principle may be acquired both from previous theories, scientific or even fictive literature, and a result of induction. Abductive logic allows for a priori assumptions of a particular phenomenon to serve as a clue when analysing empirical data, which is often the case in phenomenographical research. This feature appears suitable for my purposes to use a priori conceptualisation as a reflection ground in this study.

Third, phenomenography aims at describing a particular phenomenon through a variation of different experiences while the purpose of phenomenology is to find a phenomenon’s singular essence through similarities derived from different experiences. That is to say, phenomenology aims at clarifying a phenomenon’s singular essence through a theoretical-imaginary variation. A phenomenon’s ideal essence is that which remains consistent despite the variation. Conversely, in phenomenography the essence or meaning of a phenomenon is reflected by the variation of the conceptions of the empirical subjects. The aim in phenomenography is to find the variation and the ‘architecture’ of this variation in terms of the different aspects that define the phenomenon (Marton and Booth 1997, 117). Thus, it is implied that in phenomenology there is a single ‘core’ meaning of a phenomenon whereas phenomenography assumes that there are different meanings of a phenomenon.

The fourth discrepancy concerns different stances towards pre-reflective consciousness. Phenomenology is distinctively oriented to pre-reflective consciousness. It is also important to draw a line between pre-reflective experience and conceptual thought (Boland 1985, 194; Marton and Booth 1997, 116). The phenomenological aspiration is to describe the world as such and put aside the influence of cultural learning. Gröhn (1992) depicts phenomenology in this respect as follows: *“the purpose is to describe the world as it would look if we had not*

learned how it should be seen, or how our self-evident everyday existence should be experienced." By contrast, in phenomenography the structure and meaning of an experienced phenomenon can be found both in pre-reflective experience and conceptual thought (Marton and Booth 1997, 116-117). Unlike in phenomenology, in phenomenography it is possible to investigate both the theoretical-conceptual and experienced aspects of conceptions as well as what are culturally learned or individually developed habits relating to the surrounding world (Marton 1981). This means that phenomenography offers grounds for investigating both the implicit meanings (cf. Denzin 1992, 34) and explicit meanings. This highlights also that phenomenographic research refers to the inspection of the essence of the phenomenon as collective habits of conceptualisations. Marton (1981, 180) states that the aim of phenomenographical research is to *"find and systematise forms of thought in terms of which people interpret aspects of reality - aspects which are socially significant and which are at least supposed to be shared by the members of a particular kind of society; namely, our own industrialised Western society."* This means, on the one hand, that the conceptions include socially constructed features and, on the other hand, that phenomenography aims at relating individual conceptions to a collective way of seeing phenomena (Engeström 1986). Säljö (1994) maintains that phenomenographical conceptions are thoughts that guide people in their daily activities and that allow for the world to be perceived as meaningful in a certain community of practice. In this sense phenomenography is suitable for investigating a particular group's views, for instance, a group representing a certain profession.

Finally, the fifth dissimilarity reveals the different purposes of the approaches. Phenomenology aims to capture the full richness of an experience. The phenomenologist wishes to depict an individual's lifeworld, the world in which the individual is immersed. Whereas the phenomenologist's interest is to find how a person experiences her world, the phenomenographist's interest is to examine individuals' ways of experiencing the world and to find the critical aspects of those experiences which make people able to handle different activities in more or less efficient ways (Marton and Booth 1997, 117). Thus, in addition to finding the variation of different experiences, phenomenography is oriented towards finding the qualitative differences of people's conceptions in order to find why some people make use of their conceptualisations more efficiently than others. In other words, this feature emphasises phenomenography's potential for investigating knowledge as competence.

In this section I have described phenomenography in relation to its theoretical roots. In this way phenomenography can be seen as an approach distinct from the numerous approaches in the interpretative research tradition. In what follows I describe the nature of the basic unit of phenomenographical analysis: the conception.

5.2 Constructing conceptions by experiencing the world

Phenomenography is about individual meaning construction, which results in a conception. Thus, a conception refers to conceiving and understanding something. People form their conceptions while experiencing the world[2]. In doing so, people are neither constructing the

[2] According to Marton and Booth (1997, 86) experiencing something is equal in meaning to understanding, conceptualising, apprehending, and other similar verbs referring to human conceptions as a result of conceiving and understanding phenomena.

world nor is the world being imposed upon them. Rather, humans and the world are merged with each other by the act of an experience. Humans' experience of the world is constituted as an internal relation between the experiencing people and the world (Marton 1981; Marton and Booth 1997, 13). Therefore, a conception forms a fundamental relation between an individual and her environment. Since experiencing refers to a recurrent mental act, a conception is also regarded, on the one hand, as forming the foundation for the human construction of meanings and, on the other hand, as acting as a mediator between an individual and the surrounding world (Uljens 1992, 85). For this reason, conceptions act as interpretative schemes because they contribute to the individual construction of meanings concerning the surrounding world. In other words, conceptions are regarded as acting as a ground for action (Säljö 1994, Järvinen 1999, 47).

By defining humans and the world as inextricably intertwined, phenomenography transcends the person-world dualism suggested by the traditions of both individual and social constructivism. While experiencing the world, according to phenomenography, people are neither bearers of particular 'inner' mental structures nor behaviourist actors determined by the 'outer' world. Therefore, it is assumed that within the act of experience, people cannot separate their understanding of the situation and the phenomena that lend sense to the situation. The particular situation is understood in terms of the phenomena involved and the phenomena are experienced from the point of view of that certain situation. What becomes focal in humans' awareness is stipulated by the different aspects of the individual conception in question (Marton and Booth 1997, 83).

Marton (1981) establishes that there are two aspects in a conception: the what- and the how-aspect. These aspects render the relation that a conception constitutes between an individual and the surrounding world as contextual. The what-aspect directs individuals' thought to the object, which can be physical or mental by nature, whereas the how-aspect refers to the thought processes by which an object of thought is limited in relation to its environment. In order to understand conceptions we have to know both the object and the mode of individuals' mental acts. In this way the what- and how-aspects are interdependent: when we know how humans' mental acts are directed to their objects we better understand the qualities of the objects as people conceptualise them (Järvinen 1999, 48). This is supported also by Uljens (1993), who points out that the object of thought (what-aspect) may concern many different things, this yet having no definitive implications as such. Without incorporating the how-aspect in the analysis of conceptions, the meaning of the mental act in question does not become evident. This directness of mental acts indicates the intentional nature of conceptions (Uljens 1991, 83).

The idea of a conception's different aspects is based on the notion of intentionality as originally defined by Franz Brentano (1995). According to this notion, a thought cannot be imagined without an object to which it refers. Brentano illustrated his definition of intentionality as follows (Marton and Booth 1997, 84): "*No hearing without something heard, no believing without something believed, no hoping without something hoped, no striving without something striven for, no joy without something we are joyous about, etc.*" (Spiegelberg 1982, 37).

The philosophical stance of Brentano's intentionality indicates that a conception involves experiencing something in a certain way. In phenomenography, this means that conceptions are intentional with respect to two intertwined aspects, which signify the qualitative differences among conceptions, and render the relation that a conception

constitutes between an individual and the surrounding world as contextual. Conceptions are qualitatively different due to the way that the different aspects of an experience merge with each other. Within this merging there are two types of intentionality inherent. First, the different aspects of an experience contribute to conceptions by creating different levels of understanding. Second, the different aspects of an experience contribute to conceptions as meaningful objects of thought, which indicate what is regarded as important in a particular context. In other words, people's conceptions are qualitatively different with respect to both levels of understanding and value orientations. In what follows, the two intertwined types of qualitative differences within conceptions are examined.

5.3 Intentionality with respect to the levels of understanding

In phenomenography, different levels of understanding refer to the qualitative dissimilarities within conceptions, which are inherent in the aspects of an experience (Marton and Booth 1997, 86-88). Then an experience is specified by the analytical distinctions of a structural aspect and a referential aspect. The structural aspect denotes how a particular phenomenon is both discerned from its environment and how the phenomenon's parts relate to each other as well as to the whole phenomenon. That which surrounds the phenomenon experienced, including its contours, is its external horizon. The parts and their relationships, together with the contours of the phenomenon, are its internal horizon. The referential aspect signifies the meaning of the conception (Figure 7). These two aspects are dialectically intertwined and occur simultaneously within an experience. Marton and Booth (1997, 86-87) illustrate this by imposing a question:

> "*What does it take to see a motionless deer among the dark trees and bushes of the night woods? To see at all we have to discern it from the surrounding trees and bushes; we have to see its contours, its outline, the limits that distinguish it from what surrounds it. We have to see, at least partially, where it starts and where it ends. But seeing its contours as contours and as the contours of a deer implies that we have already identified it as a deer standing there, which is exactly where the enigma of what it takes to experience something in some context lies. On the one hand, in order to see something as something (the particular configuration in the woods as a deer, in this instance, and not as a truck or a UFO) we have to discern that something from its environment. But on the other hand, in order to discern it from its environment we have to see it as some particular thing, or in other words, assign it a meaning.*"

Thus, within a conception, structure presupposes meaning, and at the same time, meaning presupposes structure. The way the structure of a phenomenon is experienced refers to the contours or boundaries of the phenomenon in question. In brief, people create conceptions with respect to the structural aspect's external and internal horizons of a phenomenon that are dialectically merged with the referential aspect of that particular phenomenon.

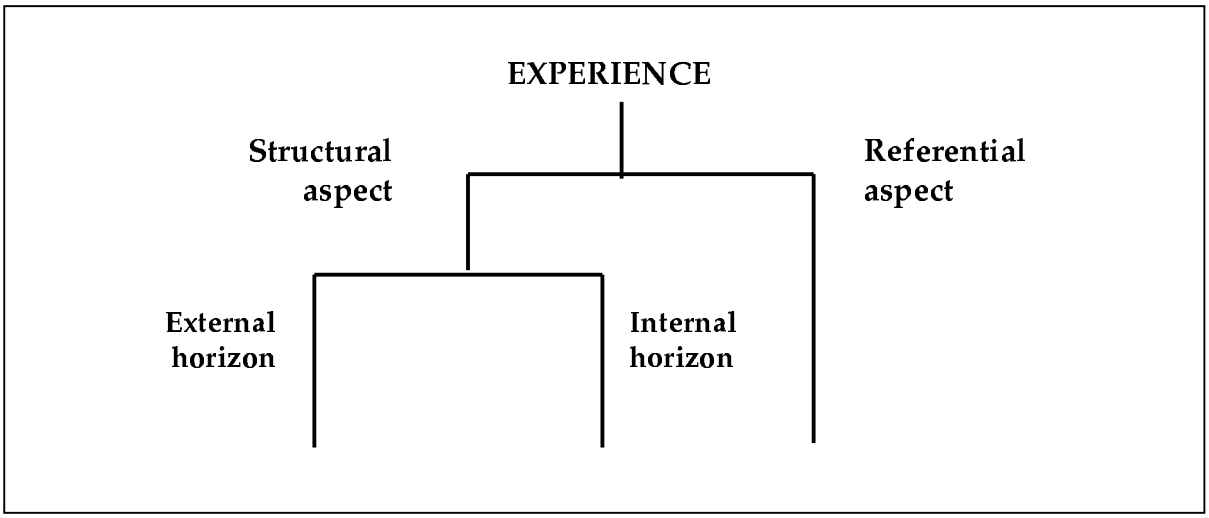

FIGURE 7. The analytical distinctions of an experience (Marton and Booth 1997).

The qualitative differences among conceptions are due to the way the structural aspects and the referential aspect merge with each other. In particular, how the internal parts of a phenomenon are related to each other and to the phenomenon as a whole while conceiving the meaning of a certain phenomenon creates qualitative variation in conceptions. On the one hand, they differ in terms of the content of the conception, and on the other hand, they differ with respect to the extent that a certain phenomenon is experienced, as a part of that phenomenon or as a whole. These two aspects of potential variation merge with each other and form the quality of an understanding. Two extremes within the different ways of conceiving phenomena are often referred to as a surface approach and a deep approach (Marton et al. 1980, Marton and Booth 1997). When detached parts of a phenomenon are the focus of thought instead of relating the parts meaningfully to the whole phenomenon, understanding is in accordance with a surface approach. Then the meaning of the phenomenon is understood in a way that refers to limited competence. Respectively, when the focus of thought is on the whole meaning of a phenomenon instead of on separate parts of it or even the surroundings of the phenomenon, the conception is in accordance with a deep approach. The less partial the conceptions are, the more explanatory power they have. Further, the more explanatory power conceptions have, the better they support competent action with respect to the phenomenon in question (see Sandberg 2000). Therefore, the qualitative variation in the ways that IS designers conceptualise humans as users of IS reflects their different conceptions of human characteristics, and simultaneously forms different levels in the designers' understandings of the human being. These levels, in turn, suggest different levels of competence in humanising IS, because the subjective conceptualisations of IS designers refer to their intention of action (cf. Schwandt 2000).

These different conceptualisations are formed with the aid of the analytical distinctions of an experience. Then the separation of different conceptions is not distinctive but associative, and is seen in the boundaries of the parts and wholes of the conceptions. In other words, the different conceptions are interconnected logically and thus do not appear as strictly separate but rather distinctive yet associated (Marton and Booth 1997, 14-32). In this way conceptions form a structure of meaning, which incorporates a continuum from more comprehensive notions to a more limited understandings.

In the following subsection I illustrate these theoretical grounds for qualitative differences in conceptions described above by an example concerning computer science students' understanding of recursion. This example also introduces the efficiency aspect of conceptions.

5.3.1 Example: Qualitative differences in conceptions of recursion

Booth (1992) conducted a phenomenographical study with the aim of clarifying computer science students' conceptions of recursion. The 14 students involved in the study had been learning programming in the first term of a degree course in computer science and computer engineering. The programming language in question was a very high-level language called Standard Meta-Language (ML). This way of programming is closely rooted in the idea of mathematical function, and this gives a special feature to programming: programs written in ML lie so close to equivalent mathematical statements formulated as functions that the programs themselves can be handled mathematically. In other words, this is regarded to be the meaning of the particular phenomenon that was under investigation with respect to the students' conceptions. The overall meaning of recursion as a mathematical phenomenon served also as the guiding principle in the analysis of the students' conceptions. The study revealed different ways of experiencing recursion, which were categorised according to their referential aspects (Marton and Booth 1997, 94).

Booth's analysis resulted in three categories according to which the students understood recursion as a construct, as repetition, and as self-reference. In the first category, the referential aspect (meaning) of recursion was something that exists to be used in the programming environment, and which has recently entered the assortment of ML constructs, and which has a certain syntactic form. In the second category, the referential aspect was that one has the ability to bring about some repetitive process over a list of natural numbers or equivalent data structure with which one is able to model the repetition indicated by some aspect of a problem. In the third category, the referential aspect extends to the self-referential abstraction of iteration, possibly mathematical induction and the resulting capability to prove the correctness of programs.

The structural aspects of the ways of experiencing recursion concern how recursion and its component parts are delimited from and related to the rest of programming and mathematics (external horizon), and with the way the parts of recursion are related to each other (internal horizon). In the first category, recursion understood as a construct, the structural aspects deal with the typical set of typical forms of templates that is the boundary of the external horizon, and the syntactic and lexical details of ML functions that form the internal horizon. In the second category, recursion understood as repetition, the structural aspects refer to the semantics of the template, the recursive case and terminating case, which form the boundary of the external horizon that extends to the idea of repetition in other contexts. The internal horizon in this category is the ML expressions for the individual recursive case and the base case as demanded by a particular situation. In the third category, recursion understood as self-reference, the external horizon is also the template, but the nature of self-reference, the mathematical correctness of the program, and the way that repetition is facilitated are essentially abstracted in comparison to the second category. The internal

horizon is formed by the recursive and terminating cases, but in addition to the second category, the relationship between them is seen in terms of a whole recursive functional expression (Marton and Booth 1997, 95).

In addition to elucidating the referential and structural aspects of an experience, the three above-mentioned conceptions illustrate how conceptions may be different with respect to the quality of understanding: the first conception is closest to the surface approach whereas the third conception is reminiscent of the deep approach. In addition to these qualitative differences, these ways of experiencing recursion indicate a hierarchy of different conceptions. The first conception is a part of the second, and the second is a part of the third. However, this order is in accordance with a one-way relation: the more comprehensive conception implies understanding of the more partial conceptions, but the reverse order is not possible. Respectively, the more comprehensive conceptions provide more efficient intellectual basis for action than the less comprehensive conceptions.

The above example illustrates the most common type of interpretation of intentionality within phenomenography. This is because phenomenographists have been interested in clarifying why some people achieve better learning results than others (Marton and Booth 1997, 1). Although the what- and how-aspects are inextricably intertwined, there are differences within phenomenography concerning the dissimilar emphases given to those two aspects. The directedness of the above-described mental acts emphasises the structural aspects over the referential aspect. A central feature in classifying some conceptions as more partial or incomplete than others is the functioning of the structural aspects of an experience, i.e., how a particular phenomenon is both discerned from its surroundings and related with its parts while conceiving the world. More attention is paid to how people conceive a particular phenomenon than to the meaning content of that particular object of thought (Uljens 1993). However, besides qualitative differences in conceptions from the point-of-view of different levels of understanding, conceptions are intentional by nature also in a way that emphasises the referential aspect (meaning) of a conception. Then the focus of conception construction is more geared towards the way that a particular phenomenon becomes an object of thought. In the following section I discuss this other aspect of the intentionality of conceptions.

5.4 Intentionality as an implied value orientation

As mentioned before, phenomenography is oriented towards empirical investigation of varying forms of thought, often referred to as conceptions. Conceptions are formed in a way that involves both individual knowledge apprehension and situational features, such as culturally learned views with a history of their own among particular groups of people. These conceptions are categorised from those expressions by which human beings describe their perceptions, experiences and concepts. The expressions result from a process by which an individual gives meaning to a certain phenomenon. Meaning is then created with the aid of the two aspects of phenomenography: the what- and the how-aspects, which indicate the structural and referential aspects of an experience. These aspects express the intentionality of phenomenography: human thought is always directed to something in a certain way. In order to understand the whole mental act, both aspects constituting intentionality must be understood (Järvinen 1999, 48).

Despite the fundamental status of the concept intentionality in phenomenography and the importance of understanding conceptions as intentional, there are no single straightforward criteria for defining how a particular object of thought becomes a mental reference. This may be due to the emphasis of phenomenographical research, which has been on examining the structural aspects of an experience, e.g., the how-aspect that refers to the mental processes according to which a phenomenon is discerned from its environment and related to its parts. Sometimes it has even been taken for granted that the content of the conception indicated by the referential aspect is not under study, only the structural aspects have been the interest of research (cf. Marton 1994, Dahlgren 1975). In this way also the intentionality that is implied by both the what- and how-aspects has been omitted to some extent. Yet another important aspect of intentionality in conceptions is inherent in the way a particular phenomenon becomes an object of thought and forms the content of the conception.

As mentioned before, phenomenography uses the what- and how-aspects in order to treat different forms of thought. It is about forms of thought or ways of functioning irrespective of the source they stem from (Uljens 1993). This means that many different things, e.g., people, cultural artefacts, certain behaviour, theoretical concepts, contents of an individual's consciousness, or whatever the human being is able to be conscious of, may become an object of thought. What is then the factor that makes a person's thought become focussed on a particular phenomenon? The structural aspects of an experience contribute to the way a particular phenomenon is conceived while the referential aspect presupposes that this certain phenomenon is experienced as meaningful to the person in question. According to Marton and Booth (1997, 123), people can never describe an experience in its entirety, but are constrained to look for and describe experiences that appear important and, thus, also meaningful to them. This means that in particular situations individuals' knowledge apprehension is directed towards a phenomenon that is regarded as important. Thus, the emergence of a particular thing as an object of thought implies a value choice: the phenomenon which becomes an object of thought is regarded as more important than the other phenomena that did not become focal in the experiencing subject's mind in a particular situation.

Consequently, the intentionality of conceptions in this study is understood to be composed of two inextricably intertwined aspects: different levels of understanding and a value orientation. In addition, conceptions are intentional in that their meaning reveals the intentions of the actors in question. The qualitative differences among conceptions are due to the way these two aspects of intentionality merge with each other. In particular, how the internal parts of a phenomenon are related to each other and to the phenomenon as a whole while individuals experience this particular phenomenon as important in a certain situation.

5.5 Summary of the principles of phenomenography

In the previous sections I have described the nature of phenomenography. In the following I sum up the approach by extracting its central principles. The central principles of phenomenography are second-order perspective, contextuality, intentionality, and the inspection of the essence of phenomena as collective habits of conceptualisations. In addition, an aspect of phenomenography is that conceptions are expressed and mediated to other people

with the aid of language. Usually these principles are seen in the light of the phenomenological notion according to which person and world are inextricably related through a person's lived experience of the world. Therefore, also the central principles are intertwined with each other.

The first principle is known as *the second-order perspective*. It defines the object of research in phenomenography. Then the investigation is oriented towards human beings' conceptualisations of the surrounding world, whereas the first-order perspective is focussed on the surrounding world. This means that the researcher aims at understanding informants' conceptions concerning a particular issue and at that very moment brackets her own conceptions about the same issue (Marton and Booth 1997, 119). A theoretical or other definition of that certain issue may serve as a guiding principle that informs the phenomenographic research process.

The second principle raises *the contextual nature of conceptions*. According to Marton (1981), the relation that a conception constitutes between an individual and the surrounding world is contextual. In phenomenography, people's conceptualisations are not detachable, either from their context or the content of the task at hand. In addition to the assumption of inextricability of humans and world, contextuality is revealed also by the two intertwined aspects of a conception: what- and how-aspects. The what-aspect directs the thought to the object, which can be physical or mental by nature, whereas the how-aspect refers to the thought processes by which an object of thought is discerned from its environment. Thus, the context or situation of a person contributes to the mental acts that result as a conception. These different aspects are analytically differentiated as structural and referential aspects of an experience.

The third principle, *intentionality*, is understood as the directedness of mental act, as originally defined by Franz Brentano (1995). Conceptions are intentional with respect to two intertwined aspects, which signify the qualitative differences among conceptions, and render the relation that a conception constitutes between an individual and the surrounding world as contextual. Then a conception is seen in terms of the above-mentioned what- and how-aspects. The what-aspect indicates again the object of thought whereas the how-aspect refers to the quality of the mental act (Marton and Booth 1997, 84). Within phenomenography, the what-aspect stands for the object of thought but the how-aspect refers to both the process of thought as well as to the quality of the conception that results from the process. In order to understand the whole mental act or conception we have to examine both the what- and how-aspects of conceptions. In this way the what- and how-aspects are interdependent: when we know how a person's mental act is directed to its object we better understand the qualities of the object as the person conceptualises it (Järvinen 1999, 48). Intentionality of conceptions is understood both as different levels of understanding and as a value orientation.

The fourth principle of phenomenographic research refers to the inspection of the essence of a phenomenon as *collective habits of conceptualisations* Marton (1981, 180). This means that, on the one hand, conceptions include socially constructed features, and, on the other hand, phenomenography aims at relating individual conceptions to a collective way of seeing phenomena (Engeström 1986). That is to say, in a phenomenon there is a third level between the general intersubjective level and the individual's own level, a level of conceptualisation manners and thought modes (Järvinen and Järvinen 1996, 60). This third level reflects the essence of a phenomenon, which is revealed through the variation of the informants' different conceptions. The conceptions, in turn, are revealed by the subjects'

expressions with which they describe their perceptions, experiences and concepts. People's conceptions, in turn, are intentional in that they guide people in their daily activities and also allow for the world to be perceived as meaningful to them (Säljö 1994).

Finally, in phenomenography it is assumed that individual conceptualisations are mediated by *language* to other people. Then the human being is seen as a conscious creature that intentionally constructs meanings for itself from phenomena in particular situations, and is able to express these meanings with the aid of language. Language is seen both as a tool for thinking and expressing thought (Ahonen 1994) and as a tool for expressing concrete purposes which indicate action in particular social practices (Säljö 1994). In brief, phenomenography describes those qualitatively different ways by which humans conceptualise their experiences, concepts and intentions with respect to certain situations.

In the next sections I describe the research method from an empirical point of view.

5.6 Data collection

In this section I discuss the revision of the data collection method resulting in a thematic qualitative interview procedure. The revision of the data collection method is accomplished with respect to phenomenographic principles and is supported by the conclusions of the pilot inquiry as well as methodological and IS literature.

According to the pilot study, data should be gathered in an interactive manner in order to be able to elaborate on the respondents' expressions. In addition, an interactive data collection method may also include questioning that promotes the interviewees' reflection on the topics that emerge during data collection. Further, it is assumed that IS designers get a better grip on their thoughts concerning humans as users when reflecting upon their work. Reflection by the respondents should be facilitated by offering the process of ISD as a context. Thus, the data collection method should be anchored in IS designers' work. Moreover, the data resulting from the pilot inquiries were not regarded as sufficiently descriptive in regard to human IS-related characteristics and behaviour. Therefore, the data collection method should include a varying set of concepts referring to human beings. In addition to the concepts that are commonly used in the practice of ISD, concepts that may act as reminders of human factors and human beings should be used. Finally, during the pilot interview there appeared some signs of interviewer bias in terms of over-politeness from the respondent's side.

For these above-mentioned reasons, an appropriate data collection method is considered to be an interview. In contrast to the pilot interview, the preplanned interview schedule includes both conceptual and contextual clarifications as well as question types that are assumed to promote the respondents' reflection. In addition, projective questioning is included in order to minimise interviewer bias. In what follows I present the interview method. In the last subsection, I depict the selected respondents and the interviews from an empirical point of view.

5.6.1 Interview method

The interviewing method was revised in conformity with the principles of phenomenography. The principle of the second-order perspective offers ways to improve interviewing because it defines the nature of the process through which a view is created. As mentioned before, the relation that a conception constitutes between an individual and the surrounding world is contextual due to the two aspects of a conception: what- and how-aspects (Marton 1981). The what-aspect directs the thought to the object whereas the how-aspect refers to the thought processes by which an object of thought is limited in relation to its environment. Thus, the context contributes to the mental acts, which result as a conception (Svensson and Theman 1983). Consequently, the interviews are fixed to the context of IS development in two ways. First, the interview discussions begin with opening questions concerning the respondents' current work. Second, the course of the interviews is supported by a framework originating from the process of IS development in order to maintain the context of the discussions on ISD. This necessitates a thematic interview framework referring to the different cyclic phases of IS development.

Due to the current 'post-methodology era' (Avison and Fitzgerald 1994), according to which contemporary IS designers do not follow ISD methodologies in an orthodox manner, the phases of ISD were not adopted from a specific methodology or approach but are in accordance with the pilot interviewee's description regarding his semi-dynamic manner of building IS. This semi-dynamic manner is also common within ISD practice concerning different applications of rapid application development methodology with a varying degree of user participation (Beynon-Davies et al. 1999). In addition, a literature-based view of the ISD process was summarised from the different classifications of IS life cycles and user relations presented by Friedman and Cornford (1989, 176-182). Consequently, the process of IS development was defined as general cyclical phases derived from the pilot study with the support of ISD literature. These general phases are planning, design, implementation, use and maintenance. Planning refers to the initiation and requirements analysis actions including client contacts and definition of user requirements. Design includes logical, physical and program design where the user requirements are refined and turned into specifications and finally prototype software as well as the evaluation of the software, often involving prototype demonstrations to the users. Implementation consists of final system testing, data conversion and training of the users. In addition, implementation refers to the institutionalisation of the system when being designed and realised. Maintenance refers to the operating, maintaining and evaluating actions of the system. These above-depicted phases may include iteration between and within them (Beynon-Davies et al. 1999). Therefore, the pre-planned opening questions were supposed to ease the interviewees' task of reflecting on a particular development situation rather than on a certain fixed order of design tasks.

Use was included in the phases because during the development process the users are supposed to use the prototype and at that stage the designers have the possibility to evaluate the human-computer interaction in regard to different characteristics of the users and the application. In addition, training users as well as maintenance often involves use of the system that has been built. The respondents may also express views according to which the development and use of IS are merging with each other. The opening questions planned for each phase are focused on the user-related aspects of the ISD process in order to direct the respondents' reflection to issues concerning the human being as a user of an IS. The opening

questions were also supposed to maintain this context during the interview or, at least, allow the researcher to get back to the theme of the interview if the discussions with the respondents' did not otherwise offer concepts or other elements to sustain the theme.

Adherent to the contextual refinement of the interview framework is also one fundamental conceptual clarification that the pilot study made apparent. The pilot interviewee's utterances concerning humans varied a lot. For example, he did indeed speak about the people for whom he has built IS using the terms 'firm', 'client', 'user', and 'IS designer'. This kind of broad range of terms concerning humans involved in IS development seems to be quite common within the field of IS. For example, Friedman and Cornford (1989, 184-188) give numerous definitions of the term 'user'. A general manner to understand the user seems to be relating them to work roles. Another way is to classify users within tasks in relation to different phases of the system's life cycle. Then the different interpretations of the term 'user' are: *the patron* who promotes the process of computerisation or of updating systems, *the client* to whom the system is intended, *the design interactors* who are involved in the ISD process mainly at specification, *the end-users* who are directly involved in manipulation of the system in operation, *the maintenance interactors* who evaluate further the application, and the numerous *secondary users*, such as people who have been displaced by the system, persons whose work has been affected by the IS, and people whose non-work life has been affected by the IS as well as the user representatives such as official union representatives. Nevertheless, besides obviously being a customary manner in the field of ISD, these definitions also refer to human work-related actions and thus are appropriate to use in order to discuss the human characteristics and behaviour that the IS designers have observed. Therefore they can be used in the opening questions. In order to maintain the human perspective during the interviews, I also included the terms 'human beings', 'humans' and 'people' in the opening questions.

Another principle of phenomenography which I utilised in refining data collection refers to the different aspects that are assumed to be inherent in an individual's experience of a particular phenomenon. As stated above, phenomenography describes those qualitatively different ways by which humans in certain situations conceptualise their experiences, feelings and intentions (Järvinen and Järvinen 1996, 60). During an interview this involves the functioning of both intellectual and affective operations with respect to a certain phenomenon, i.e., reflection which is directed to the phenomenon in question with the aid of the interview questions. Hence, the nature of the interaction needed during the interviews necessitates - in addition to contextuality – support for both rational thought and contemplation of emotional aspects concerning the phenomenon. This means that the interviews should include expressions and concepts relevant to the context of ISD and that the interviews should consist of both factual and descriptive questions as well as affective questions. Therefore, I classified the interview questions into factual, descriptive, and affective questions. In addition, I divided the affective questions into questions aiming at revealing feelings, attitudes and values in order to promote the designers' reflection. This kind of classification follows the same lines as the classification of questioning in an in-depth interview (Banaka 1971). I supposed that this classification both promotes the respondents' reflection, and also prevents the respondents from excessive rationalisation, which would impede frank discussions (Fielding 1993, 138). Moreover, this kind of procedure is consistent with the nature of human reflectivity. According to Mezirow (1981, 1995), people's knowledge becomes active with the aid of reflection, which refers to becoming aware of our perceptions, thought, action,

feelings, and values. In this way the interviewees were also faced as reflective social beings with thought and emotion (will needs to be paid attention to in regard to voluntary participation in the interviews). This kind of consistency is indispensable in this study because the object of investigation concerns IS designers' consciousness. Therefore, the basic features of human consciousness should be taken into account.

The difference in the actual wording of the questions referring to either feelings, attitudes or values lies in the fact that questions aimed at carving out expressions concerning feelings include verbs denoting emotions, such as 'like', questions concerning attitudes include phrasing referring to the interviewees' interests, and questions regarding values include considerations of preference and importance (cf. Hofstede 1998).

Since the data collection should, on the one hand, meet the demand of maintaining a certain pre-planned topic, and on the other hand, adapt to the conversational procedures that are routine in the respondents' work practices, the data collection was planned as a thematic interview. This gives me as an interviewer the possibility to both maintain the human-centred topic throughout every interview and yet also adapt the discussions according to the comprehension and articulacy of the respondent. The use of a thematic interview also reduces the impact of the interviewer on what the respondent feels able to say in comparison to a non-standardised interview (Fielding 1993, 144). Furthermore, in order to minimise interviewer bias, the opening questions were worded as both direct questions (e.g., "*do you think there are common features in those human beings for whom you have built systems?*") and indirect questions (e.g., "*what is usability in your opinion*?").

The indirect questioning technique is regarded as particularly useful when investigating issues which the respondents probably feel awkward to discuss, such as issues which respondents do not consider themselves to possess knowledge about or have negative feelings towards (Fielding 1993,139). It was also important to use indirect questions because I did not want to give the respondents an impression of being actively committed to merely a particular point of view concerning the interviews. Moreover, some of the probing questions were also included in the framework. Further, as it has been claimed that questions in a comparative form result more consistent answers than direct singular question (Järvinen and Järvinen 1996, 105), some questions were put into a comparative form (e.g., "*what is a good user like?; a bad user?*"). The pre-planned questions are presented as a matrix in which the columns represent a robust division of ISD into different phases that express the context of the interviews. The rows of the matrix include the classification of question types with respect to descriptive and affective questions as well as to direct and indirect questions. The revised interviewing framework for data collection is presented in Appendix 2.

In the following section I describe the respondents involved in this study.

5.6.2 Selection criteria for respondents

The process of selecting respondents can be described using Patton's (1990, 169) definition of purposeful sampling, together with what is known as theoretical sampling (e.g., Glaser and Strauss 1967, 45-49). A technique used in an approach known as snowball sampling was also applied to some extent (Arber 1993). In addition, the procedure in this study is in accordance with the selection strategy in regard to 'the common person' (Plummer 1995). In accordance

with these principles, a group of 23 Finnish IS designers was selected as potential respondents on the basis of accessibility, commonness, and presumed information intensiveness.

Accessibility refers to voluntary participation; during the initial discussions concerning the research interviews attention was paid to the respondents' willingness to grant the request for an interview. This means that the respondents agreed to be interviewed after they had heard what the research was about, who was undertaking it and financing it, why it was being done, and how it was to be disseminated (cf. Hornsby-Smith 1993). It was also considered important that they were not too busy to be involved in an interview.

Commonness refers both to the respondents and their field of work within current IS companies. The respondents have in common their occupation as an IS designer. Also their educational backgrounds are to some extent in accordance with their profession. In addition, they also work in companies that build applications that are common within the Finnish information industry. These application domains were enterprise network services, Internet services, information security, office systems, group work, health care, and network management.

Information intensiveness means that the respondents presumably possess knowledge and 'know-how' with respect to the topic of the interviews because they have been building IS for users within different domains. I confirmed this property by requesting references on suitable interviewees from my acquaintances and colleagues. In addition, the respondents have acquired their education and work in an area where many educational institutions, local government and companies are promoting the field of IS. Moreover, according to their commercials, company name and web-pages, the company images of the firms in which the interviewees were working appeared as human-centered. Thus, the sites were selected on the presumption that each of them would have a potential for representing a different perspective on the IS-user relationship.

In brief, the respondents meet with common characteristics of an IS professional but are also unique persons with a life history of their own. They are also involved with actual design practices, and thus their views indicate the theory-in-use of current IS work (cf. Argyris and Schön 1987). In addition, they represent a variety of geographical location, age, gender, and educational background or work experience concerning ISD and its application domains. Moreover, their occupational contexts imply different perspectives on the relationship between users and IS as well as on co-operation during the ISD process. Consequently, the respondents are assumed to yield information that is common among IS professionals but every respondent is also supposed to bring his or her unique contribution to the data.

In the following I describe the respondents in more detail.

5.6.3 The respondents

Since a collective or group view is suggested by phenomenography, I interviewed IS professionals who were working in a same ISD project at seven different firms. However, the interviews were individual. The first interviewees were four male designers, one working as a project manager and three others as system experts. The project manager had a degree in computing from a polytechnic and he had been designing and programming applications for 20 years for several different purposes. He was 44 years old. The system experts were 29, 30

and 42 years old. Two of them had a Masters degree in information systems science and economics, another had five years of work experience in IS and computing in both a university and different firms, and the other had eleven months working experience of systems design. The third system expert had been working as a system analyst and a programmer for 22 years after graduating from a high school. They all were talkative, co-operative and seemed self-confident as well as satisfied with their work. All four of them worked in an open-plan office and at the time of the interviews they were building a web-based reporting system as a so-called added value service for their clients to be able to effectively utilise information about their use of a telecommunication network. They were working in a unit specialising in enterprise network services located in Jyväskylä belonging to a telecommunications company employing some 8000 people. The company acts in the mobile, data and media communications sectors and provides services for people both in international and domestic markets.

Secondly, I interviewed three male Internet specialists who were working in a 10-person firm in capital area engaged in developing its customers' tailor-made, business critical Internet economy solutions, and dealing with questions of information security. Their services comprise software projects, consultations and training. All the interviewees were in their mid-thirties. One of them had a Masters degree in electrical engineering and 10 years of working experience in developing applications, for example, for airfield control. He was very articulate and gave me an impression of an extrovert being. Another respondent had a degree in EDP from a polytechnic and had been developing applications over 12 years for numerous purposes both in mainframe- and PC-environments. He was contemplative and at first responded quite cautiously but soon opened up. The third interviewee was a technical student at a technical university and had worked for 13 years as a systems analyst and a programmer. He had also some studies in psychology. He appeared very analytical and reflective to me; for example, he said that he is devoted to problem solving. Moreover, he was one of the two respondents who evaluated the interview after the discussion. This second group of interviewees was also working in an open-plan office with other experts. At the time of the interviews they were building, among other things, an application involving electrical identification of humans. Their other duties included minding client relations because the firm was quite new and was expanding and establishing its circle of customers.

Thirdly, I interviewed three female IS professionals who were working in a big insurance company in the capital region. Two of them were working in an internal IS unit, one as a project manager and the other as a systems designer. The third was acting as a design interactor between the IS experts and the users in the other units of the insurance company. The project in common to these three aimed at building a database application for dealing with farm insurances. The project manager was planning the whole project, the systems designer was designing the user interface of the application, and the interactor was particularly responsible for the accuracy of user requirements. The interactor was 52 years old and had 36 years' work experience including numerous duties; for example, planning different test runs for mainframe computers using punch cards, and designing follow-up systems for operative action as well as evaluating user interfaces. In other words, she was trained-on-the-job to be an IS expert. She was very talkative, experienced, and very enthusiastic about her work. The project manager was 41 years old, had a Bachelors degree in physics and had been working for 13 years in IS development and project management duties. She was a little distant and reserved at first but after the first affective questions on whether

she liked her work she ‘melted’ and responded openly. The systems designer was 45 years old, had graduated from a polytechnic with EDP as a major subject, and had been working five and a half years as an IS designer. At the beginning of the interview she showed some signs of over-politeness in her answers. However, this tendency ceased and it appeared to me that she expressed her sincere opinions.

At the fourth site I interviewed three male CSCW professionals who make up a small firm in Jyväskylä specialising in both designing local area networks and developing groupware applications based on Lotus Notes. One of the interviewees was a 28-year-old managing director of the company, the other 26-year-old system expert, and the third was a 33-year-old trainee from a polytechnic. The managing director was a telecommunications engineer and had designed LANs and Lotus Notes applications for six years. The system expert had a degree in computing from a polytechnic and had been working in the company for a year. The trainee had been working as a building constructor technician before starting to study computing. They all shared two offices, one of which one was used also as the managing director’s office. The managing director was energetic and talked a lot whereas the system expert was quite soft-spoken and discussed his work in an even manner. The trainee appeared sympathetic in that he gave me an impression of a sincere and co-operative person. It appeared to me that they appreciated their area of activity a lot; particularly the managing director seemed to be proud of having the Lotus Business Partner rights. They also obviously worked hard for their company to succeed.

The fifth group of interviewees worked in a small company in Oulu developing IS for health care; for example, a system for maintaining high quality in patients’ self-driven diabetes treatment. I interviewed the deputy managing director and two IS designers. The deputy managing director was a 30-year-old woman who had a Masters degree in economics. She had been working in software houses for nine years in different duties, e.g., customer relations, communications, and also designing IS. She was pleasant and relaxed despite being busy and one of the two interviewees who questioned their expertise concerning ISD. However, I regarded her as valuable as informant as all the other respondents due to her opinions and work experience in the domain of health care systems. The first IS designer was a 33-year-old woman who had graduated from a polytechnic with EDP as a major subject. She had been working as an IS designer, product manager and system manager for nine years. She was a little reserved at first and maybe to some extent defensive: when I asked about her work at the beginning of the interview she blurted out that she was an adherent to the ‘Nokia way of thinking’ as if this was the kind of qualification for an IS designer that needed no further comment. However, we discussed a lot more. The other IS designer was a 40-year-old man who had a Masters degree in computer science and information systems and 18 years of work experience in computing and designing IS. He had also worked in a university as an assistant and an assistant professor. He was congenial, articulate and talked to me for quite a while also after the actual interview. They had their own separate offices in a stylish and modern building.

At the sixth site I interviewed two male IS professionals who were employed by a company with a staff of 1800 located in Tampere and specialising in taking all-inclusive responsibility (hardware, software, and services such as training) for their clients’ IS. The interviewees, a services manager and a project manager, were at the time of the interviews developing office systems for a very big industrial company. The services manager was 32 years old, had a Masters degree in computer science and information systems. He had also

become familiar with usability during his studies. He had ten years' work experience in IS design, programming and training both in enterprises and local government. He had also been working in a university as an assistant and an IS planner. His duties were to initiate projects, clarify users' needs and organise services for meeting these needs. After he initiates a project, a project manager takes over. He was very talkative, alert and gave me the impression of a true 'white-collar' professional. The project manager was 46 years old, had a Masters degree in computing and over twelve years' work experience in six different firms as an IS designer, programmer, and project manager developing systems for, e.g., management of R&D-projects, marketing and technical services. He was pleasant, articulate and forthright in expressing his opinions.

The last two interviewees in the seventh site were selected because they were just about to graduate from different universities and thus they represent in this study the state-of-the-art of higher education within computer science and information systems. They were both 24 years old and worked as trainees in a big telecommunications unit located in Tampere belonging to a very big information technology company. One of the trainees was a young woman who had studied statistics and computing. She had been working in the company for a year. The other was a young man who had studied information technology and had four months of work experience. They were working on a project, which was developing an application for operators in the same company for network management. A particular aim was to improve the way information concerning network status was presented to the users. The young woman was sweet and lively and showed signs of reflecting on the interview since during the interview she gradually became more concerned whether her answers were of any use to me. The young man was analytical and self-confident but easily got frustrated by prompt questions.

Since phenomenographical interviews are interaction between the interviewer and the interviewees, I shall also describe myself in a similar manner as I have portrayed the respondents above. At the time of the interviews I was 39 years old and was a doctoral student in information systems science. I was working as a researcher in a research project called User's Cognitive Resources Evoking Technology funded by the Academy of Finland. I had a Masters degree in information technology and educational science, which partly explains my interest concerning the relationship between the human being and an IS. Before becoming a doctoral student I had worked over ten years, mainly as a planning officer of information technology in the continuing education centre of a university. I have described my research interest and views in this report. I enjoyed travelling across Finland and visiting the different firms in order to meet the IS designers and carry out the interviews. During the interviews I tried to act congenially and not too self-consciously but still paid attention to the flow of communication and the reactions of the respondents and myself. In the next subsection I describe more closely the main points arising in the course of the interviews.

5.6.4 The interviews

The interviews were carried out in April, May and June of 1998. About a week before the face-to-face interviews I contacted the respondents by e-mail and asked them in return to tell me their name, age, education, previous work experience and also give a short description of

their work. In this connection I also introduced myself, my research topic and the theme of the interview. In order to maintain the appropriate context the interviews took place in the respondents' office or in a negotiating room nearby. Before the interviews I aimed to chat with the respondents in order to create a comfortable atmosphere. It turned out that often a good way to create an open and relaxed situation was to share the setting up of the tape recorder with the interviewees, i.e., asking where is the closest wall socket, or whether the interviewee preferred the microphone on the table or somewhere else.

I began the interviews every time with questions concerning the respondent's current work and asked every interviewee all the questions in the framework but not always in the same order. With respect to the particular feature of the phenomenographic interview, leading the respondents to reflect on a certain phenomenon (Francis 1993), I followed the principle of letting the interviewees' response to the opening questions indicate the focus of their reflection and aimed at elaborating this initially emerging view through probe questions like, for example, "*why*?", "*could you explain it a little more*?", "*what exactly do you mean*?" or just giving expectant glances. This strategy was possible since the respondents turned out to be talkative.

Probing was also important because I wanted to be sure that I had understood the respondents' expressions in a way they regarded to be correct. Moreover, I paid attention to probing because it was needed to ensure that the respondents reflected on my questions. With some of the respondents the conversation continued after the actual interview and if something important emerged in these conversations I made notes of it in my research diary. These and other notes important for the study support the analysis of the data.

The interviewees' statements were surprisingly similar in regard to some issues already in the first three interviews. After conducting ten interviews the respondents' answers appeared to follow quite similar lines. Yet I interviewed 20 designers in order to ensure that there were no new topics or elaborated views in the respondents' utterances. In this way three of the designers that were selected as potential respondents were left as a 'reserve' of interviewees.

The duration of the taped interviews was usually a little over an hour but the shortest took about 40 minutes and the longest about 90 minutes. The transcripted data consist of approximately 350 single-spaced pages. In the following section I describe the principles and procedures for analysis of the data.

5.7 Data analysis

In phenomenography, the categorisations are made from those utterances by which human beings describe their perceptions, experiences and concepts. These utterances result from a process by which an individual gives meaning to a certain phenomenon. Meaning is then created with the aid of the two aspects of phenomenography: the structural and referential aspects. These aspects express the intentionality of phenomenography: human thought is always directed to something in a certain way.

Essential with respect to analysing data is that in order to categorise the respondents' utterances they must be understood in terms of intentionality. That is to say, to understand the subjects' whole mental acts, and to categorise their utterances depicting these mental acts,

both aspects constituting intentionality must be understood (Järvinen 1999, 48). This is corroborated by Uljens (1993), who points out that the object of thought (what-aspect) may concern many different things, this yet having no definitive implications as such. Respectively, without incorporating the how-aspect within the analysis of data, the meaning of the mental act in question does not become evident. This means that in order to be able to analyse the data one should first know the underlying assumptions for defining how individuals' thought becomes directed to a particular object. In other words, what kind of phenomena become objects of thought, and which would then indicate where to look for the meanings within the data. In this way the referential aspect of the conceptions are found. Then it is possible to analyse the how-aspect of the conceptions.

However, phenomenography does not offer a theoretical explanation as to the content of the object of research as, for example, post-modern social theory does by offering various theoretical positions for defining identity and how it is constructed in social life (e.g., Taylor 1989). Instead, the object of research in phenomenography is people's conceptions irrespective of the source they stem from. Empirical subjects are only interesting as exhibitors of varying forms of thought (Uljens 1993). This means that the phenomenographical aspects of a conception may concern many different things, e.g., people, cultural artefacts, action, contents of an individual's consciousness, or whatever the human being is able to be conscious of. Yet it is assumed that the meaning of the conceptions must be understood in terms of intentionality indicated by the what- and how aspects that are attached to a particular phenomenon. In case that the researcher's and respondents' views of the phenomenon in question differ, and the researcher does not consider it as appropriate to lead the interviewee to reflect on particular phenomena but aims at avoiding questions which prompt the respondents to try to see their experiences through the eyes of the interviewer rather than through their own, this may be a problem. As was indicated by the pilot study, it would be simplistic to presume that the topics that the researcher introduces during the interviews would become the content of the respondents' thoughts in a similar manner. Respectively, the meanings in the data cannot be categorised mechanically according to the connections between a concept in a question and in an answer.

In this study, this problem is solved in such a way that the analysis of the data begins by creating a coding paradigm, which facilitates the identification and categorisation of the meanings in the data (Glaser and Strauss 1967, 46; Tesch 1990, 87; Strauss and Corbin 1990, 68-69). This was necessary since at first the data seemed to me to be permeated by meanings that appeared as strange understandings. To me it seemed as if the focus of the designers' reflections was predominantly on something that would not be associated with my a priori predisposition concerning the qualities of the human being. In phenomenographical terms, it seemed as if the internal horizons of the IS designers' experiences were something else than I had assumed. For this reason, the first 'step' in the data analysis was to make myself familiar with the data by forming an understanding referred to as a coding paradigm. This procedure is in conformity with Uljens (1993), who states with a reference to Merleau-Ponty (1962, xvi) that we must not wonder whether we really perceive the world. Instead, we must think that the world is what we perceive. So, I established the coding paradigm by reading the interview transcripts with the aim of understanding the meanings in the data. In addition, this initial understanding referred to as the coding paradigm was influenced by the way that intentionality is understood in ISD. For this I used the IS literature in order to ensure that all

the meanings in the data could be found, as is the purpose in phenomenography (because it is interested in finding a qualitative *variation* of conceptions).

As pointed out earlier, an essential principle regarding the intentionality of conceptions is that conceptions are context-dependent and every experience is described in content-loaded terminology (Säljö 1994), i.e., the descriptions are carried out in terms of the nature of the situational experiences in question. In particular, people's conceptualisations are not detachable, either from their context or the content of the task at hand (cf. Uljens 1993). Therefore, the initial referential aspects should be looked for in accordance to the way that intentionality appears in the context domain of the study in question. Consequently, the context-dependent meanings are to be found in accordance with the underlying assumptions concerning the intentional nature of ISD. In addition, since it is assumed in phenomenography that the meanings of the respondents' mental acts exist in the data and are constitutive of the data (Walsh 1994), the way meanings are understood in this study should also be in accordance with the types of intentionality existing in the data. Therefore, I aimed at reading the interviews with an open mind, i.e. bracketing away my own preconceived ideas of what the IS designers' views might be like (Francis 1993), but letting the analysis be informed by the way that intentionality of ISD is seen in the IS literature, which reflects on the underlying assumptions of ISD. This was necessary in order to ensure that all the meanings in the data could be found, and anything relevant would not be left out of the analysis.

First, the data includes utterances that describe various actions and objectives concerning ISD. These expressions indicate intentionality as defined by Hirschheim et al. (1995, 16). They state that *"IS development is intentional, to the extent it reflects a planned change. It is based on developers' intentions to change object systems towards desirable ends"*, and continue (1995, 17) *"intentions in systems development are expressed by objectives. These are related to general value-orientations and represent what 'one ought to do' or 'what is good'."* From this it can be concluded, in the first place, that intentionality in ISD is expressed by intentional action. That is to say, IS designers' descriptions of the actions and means that they are involved with when developing an IS reveal the meanings they give to the phenomena that they deal with concerning ISD. This notion is in accordance with the principle of contextuality in phenomenography, which denotes that people's conceptualisations are not detachable, either from their context or the content of the task at hand. This notion also reinforces the interpretative nature of phenomenographical analysis in that the researcher must see the designers' action as inherently meaningful (cf. Schwandt 2000, 191). In the second place, as Hirschheim et al. (1995, 17) point out, intentions are expressed by objectives of ISD. Consequently, it is an appropriate way to define that the way the IS designers understand the human being as a user of an IS is revealed through descriptions in which the respondents' focus of reflection is on the objectives of ISD. That is to say, in addition to the actions and means that the designers refer to, the IS designers' intentions to change object systems towards desirable ends reveal the meanings they give to the phenomena that they deal with concerning ISD. These desirable ends or objectives represent the things that are regarded most important in ISD. In this way the IS designers' descriptions of action, means and objectives also implicitly indicate value orientations included in the process of ISD. Therefore, the described actions and objectives represent the things that are regarded important, and thus reveal the referential aspect in terms of intentionality as an implied value orientation. This means that the initial referential aspects of

conceptions may be found in utterances in which the designers refer to their way and means of building systems, and the objectives of their actions.

Second, the data includes descriptions in which the respondents' thoughts are attached to human objects. These descriptions of people indicated human features and also value orientations towards people. In this way these expressions are in conformity with the notion of intentionality as a value orientation. Often these descriptions also included expressions which indicated emotionally toned reactions. These kinds of expressions within the data indicate intentionality that is in accordance with Järvinen (1999, 48) and Uljens (1991), who state that the process of qualitative individuation of a mental act has been done when an object and a psychological mode referred to as an attitude is shown. In other words, how a particular object of thought is experienced denotes the respondents' attitudes towards the phenomenon that is being reflected on.

In brief, the inherent meaning of an utterance may be seen as the correlation between the what- and how-aspects in that they are not detachable from each other but are interrelated in a particular logical way indicating what a particular phenomenon is, in what it is revealed, and what kind of values and attitudes are related to it. As described above, the search for the meanings in the data, i.e., data analysis, was initiated by establishing a coding paradigm, which suggests that the meanings in the data are found in utterances in which the designers refer to their actions, means, and objectives concerning ISD, as well as to human characteristics. In this way the first reflection on the data indicated that in the data there were both implicit and explicit meanings in regard to the a priori assumption concerning the nature of the human being. Because there are no 'right' or 'wrong' conceptions in phenomenography, all these expressions were incorporated into the pool of meanings formed by the data (cf. Marton and Booth 1997, 133). After making myself familiar with the data in the way described above, I proceeded with the analysis by forming initial categories of descriptions as is described in the next section.

5.7.1 Analysis procedures

In the above-mentioned way I first explored the data by reading through the whole data in order to find all aspects of the respondents' conceptualisations. Then I created an initial categorisation based on the objects of thought expressed by the interviewees. In this phase the practical handling of the data by, for example, turning dozens and hundreds of pages back and forth in order to compare the different expressions, turned out to be awkward and I implemented a piece of software developed for qualitative analysis. In the next subchapters I depict how the analysis was accomplished after employing ATLAS.ti –software (cf. Muhr 1995, Strübing 1997).

After forming the initial categorisation in regard to *what* the designers referred to when describing human features, my aim was to search for variation in the designers' statements. In this phase the focus of analysis was on the meanings in single statements and the surrounding statements, and the data as a whole. The analysis required several iterative processes including comparisons and crosschecking between the emerging categories. I used ATLAS.ti for browsing and retrieving the data as well as searching for meanings which I selected as text segments and coded in accordance with the meaning. These procedures were involved when I

- still basing my work on the aim of describing a variation of different ways of conceptualisation, looked for both similarities and differences within the data in regard to the previously found initial categorisation, which was modified and reconstructed in the course of the analysis. In addition, I found the different sorting and printing options in ATLAS.ti very handy. For example, an option for printing the meanings by code was useful when checking the consistency within a particular category and comparing it to another categories. In order to get an idea of the whole data an useful option was to print a matrix with primary texts by codes which shows the codes and their number indicating different meanings in the whole data and in each primary text (interview). A holistic view of the data was needed because analysis of the data is a discovery process which tries to incorporate all aspects of the data, attempting a holistic account of the ways of understanding the phenomenon in question as a collective habit of conceptualisation. These two above-mentioned procedures well illustrate at a practical level well the nature of the phenomenographical analysis process that I was involved in. In particular, I did not use the advanced functions of the software for automating the creation of the categories of description but used the software to support my own thinking.

In a subsequent phase, I analysed the prevailing categories of description in regard to *how* the designers depicted humans. The focus in this phase was on how the interviewees delimited and organised what they conceived as the human being. In particular, the parts of each category of description were contemplated with respect to the whole of the category in question in order to differentiate between the less advanced conception, which has fewer parts, and from the more comprehensive conceptions, which have more parts. In this way the focus of analysis was on the interdependent meanings of the more and less comprehensive conceptions. During the analysis, these interdependencies emerged both as expanding a particular meaning into another level of understanding (Marton and Booth 1997), and also as revealing contrasting polarities within a same dimension (Strauss and Corbin 1990, 70), thus rendering the conceptions' structural aspect on a same level of understanding. That is to say, the analysis aimed at establishing the different levels of understanding within the data. Again, the analysis was an iterative process including comparisons and cross-checking between the emerging categories. The categorisation was abstracting rather than merely abstract because it has the character of selecting and organising the data and not just describing the content of the data on a more general or abstract level (Svensson and Theman 1983).

In this way the different levels of understanding in phenomenography differ from, for example, the different analysis levels in discourse analysis (cf. Alvesson and Karreman 2000). In phenomenography the idea of forming different levels of understanding signifies a developmental trajectory of understanding concerning a certain concept by focussing also on the relationships between different conceptual levels. Renström (1988, 218) illustrates the phenomenographical representation levels of interpretation of data as a continuum of distinct but associated categories which also uncovers the relationships or transitions between the categories of description (see Figure 8 below).

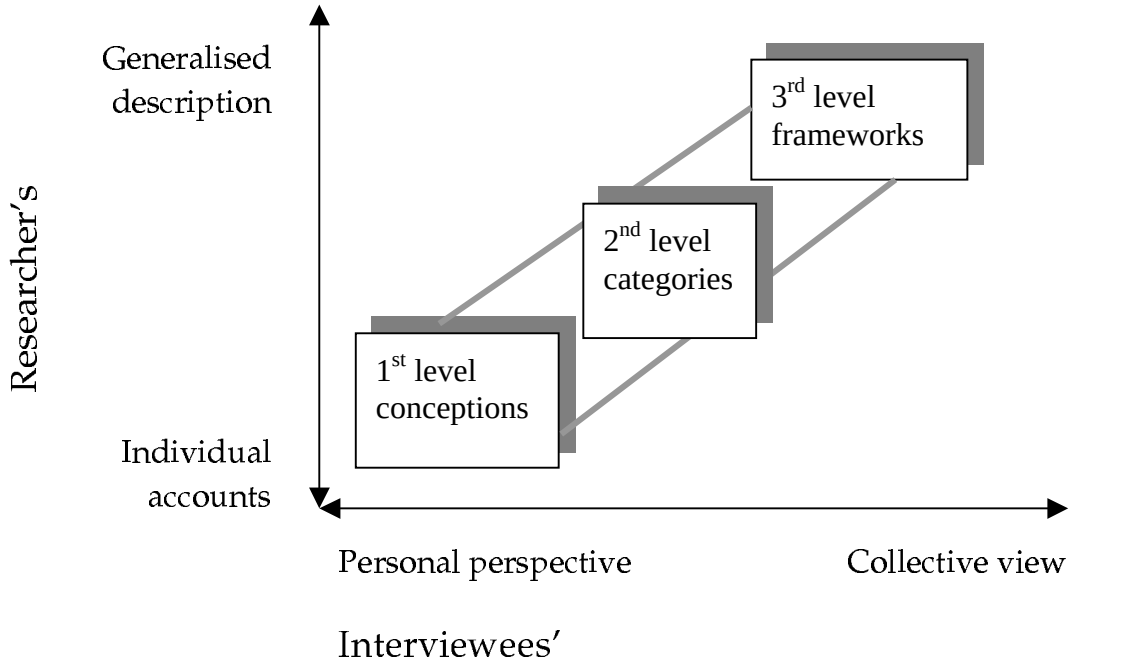

FIGURE 8. Representation levels of data interpretation in phenomenography (Renström 1988).

In comparing the meanings during the phases of analysis, I aimed at forming non-overlapping categories. Thus, in contrast to some qualitative approaches such as grounded theory (Glaser and Strauss 1967, 105), I was able to assign one meaning only to one category based on one or more distinctive features with respect to the what- and how aspects of the meaning. In addition, by categorising the meanings in relation to the whole data, not to the individual interviews, I aimed at creating categories which reflect the essence of the IS designers' view of the human being as collective habits of conceptualisations. This procedure is due to the phenomenographical assumptions concerning conceptions: on the one hand, human consciousness has no permanent content, and on the other hand, the meaning of a conception is context dependent. Thus, during the interviews, when the respondents' thoughts were stimulated with a question framework that referred to different contexts concerning the situations of ISD actions, they expressed various meanings in relation to the different situations that emerged in their minds. Therefore, instead of creating categories based on an individual respondent's conceptions as wholes, in the way pictured above I created a categorisation where individual respondents' expressions were categorised to the same category, or to different categories depending on the content of the meaning in relation to the whole data. In this way, the analysis results in categories of descriptions which fulfil the phenomenographical aim of revealing a particular phenomenon's collective, intersubjective meaning (Marton 1981, 180). This made it possible to both maintain the comprehensive descriptive presentations of the specific contents of the conceptions and form categories of description which yield a more general level of different conceptions within the IS designers' community of practice (cf. Figure 8).

In the following chapter I discuss the results of the analysis, i.e. the categories of description expressing the qualitatively different ways that IS designers conceptualise the human being as a user of an IS.

PART IV: RESULTS

In this chapter I present the IS designers' conceptions of the human being which result from the analysis of the data collected in this study. As noted before, in this study the conception of the human being is understood according to the physical, organic, mental, social, and cultural modes of being and their implications for human behaviour and characteristics. These human features are seen to form behavioural affordances that are regarded as important issues of design in contemporary ISD. The focus of this study is how the IS designers see the human being as users of IS. This refers to the understandings inherent in different situations of ISD with an emphasis on the way that the designers conceptualise humans as parts of an object system.

In my interpretation, 18 qualitatively different conceptions of the human being emerged from the IS designers' descriptions. Within each conception, it is possible to distinguish essential characteristics with respect to the what- and how-aspects of a conception. A characteristic indicating the what-aspect is the referential aspect of a conception, and the structural aspect of a conception signifies the how-aspect. The degree of partialness of each conception is formed by the structural aspect and appears within the boundaries of the internal and external horizons of the conceptions. Conceptions often appear in an associated manner: the more developed conceptions tacitly imply the understanding of the more partial conceptions. However, both the referential aspect and the structural aspect indicate the qualitative variation of the conceptions.

Respectively, I present the conceptions as forming different layers of understandings. The first layer consists of dimensions comprised of descriptions which emphasise the IS designers' focus of reflection when conceptualising the human being. The level of representation is then on the first level, i.e., on the categories formed from the interviewees' conceptualisations with respect to the what-aspect of conceptions. The second layer is comprised of abstracted dimensions concerning the structural aspects and, thus, it highlights three distinctive but hierarchical forms of thought within the IS designers' conceptions. The representation is then on the level that reveals the collective conceptualisations of the IS designers in regard to the how-aspect. The third layer reveals the way that individual designers embrace the previous two layers. The representation concerns then the individualised forms of thought which highlight what each designer conceives as the human being as a user of IS in relation to how she conceptualises those humans. That is to say, these forms of thought express the third level between the general intersubjective level and the individual's own level, a level of personal modes of thought in regard to the collective habits

of conceptualisation. These above-mentioned layers are comprised of 18 conceptions, which are presented as distinctive but associated categories of description. The way each conception and its characterising features form a layered, but also two-fold meaning structure concerning the IS designers' conception of the human being as a user of an IS is presented in summary form in Table 1.

TABLE 1. Summary of the IS designers' conceptions of the human being.

	What ↓ / How →	Separatist	Functional	Holistic
Context-centred	**Technology**	***Conception 1:*** The human being displaced by technology	***Conception 2:*** The invisible human being	***Conception 3:*** The human being reflected in technology
	Work	***Conception 4:*** The human being as a job title	***Conception 5:*** The human being behind the process of work	***Conception 6:*** The human being as an organisational learner
	Business	***Conception 7:*** The human being as a market	***Conception 8:*** The human being in terms of cost-effectiveness	***Conception 9***: The human being as a satisfied client
Human-centred	**Knowledge**	***Conception 10***: The technology-illiterate human being	***Conception 11***: The human being as an active knower of computers	***Conception 12***: The knowledge sharing human being
	Emotion	***Conception 13:*** The computer-anxious human being	***Conception 14:*** The techno-enthusiast human being	***Conception 15:*** The emotionally coping human being
	Self	***Conception 16:*** The human being through the physical self	***Conception 17:*** The human being through self-activity	***Conception 18:*** The human being through the feeling of self-efficacy

The vertical columns in the table show the first layer that emphasises the focus of the designers' reflections as descriptive presentations of the specific contents of the conceptions. The horizontal rows in the table delineate the different forms of thought that put more stress on the structural aspect of the conceptions. The categorisations are based on analytical distinctions in that the different aspects of conceptions are intertwined with each other so that the more comprehensive forms of thought tacitly imply an understanding of the more partial forms of thought.

Within the resulting conceptions the IS designers' reflections are focussed on both context-centred and human-centred issues. The context-centred conceptions indicate an indirect understanding of the human being. Then humans are seen through other facets of an

IS, its environments, or through the objectives of ISD. The human-centred conceptions denote a direct understanding of the human being and adduce explicit human features in the IS designers' conceptualisations. In the expressions associated with the context-centred conceptions the focus of reflection is on technology, work, and business. The human-centred conceptions deal with knowledge, emotions, and designers' selves. All the 18 conceptions indicate also three different forms of thought. These forms of thought appear as separatist, functional, and holistic understandings of the human being as a user of IS. In the following I describe the resulting conceptions further by first introducing the layer that reveals the designers' reflections as descriptive presentations of the specific contents of the conceptions. Second, I represent the second layer, which refers to the different forms of thought that put more stress on the structural aspect of the designers' conceptions. Third, I describe the third layer which signifies the IS designers' individualised forms of thought.

6 The first layer: The ingredients of the human being

In this section I describe the emerging conceptions at a level that reveals the personal accounts of the respondents. In so doing, I draw on the designers' utterances to lay out and support my interpretation. In addition, I delineate each conception against the analytical distinctions of a conception in order to highlight the connection between my interpretation and the method deployed. First, the context-centred conceptions are described, and second, the human-centred conceptions. The context-centred conceptions are referred to as technology-centred, work-centred and business-centred conceptions.

6.1 Technology-centred conceptions

In this section the IS designers' technology-centred conceptions are depicted. Common to these conceptions is that they are focussed on technology. The conceptions differ, however, in terms of the remoteness of the implied IS-user relationship as well as with respect to the characterised human features. These conceptions are referred to as the human being displaced by technology, the invisible human being, and the human being reflected in technology. These conceptions are further delineated below.

6.1.1 Conception 1: The human being displaced by technology

The most characteristic feature of this conception is that in the expressions associated with this category the human being is excluded from the designers' reflections. Instead, the designers' thoughts become geared towards technology. The following discussion between the researcher and a designer illustrates this kind of train of thought:

R[3]*: "You mentioned earlier that from the point of view of the users' needs your product is sort of a compromise. Could you explain what kind of needs you were thinking of when constructing this compromise?"*

D16: "We collected requirements and wishes from a certain number of customers and constructed a list of requirements. On this basis we then carry out these things [ISD].

R:" What are these requirements and wishes like? Could you tell me more about them?"

D16: "Well, because it is a question of - let's say - a feedback channel that our company offers as a product to its clients, it means that if the client purchases, for instance, a datanet-based customer network, they have datanet and router accesses through which they operate between their networks and use the whole telecommunication network. Then there are a lot of this kind of usability issues, response times and load percentages, or in a way, how it [telecommunication network] *sort of behaves, what happens there."*

In the above interview extract the designer considers the customers' needs as a piece of software – 'a feedback channel' – and the emerging main point is how this software works with the functions of a telecommunications network. The designer's train of thought becomes focussed on technology instead of on human-centred issues, such as how the software is built in regard to the humans that use it. In this way the internal horizon in this utterance is telecommunications technology and the external horizon is the system that the designer in question is building. The human being remains as a non-existent subject of thought. This kind of tendency to conceptualise humans as being displaced by technological issues is frequently implied in extracts in which terms with at least a two-fold meaning - a human-centred meaning and a technological meaning - are understood as technical in meaning:

R: "What is usability in your opinion?"

D4: "Usability is...the first term that comes to mind is that when you're making this system, usability is the time that a certain system accessible."

R: "What, to your mind, is most important in information systems development?"

D6: "Surely the most important is the architecture under the system, it should be solid and the kind that it is good to build an application on, and when it's good it is easy to build an application that functions well and is easier to maintain."

R: "What is most important in implementation, in your view?"

[3] I use the abbreviations *R* for researcher and *D[number]* for designer for reasons of anonymity promised to the respondents. I have translated the quotations from Finnish into English, and they have been language checked.

D19: "In implementation, I think that usually - if you think from this information processing point of view - the most important things are technical things, such as errors in the new software."

R: "If we think of the situation when you're building a system, so for whom do you think you're making it?"

D14: "If we speak about realisation, making a program, so it is made to meet a certain specification, I am doing it as a commercial job, so that the specification is the one I am comparing it to, if there is a mistake made in the specification, so the designer is not going to correct it at this stage...this structured phase model is just based on the idea that you cannot go back to your roots but some matters must be fixed finally in a certain phase in order to get the process moving."

To put it briefly, in the utterances assigned to this category of description the designers' scope of thought is limited to technology. They do not use any expressions that would refer to human characteristics. Rather, they consider the tasks of ISD, such as requirements analysis, usability, systems implementation, ISD in general, and programming, solely as issues that concern only technology, such as program code, program specification, systems architecture, methodology, and the functions of telecommunication networks. That is to say, the structural aspect of the IS designers' experiences of building systems for people concern how technology and its various components are delimited from and related to ISs development. Therefore, the referential aspect indicates the meaning of this conception as the human being displaced by technology. The meaning structure of this conception is illustrated in Figure 9 below.

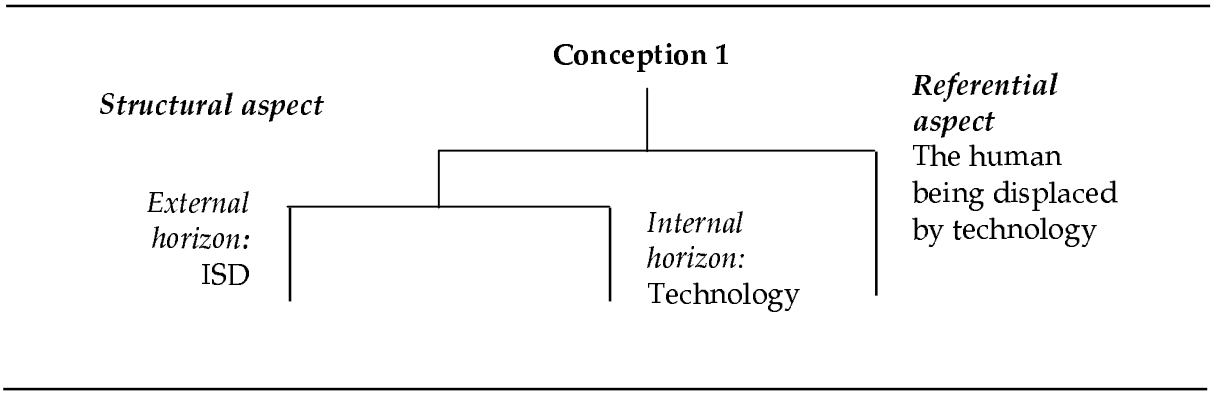

FIGURE 9. The meaning structure of the first conception.

With respect to the IS-user relationship the meaning structure of this conception indicates that the boundary between the human being and technology is blurred to an extent that humans are understood in terms of technology. This notion was also explicated by a designer who lamented after an interview: *"Why did you ask about a user if you wanted to talk about the human being, the term user refers to electronic data processing and directed the interview to technical issues"*. This corroborates this conception by suggesting that the

traditional term ‘user’, which is meant to refer to human beings in the context of IS, has transformed into a predominantly technical term.

6.1.2 Conception 2: The invisible human being

In contrast to the first conception, within the expressions combined in this category of description, the human being is depicted as a user of IS. However, technology is still the main point and the human being is understood as an insubstantial actor without any explicitly defined characteristics of her own:

> *R: ”If you think of a situation when you are creating an application, for whom do you think you’re making it?”*
>
> *D16:”Hm…..”*
>
> *R: ”Do you think that you are making it, for example, for some firm or for people?”*
>
> *D16: ”I’m making it for people, at least I think I’m doing so.”*
>
> *R: “Do you think of certain types of people or how does it show that you make it for people?”*
>
> *D16: “I don’t think of particular types of people but I think that the human being is in some sense always a part of the system. If it is a system that has a user interface so there must be somebody who uses it. Even if it is a system that runs by timer initiation, there must be a user interface, too, for setting the timer parameters in the system, so there must be somebody to use it, too. To my mind there is always someone using the systems, they* [systems] *are not fully automated.”*

A typical way of conceptualising people within this conception – as in the above extract – is to think that there is a user who uses a system. Yet the user is not characterised further but is assumed just to use the system. The focus of reflection is on technology, the system, which is used by the insubstantial user. Respectively, the relation between people and IS is depicted but is seen as not including any features emerging from human characteristics. IS are considered as tools which have no other connection to humans than an instrumental one, without any further implications for the IS-user relationship. This is often implied in explanations in which the system is emphasised to be a tool. Within these utterances the word ‘tool’ is used to imply that there is somebody using the system, though the user is not portrayed further. Yet what should matter is how humans use the tool.

In some cases the possible relation between human characteristics and the tool is explicitly denied:

> *D2: “There are a lot of people for whom it* [IS] *is just a tool. They feel that the software does not have to do a lot, just the specific thing it is a tool for.”*

R: "Do you think that an IS has implications for people's work?"

D17: "If one thinks about working in general so the IS is a tool in computerised work. Then there are these other things like atmosphere, other work, interaction with the customers, speaking on the telephone, and such like. There are a lot of different things but I think that we are making a tool, the system is just a tool, nothing else."

In brief, in this conception the internal horizon is an IS, and the external horizon is the disembodied use of that technology. The structural aspect concerns how an information system as an instrumental tool is delimited from and related to the use of the system (Figure 10). Because of the way that the use and the system are related to each other in this conception, it lacks descriptions concerning the users, and as a result the conception is centred on an instrumental use of the system. In this sense this conception is functional: the human being is seen to use the functions of the system but human characteristics are not connected to use. This conception expands on the first one in that the user is taken into account but nonetheless without a full human substance. Similar to the first conception is that the internal horizon is conceptualised as technology.

The meaning structure of this conception reveals an understanding according to which technology is the main point and the use of that technology is neutral. That is to say, the use of technology is seen without any behavioural meanings emerging from the physical, organic, mental, social or cultural modes of the human being. In contrast to the design approaches which aim at constructing the system as invisible (e.g. Norman 1998), within this conception the user is understood as invisible. Therefore, the referential aspect of this conception is the invisible human being.

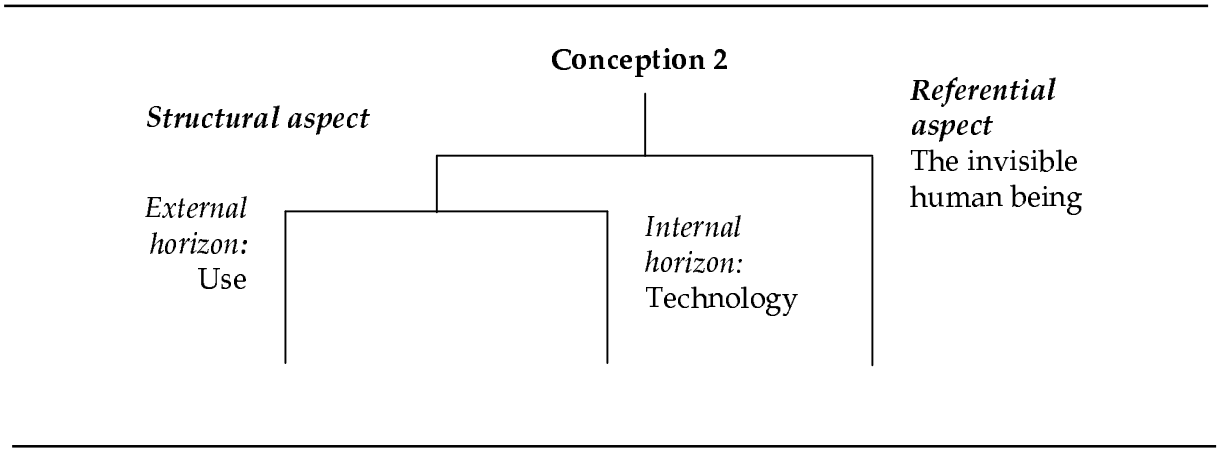

FIGURE 10. The meaning structure of the second conception.

6.1.3 Conception 3: The human being reflected in technology

As in the two previous conceptions, the focus of the designers' reflection within this conception is on technology. However, unlike in the two preceding conceptions, in this third conception human characteristics are depicted, even if not in people but in technology. IS are

considered to include human features such as intelligence, human-like figures or avatars, and socio-cultural features. These features are seen, on the one hand, as inherent structural parts of the system, and on the other hand, as conveyed by the system. Within understandings according to which human characteristics are structural parts of IS, technology is often depicted as intelligent, and thus capable of imitating human reasoning:

> *R: "What, to your mind, is the factor in them [systems] that users prefer?"*
> *D2: "It's that you don't have to do everything by yourself but the system could be like an artificial intelligence, kind of, so it could realise in some way what you're thinking."*

Another way to conceptualise human characteristics as a part of the system is to describe a system's outward appearance – usually the user interface - as resembling people:

> *R: "What kind of user interface do you think that people would want to use?"*
> *D4: "I strongly believe that 3D interfaces are coming. They could offer kind of human-like facial features as agents, which would bring a human sense to the systems. The third dimension could also be utilised so that interfaces become tangible and accessible."*

IS are also seen to convey human characteristics, such as different ways of communicating, and differences in culturally rooted types of action. A common way to conceptualise IS to convey human characteristics is to describe computer-mediated communication. In an illustrative extract below the designer is depicting users' needs in terms of communication. However, the focus of reflection is solely on technology. The differences in communication become evident as dissimilar document templates, keyboards and communication devices. These kinds of conceptualisations lack descriptions of how the technological devices support human features of communication, and thus, the human way of communicating remains without its actual substance, and technology is seen to convey communication in terms of different devices. Within these kinds of conceptions, the structural aspect deals with how technical objects are delimited from and related to communication. Yet the order of appearance is that the internal horizon is technology, and the external horizon is communication:

> *R: "Could you define further what you mean by users' needs?"*
> *D7: "At present we are replacing and adapting a version of Microsoft Office and in this project making an easy system from the end-users' point of view is quite easy to accomplish. There are prepared document templates for different use situations, so one doesn't have to create them separately. So, for example, if one wants to make a memo, there is a document template already available* [in the system]. *Some settings may vary though in different cultural areas, for example, in Europe the standard size of a sheet is A4, whereas Americans have a document format of their own. Also some variations are due to different symbol systems* [keyboards], *and there are also differences in the predominant means of communication. In some cultures fax is the most used means of communication,*

but in Scandinavia the e-mail culture is very intensive. These kinds of issues create the factors that need to be looked at."

In an exceptional utterance technology is seen to convey different culturally rooted types of action. In the extract below, the designer is criticising methods of ISD for forcing all the designers in a multinationally operating firm to design systems in a way that is typical of German designers. In addition, the designer depicts the implications of the design manner for the systems that are built. The culturally different types of action are seen as inherent to technology, particularly in a methodology. The internal horizon of this understanding is how the method is related to the systems that are built, and the external horizon is a difference in a cultural human feature described as preciseness:

R: "Do you prefer to build tailored systems or other systems intended for more general use?

D14: "I have always worked on tailored systems, I have not been doing product development or involved with this newest craze, the installation of package systems. So I prefer making tailored systems. I think that the zing in doing this is the interaction with people, or at least it has been so. Nowadays it sometimes seems that the methodology is guiding the work more than the customers' wishes."

R: "Do you see that kind of progress going on?"

D14: "Yes, it's due to the fact that at least the bigger firms are acting multinationally and have several offices around. Then a package method is the key to common systems. This means that systems are not tailored as multilingual and multicultural. Instead, German precision, like SAP/3R, is embedded everywhere."

In summary, within the expressions related to this category of description, the designers' focus of reflection is on technology. Unlike in the previous two conceptions, within this conception human characteristics are explicitly described as properties of technology. The structural aspect of this conception refers to the way technology and its various forms are delimited from and related to human characteristics (see Figure 11 below). Therefore, the referential aspect is the human being reflected in technology. In this way this conception is the most comprehensive among the technology-centred expressions within the data. In the following section the work-centred conceptions are described.

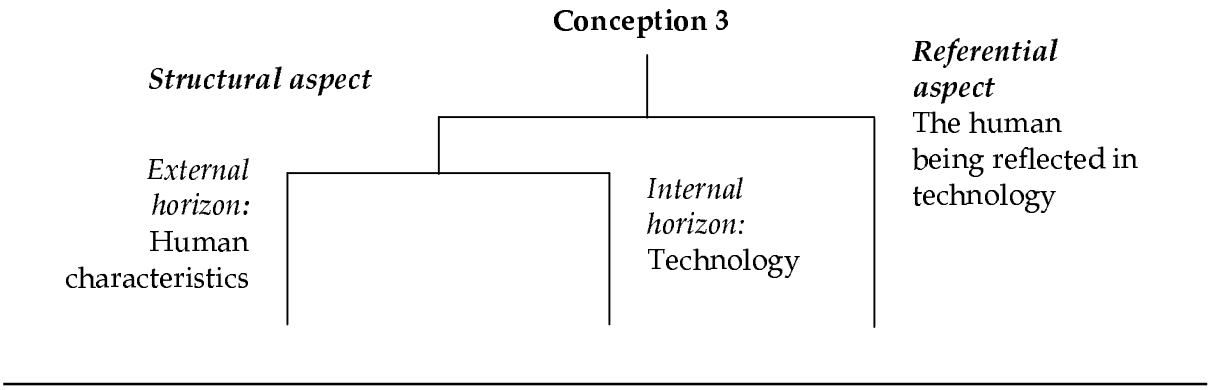

FIGURE 11. The meaning structure of the third conception.

6.2 The work-centred conceptions

In this section the IS designers' context-centred conceptions of the human being are described further by introducing the conceptions that are centred around work. Common to these conceptions is that in their conceptualisations the IS designers focus on work, either as work tasks or organisational processes. The conceptions are dissimilar in their degree of integration between implied human activity and work which is seen to relate to IS. The conceptions are referred to as the human being as a job title, the human being behind the process of work, and the human being as an organisational learner. In the following these conceptions are described.

6.2.1 Conception 4: The human being as a job title

The most characteristic feature of the utterances within this category of description is that the IS designers conceptualise individuals by job titles but do not discuss actual human behaviour. They depict human action and job titles as separate entities, either implicitly by omitting explanations of human behaviour or explicitly by understanding them as different things. The following discussion between the researcher and a designer illustrates an explicit way of understanding human action and an occupation as separate issues:

> *D15: "There are marketing and management staff and then of course EDP staff, they are two which are very clearly separate, they are a different kind of people."*
>
> *R: "What kind of differences have you noticed in them?"*
>
> *D15: "In any case, they work in different places and in totally different ways, and they are not necessarily even familiar with each other even though they are from the same firm."*
>
> *R: "What is the most obvious difference in their way of working?"*

D15: "I don't think it is in their way of working. Both of them certainly do their best, so it's not there, but the work of course is different in that one of them looks at it from the point of view of marketing and management, and the other from the EDP viewpoint."

In the above extract the designer considers the job title of the people in question as the most significant characterising factor of humans. Thus, the focus of reflection is a job title. The actual behaviour and actions of people remain as insignificant issues. Within this conception, the structural aspect concerns how job titles are delimited from and related to particular employees' activities. In this way the internal horizon of the conception is the job title and actual human action remains as the external horizon. This kind of predisposition is frequently implied also in utterances in which the job title clearly emerges as the most characterising feature of humans. However, no descriptions of human behaviour are added to the characterisations:

R: "Do you think there are any common features in those humans for whom you have built systems?"

D16: "They are kind of functionary types...yes, a functionary is a common feature amongst them."

R: "What is a skilful user like, to your mind?"

D11:"…Skilful user...now again I have the difficulty in grasping whether I think of an end-user or a computer support person or a sales person."

R: "How do you think people are disposed to new software or a computer?"

D1: "Certainly in a great variety of ways, it depends so much on the occupation of the person."

In brief, within the expressions associated with this category of description the IS designers' focus of reflection is limited to job titles. They do not bring out expressions that would indicate understandings of human behaviour. Instead, they consider the job title and occupation to be the most characterising feature of the human being. Therefore, the structural aspect of this conception refers to the way that humans' job titles are delimited from and related to the people (Figure 12). In this way the referential aspect of this conception is the human being as a job title The meaning structure of this conception also implies a separatist conceptualisation of the human being: the job title is seen as a separate entity from human behaviour to the extent that human features may be understood as a job title.

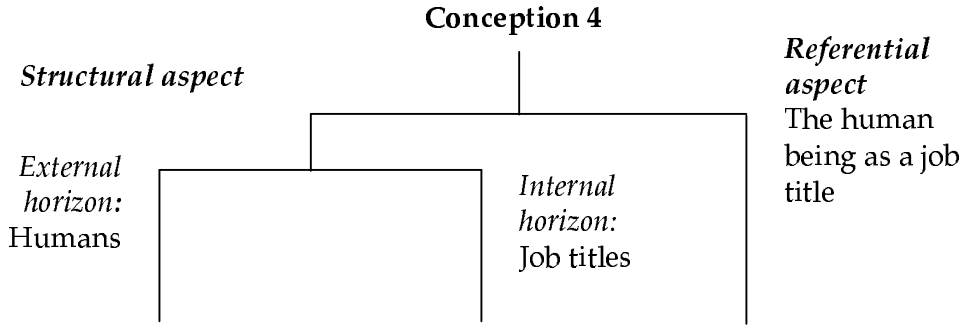

FIGURE 12. The meaning structure of the fourth conception.

6.2.2 Conception 5: The human behind the process of work

In contrast to the previous work-centred conception, within the expressions included in this category of description the human being is depicted as part of a work process. Humans and the process of work are seen to intertwine with each other. However, work is still the main point and the human being is referred to as an inconsequential performer of work tasks, without any explicitly defined characteristics of her own:

> *R: "What is usability in your opinion?"*
>
> *D14: "That the system supports the smooth progress of the work tasks. For example, like in the case of a telephone salesperson, it must be possible to go ahead with the tool like the normal telephone salesperson's work proceeds, you can move ahead as you take the phone call forward and the system gives you tools with which you can answer the client's questions."*

A typical way to describe humans within this conception – as in the above extract – is to depict different kinds of work processes both from the point of view of an individual's work or organisational activity. Yet the people performing the tasks are not characterised further but are presumed just to use the system according to the task flows. The focus of reflection is on the process of work in which people are insubstantially intertwined. The behavioural aspects of people remain as insignificant issues. Within this conception, the structural aspect concerns how work processes are delimited from and related to employees' activities. In this way the internal horizon of the conception is the process of work and human action remains as the external horizon. These kinds of understandings are frequently implied also in expressions in which the process of work clearly emerges as the most characterising feature of humans. Yet no descriptions of human characteristics are added to the portrayals:

> *R: "What is a skilful user like, to your mind?"*

D7: "Concentrates on finding the essential, that is the work tasks, and does not pay attention to inessential details."

R: "How would you define users' needs?"

D8: "They consist of the utilising organisation's needs at all levels, beginning with what the people need in order to continually do their work tasks, and ending with the things that the organisation expects from the system, what can be abstracted from the process and be used to develop and control action."

R: "If you think about those people for whom you have built systems so do you think there are any common features in those humans?"

D18: "No, I can't say that; about organisations and environments of activity I can, but I cannot say that about users."

In summary, in the expressions included in this category of description the IS designers' focus of reflection is on work processes. Yet they do not explicitly include any human characteristics in their delineation. The main topic is the flow of work activities. In this sense this conception is functional: it refers to the functioning of work processes. The structural aspect demonstrates how the work processes are delineated from and related to human activity. Respectively, the IS-user relationship is seen in terms of a work process. Therefore, the emerging referential aspect is the human being behind the process of work (Figure 13). This conception adds to the previous work-centred conception in that the descriptions of work tasks imply that the title of the job in question is also comprehended. Therefore, the expressions within this category of description are more comprehensive than the expressions associated with the previous category because the implied understanding of work is elaborated here to include depictions of actual work tasks related to human activity rather than just describing the job titles of humans.

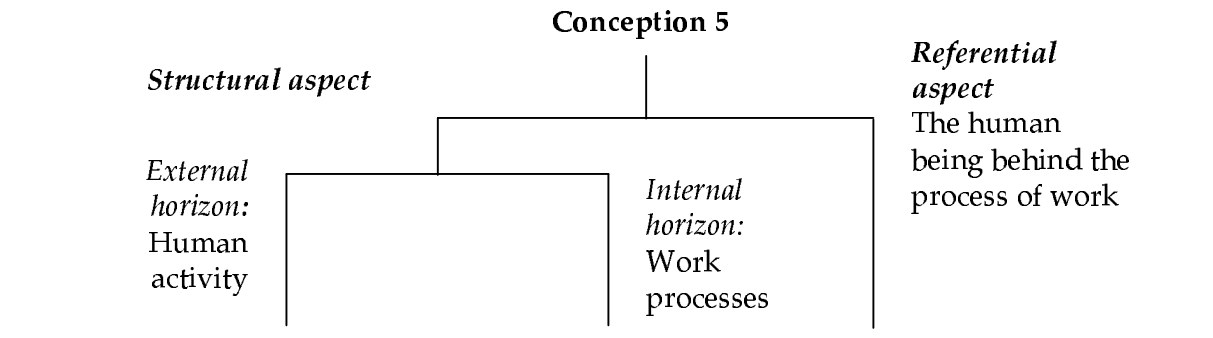

FIGURE 13. The meaning structure of the fifth conception.

6.2.3 Conception 6: The human being as an organisational learner

As in the previous two work-centred conceptions the IS designers' focus of reflection in the expressions attached to this category of description is on the process of work. However, in contrast to the previous conceptions, within this conception descriptions of learning as human activity are included. The following extracts illustrate these kinds of views:

> *R: "You mentioned that the users' needs are central. Could you elaborate on what you mean by these needs?"*
> *D14: "To begin with, an information system itself is seldom nothing as an entity. Rather, it is a part of an action, a workflow, or, as it is put nowadays, a process. Then several work tasks are included in it and the central idea is to take care of the whole in a flexible manner. Another essential thing – which should be obtained somewhere else than from the users– is the direction that the whole action is geared to. This would mean that the system is reflected in regard to the future, not just with respect to today's needs that probably are out of date when the system has been completed. This has often been the case in traditional tailored systems design, the change process begins before the system has been completed."*

> *D8: "Needs are prone to change rapidly, especially after the implementation of the system, because they teach an organisation a lot about itself, and an organisation's self-knowledge increases and usually needs change in a more clever direction. Then there very quickly happens a sort of 'learning leap', which is often experienced as if the system is not valid at all although it is a question of the organisation's increased knowledge of its own activity."*

In the above extracts the IS designers consider users' needs as inherent to the processes of work. The view of the process is seen to include both the end-users' work tasks as well as the whole organisation's action. In this way the focus of reflection within this conception is directed towards the process of work as an organisational activity. The work processes are articulated with respect to learning that occurs during systems development: the examination of work processes teaches the involved organisation about its own activity and, thus, a new insight into the processes of work is created. Human behaviour is described by referring to organisational work-related learning in which the process of organisational activity is the source, learner and outcome of learning. A particular specification for this process-bound view of human behaviour is that power relations inherent in organisational activity are recognised. The following extract, which developed out of the question "*What, to your mind, is most important in information systems development?*" illustrates this kind of understanding:

> *D14:"The most central issue in the planning phase is that the real needs of the real users are being worked on. I believe that an experienced IS designer can make the system according to the real needs when they are known. Often there are sort of two issues jumbled together and this is because - like in my last work assignment - the real users are not involved with the planning but there is*

traditionally some departmental or divisional superior involved with the work. Often this person acts as a bully to the real users although s/he is not the real expert concerning the work. This is, to my mind, often a central issue: that which is supposed to be needed has been designed but not the things that are actually needed."

To sum up, in the expressions included in this category of description, the IS designers' focus of reflection is on the process of work as an organisational activity. The work process is delineated with respect to learning that occurs during systems development: the examination of work processes teaches the involved organisation about its own activity and, thus, a new insight into the processes of work is created. Human behaviour is described by referring to organisational learning. In this way the structural aspect of this conception concerns how the process of work is delimited from and related to organisational learning. The internal horizon is the work process and the external horizon consists of organisational learning. Therefore, the referential aspect becomes the human being as an organisational learner (Figure 14).

This conception adds to the previous work-centred conceptions in that the human capacity for learning is included in work processes. This implies a tacit understanding of both the job titles and actual work tasks of the people involved. Therefore, this conception is the most comprehensive work-centred conception within the categories of description and, thus, it is referred to as holistic.

In the following section the last context-centred conceptions are described. They are the categories of description that deal with business.

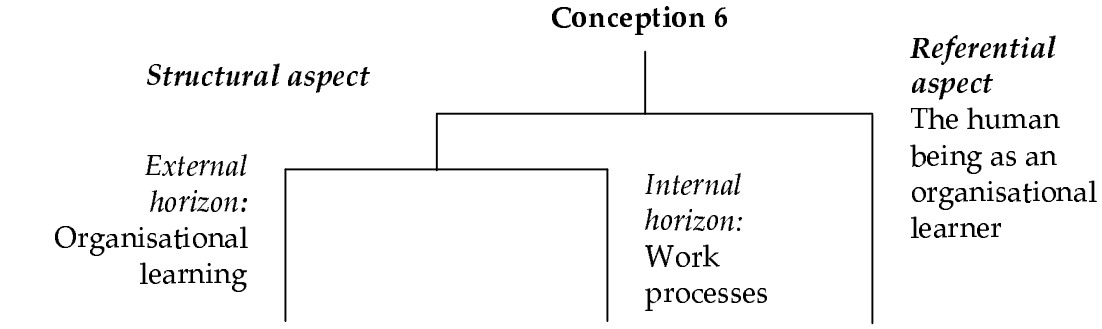

FIGURE 14. The meaning structure of the sixth conception.

6.3 The conceptions centred on business

In this section the conceptions with a focus on business are depicted. Common to these conceptions is that the IS designers focus on business issues in their utterances, and that potential human centred characterisations remain to the background. The conceptions differ, however, in regard to the remoteness of the IS-user relationship as well as with respect to the

explicitness of depicted human characteristics. The conceptions are referred to as the human being as a market, the human being in terms of cost-effectiveness, and the human being as a client. These conceptions are elucidated in the following.

6.3.1 Conception 7: The human being as a market

The most characteristic feature of this conception is that in the expressions associated with it the human being is depicted in terms of an economic profit. Typical of these statements is that the proceeds of a sale are acquired by selling standardised systems that are intended for a mass of users. These conceptualisations imply that humans are understood as forming a market for IT products:

> *D5: "It is more reasonable to develop a mass product which has a lot of users. The point here is that then it can be copied and sold."*

> *R: "Do you prefer making tailored systems or some other kind of system?"*
> *D10: "Of course products, and particularly standardised products that can be sold by just copying them."*

As in the above extracts, a typical feature within this conception is to regard it as reasonable or motivating to build systems that are intended for a mass of users. The predominant motive in these considerations is that in this way the designers' work is turning more profit. Usually these kinds of opinions are revealed in an emphasis on economic gain as a benefit of product development. Some designers, nevertheless, admit quite frankly that monetary profits are considered important:

> *R: "How would you define a good principal who assigns a design task to you?"*
> *D12: "Someone who pays a high price."*

In addition to the straightforward opinion that mass products self-evidently increase sales, it is considered that constructing a 'brand' – a particular alluring image - for the system provides a guarantee that masses of users will buy it. However, the users are still not described explicitly but, as in the expressions connected with this category of description, are implicitly understood as buyers of IT products:

> *R: "Do you prefer making tailored systems or others, like product development?"*
> *D1: "I like product development, probably as a change to building tailored systems. There is a clear difference between them in that in product development more work is done on polishing the product, like creating a brand and giving the product a uniform appearance. This brings more to my work than some tailored system for a single customer because it* [the system being built] *does not have to be saleable or market itself since the client has already bought it."*

In sum, within these conceptualisations the IS designers' focus of reflection is on the sales profit that can be gained from the mass of users that buy IS. Within this conception, the structural aspect concerns how economic gain is delimited from and related to the people that may buy IT products. The internal horizon of the conception is economic gain and the external horizon is the mass of buyers, i.e., the market. The relation of the internal horizon and external horizon emerges as separatist in that the relation of economic gain and humans as buyers of IS is not depicted in terms of human characteristics, such as the human features that could be a premise for selling the IT products. Instead, these kinds of understandings imply that humans are seen only as featureless consumers. The referential aspect, therefore, reflects the human being as a consumer of IT products. The meaning structure of this conception is illustrated in Figure 15 below.

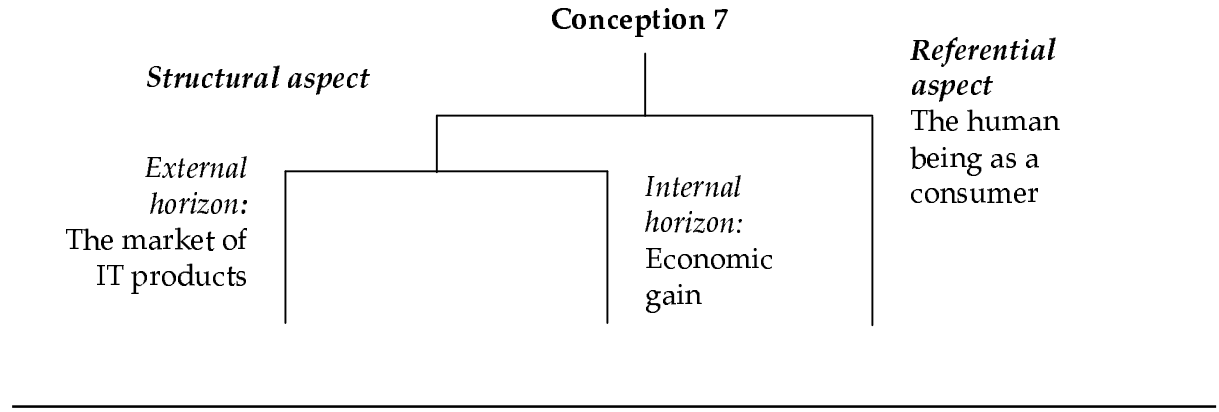

FIGURE 15. The meaning structure of the seventh conception.

6.3.2 Conception 8: The human being in terms of cost-effectiveness

As in the preceding conception, the most characterising feature of this conception is that in the expressions associated with this category of description the human being is depicted in terms of economic gain. However, deviating from the previous economy-centred conception, human action is included in the depictions as the main factor in improving effective use of IS, which is considered the key in gaining economic benefits. The extract below illustrates this kind of thinking:

> *R: "I would like to check again: what exactly do you mean by needs?"*
> *D7: "The client's needs are at this time highly cost-effective information technology which serves the end-users. Especially in big companies a lot of calculations are made in order to clarify how much information technology costs, and a clear trend is to create models according to which information technology can be made more cost-effective. Often this means the*

implementation of standardised products by means that create a more efficient action ground, and then attention must be paid to the point of view of the end-user, because it is the area with the most potential for achieving savings."

In the above extract the designer explains a client's needs in terms of cost-effectiveness. Then the central issue is to pay attention to the users' ways of employing IS because the use of the systems is a significant target for improving efficiency. The focus of reflection is on cost-effectiveness. The users are seen important only as objects for improving effective use of IS. This kind of predisposition is implied also in conceptualisations according to which increased effectiveness is regarded as an essential implication of an IS. It is then assumed that the users' are able to act in a more efficient manner:

R: "In your opinion, what kind of bearing does an information system have on people's work?"

D13: "It certainly increases the efficiency of work and in this sense it [IS] *improves it* [work]*."*

R: "How do you think that people like to use an information system?"

D20: "Surely effectiveness is the most important thing. They want to get their work done as efficient as possible."

In summary, within this category of description the designers' scope of thought is focussed on cost-effectiveness. They do not reveal any explicit delineations of human behaviour or characteristics but consider cost-effectiveness in terms of efficient use of computers as essential. In this way it is implied that the human being is seen as a potential object for increasing cost-effective action in regard to the use of IS. Respectively, the IS-user relationship is understood in terms of cost-effectiveness. The structural aspect of this conception concerns how cost-effectiveness is delimited from and related to the use of IS. The internal horizon is cost-effectiveness and the external horizon is the use of IS. Therefore, the referential aspect of this conception emerges as the human being in terms of cost-effectiveness (Figure 16).

This conception adds to the first economy-centred conception in that the human being is understood as a user of an IS. Yet this stance acknowledges the possibility that a user may also be a part of the market for IT products in that before a cost-effective way of using IS can be considered, people must have acquired a system which they use. Further, this conception is more comprehensive because the IS-user relationship is seen as closer than in the preceding conception: the human being is assumed to act as a user of IS instead of being seen as a remote potential buyer of IT products. This conception appears as functional in that the IS-user relationship is seen in terms of effective activity between the human being and the system.

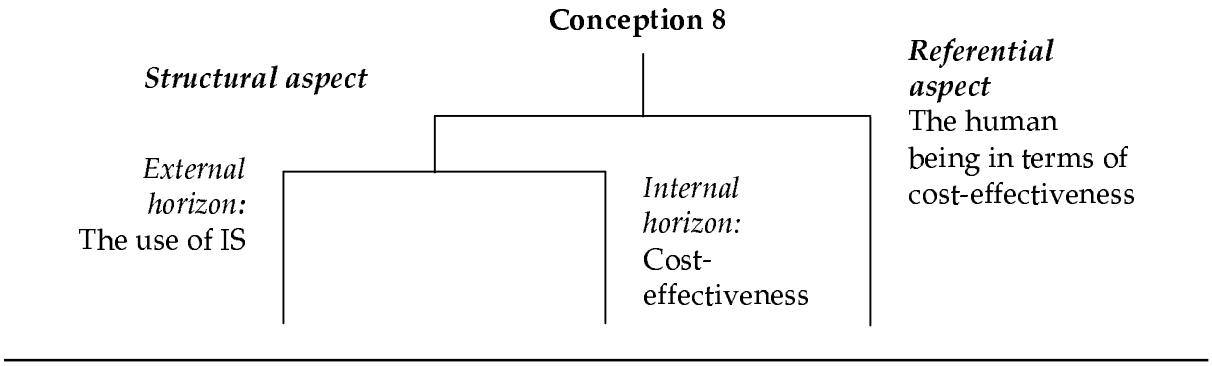

FIGURE 16. The meaning structure of the eighth conception.

6.3.3 Conception 9: The human being as a client

As in the preceding two economy-centred conceptions, within this category of description the designers' thoughts are focussed on business issues. In the utterances attached to this conception the human being is described as a client and the designers consider it important to take care of customer relations:

> *R: "Are you interested in users' problems concerning use after implementation?"*
>
> *D7: "Well, yes."*
>
> *R: "Why?"*
>
> *D7: "It comes down to the fact that a satisfied client is the basis for the continuity of the customer connection. If you as a deliverer neglect that relationship in that the system has been delivered and after people are dissatisfied, so then you should immediately react to it. The situation should be handled so that there is not a sort of feeling of negligence, that you've rushed off without so much as a goodbye."*

The above extract demonstrates the way that the human being is taken into account as a client. The emerging main point is the continuity of the customer connection, which is considered in terms of customer satisfaction. In the expressions associated with this category of description it is implied that the contentment of the human being is seen as important because it provides a guarantee of customer satisfaction, and thus, of continued business:

> *R: "Are you interested in users' problems concerning use after implementation?"*
>
> *D10: "Yes they do interest me. On the one hand, it is a crummy feeling if you've made a system for them and then it does not work. On the other hand, we cannot act if we don't do the after-care. It could be that we want to sell something else to them, too."*

Within this conception the designers' focus of reflection is on the continuity of the customer connection. They adduce a human characteristic, satisfaction, which is regarded as important with respect to the client-deliverer relationship. In this way the structural aspect of this conception covers how the continuity of the customer connection is delimited from and related to the client's satisfaction. The emerging internal horizon is the customer connection and the external horizon is the client's contentment. Therefore, the referential aspect is the human being as a satisfied client (Figure 17).

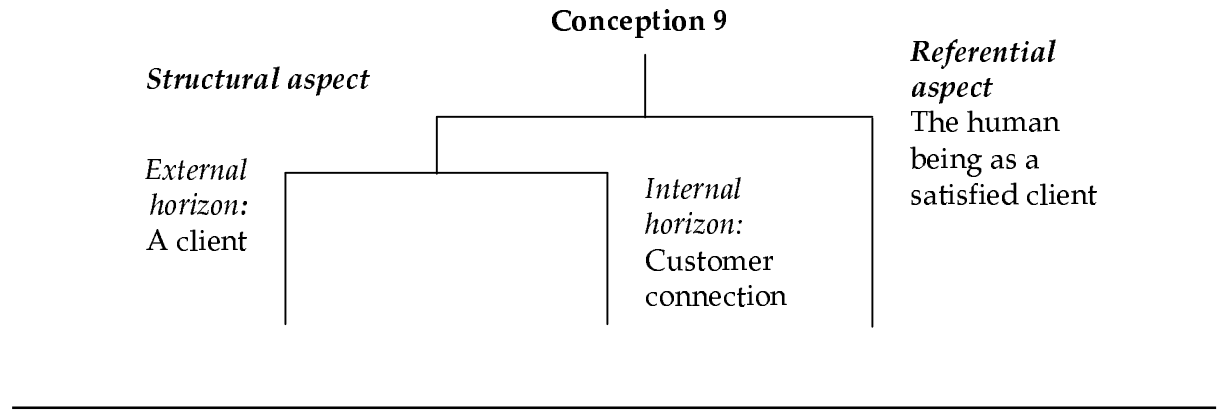

FIGURE 17. The meaning structure of the ninth conception.

This conception elaborates the two preceding business-centred conceptions in that the human being is characterised in terms of human features. These conceptualisations refer to a more comprehensive view of the human being than the two previous conceptions. Therefore, this ninth conception is seen as holistic. In addition, this conception implies that contentment is an important human characteristic in regard to both the IS-user relationship and between designers and users.

In the following sections the human-centred conceptions are described. These conceptions are referred to as the knowing human being, the emotional human being, and the human being through self. Each of these categories of description is comprised of three distinctive but associated understandings of the human being.

6.4 The knowing human being

In this section the IS designers' human-centred conceptions are depicted further by introducing conceptions within which the human being is seen with respect to knowledge. Common to these conceptualisations is that the designers' descriptions are focussed on the human as a knowing being. These conceptions differ in the ways the users are seen as knowing humans, and how knowledge is intertwined with the relation between the designers and users as well as with the IS-user relationship. The conceptions are referred to as the technology-illiterate human being, the human being as an active user of computers, and the knowledge-sharing human being.

6.4.1 Conception 10: The technology-illiterate human being

The pivotal attribute of this conception is that in the expressions attached to this category of description the human being is depicted as oblivious to computers and technology in general. According to the IS designers' delineations the most striking characteristic of users is that they are ignorant of technology:

> *R: "What kind of problems do you mean they* [users] *have?"*
>
> *D2: "They usually have a problem situation already in that they do not even know the basics of computers."*

> *R: "What did you mean when you said that computing people think differently from users?"*
>
> *D6: "Well, the computing people think that the main thing is that an application is made with a certain tool and particular methods, by using the latest technology. They also make assumptions such as everybody knows how to use a mouse, and how everything supporting works. But the users do not necessarily know all that."*

Often this feature is depicted as a contrast to the designers' knowledge. This tendency to conceptualise humans is revealed in descriptions in which technology-illiteracy is seen, on the one hand, as an explicit feature of users, and on the other hand, in expressions where users are exposed as technology-illiterate and it is implied the designers are not. The extracts below illustrate these kinds of views that reveal users as ignorant of technology in contrast to the designers. In these utterances the IS designers' focus of reflection is on humans, particularly users and EDP people. These two groups of people are comprehended explicitly or implicitly as dissimilar in relation to technological knowledge:

> *R: "Have you ever wondered why people behave in that way – that they cannot say what they want from the system?"*
>
> *D17: "I think that it is because they do not know how these* [IS] *are defined. If one does not know these methods, one cannot do it. That is the biggest reason, not that they aren't willing to say what they want but they do not have the know-how."*

> *D5: "These days it is very common that someone buys an expensive system and then they think that they will minimise expenses by training one or two persons from the firm to know how to use the system. These persons are then supposed to train the rest of the employees in the company. This is the worst option because it concerns a technical product, and a person who comes to the training with the intention of training the rest of the staff is going to fail. They simply do not have enough technical know-how to be able to teach other people."*

In brief, in the expressions associated to this category of description, the designers' thought is focussed on users and designers as being different in regard to technological knowledge. That is to say, the structural aspect deals with how users and designers are discerned from and related to technical knowledge. The emerging internal horizon is the discrepancy between users and designers and the external horizon is technological knowledge. In this conception, the discrepancy is understood in terms of the users' ignorance of technology. Therefore, the referential aspect appearing is the technology-illiterate human being. The meaning structure of this conception is illustrated in Figure 18 below.

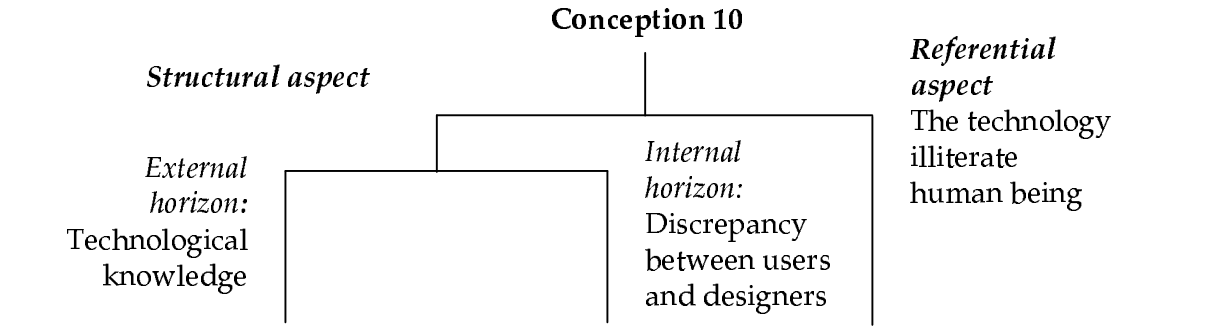

FIGURE 18. The meaning structure of the tenth conception.

The meaning structure of this conception indicates that a discrepancy between users and designers as well as between users and technological know-how is the main point in conceptualising humans. In other words, the discrepancy is a separating element that intertwines the interaction between users and designers as well as the IS-user relationship. Therefore, this conception is separatist in the sense that within it the user is seen as separate from viable interactions with the system and with the designers.

6.4.2 Conception 11: The human being as an active knower of computers

As in the preceding conception, in the descriptions connected to this category of description the IS designers reflect humans in relation to technological knowledge. However, in contrast to the previous conception, within this conception the human being is seen as a knowledgeable and active user of computers. These kinds of views are displayed in expressions in which the user is understood as technologically knowledgeable and competent in using computers:

> *D7: "We have developed a particular method for improving systems implementation. We try to find certain key persons in the client organisations. We call them Bright Spark Mike or Bright Spark Mary. They are active users and*

think about how the tools, such as operative applications, word processing, and e-mail, are best utilised."

In the above extract the designer considers the users as active in using computers. In addition, the knowing aspect of users is articulated in know-how concerning the utilisation of common computer applications. That is to say, human knowledge construction is understood in terms of active use of computer applications. Often this knowledgeable activity of humans as users of IS is reflected in people's way of learning:

R: "How, in your opinion, do people learn?"
D13: "Through practice one learns best. One should do things with computers."

R: "Do you think that people easily learn to use new systems?"
D16: "Yes, I think that nowadays those who have used computers, word processing, spreadsheets and Windows-based applications in general, do. "

R: "Have you paid attention to, or have you formed an idea of, how people learn? You've said that you have also trained people."
D1: "It depends on people, some learn by a 'learning-by-doing' system so that they just do things independently. If we think of a training situation – whether traditional schooling or training in an enterprise – then you can characterise a training day in such a way that there are people who just use the system for the whole day and do not listen to the training but try the system by themselves."

Briefly, in the expressions associated to this category of description, the designers' focus of thought is on humans as active knowers of computers. In particular, action is understood as exploring software. The structural aspect of this conception concerns how humans as active users are delimited from and related to knowledge concerning the functions of software. The evident internal horizon is the active user, and the external horizon is technical know-how, especially knowledge regarding software. Due to the way that the internal and external horizons merge within this conception, the referential aspect is the human being as an active user of computers (Figure 19). In the same vein, this conception is also regarded as functional. It focuses on human activity with respect to software functions. Human behaviour naturally present in the use of computers is not evident. Instead, it is implicitly assumed that the human features emerge as knowledge of software functions when people are actively using computers. Therefore, the IS-user relationship is seen to build on knowledge concerning software functions, and thus it is functional by nature.

This conception adds to the preceding knowledge-related conception in that technical knowledge is seen to be the emerging connection between users and IS. The previous conception is then extended from a separatist view concerning technical knowledge and humans into a functional understanding of technical knowledge as a connector of users and computers.

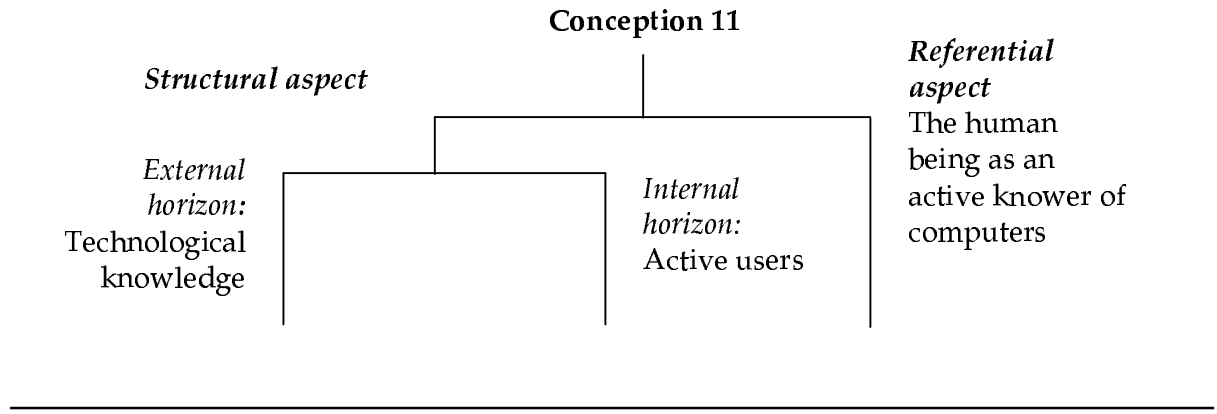

FIGURE 19. The meaning structure of the eleventh conception.

6.4.3 Conception 12: The knowledge-sharing human being

As in the previous two knowledge-related conceptions the IS designers' focus of reflection in the utterances associated with this category of description is on humans in regard to knowledge. However, in contrast to the previous conceptions, within this conception descriptions of knowledge are expanded from technical knowledge to shared knowledge. This kind of predisposition is often evident in utterances in which mutual understanding between designers and users are emphasised. The following extracts illustrate these kinds of views:

> *R: "What, in your opinion, is a good principal like?"*
>
> *D6: "It is important to be able to explain things so that we understand each other."*

> *R: "Are you interested in users' problems after implementation?"*
>
> *D8: "… To my knowledge no systems have been completed by the implementation stage. Rather, the glitches aren't ironed out until just after implementation. I think that implementation is an inherent stage in the process of systems development. If it is done by different people than the actual developers, a lot is wasted. "*
>
> *R: "What is being wasted?"*
>
> *D8: "Firstly, the personal relationship between users and designers is wasted. Well, not everybody considers this as a bad thing. But, anyway, then all the discussions during development are wasted, especially all the information that has not been written in the minutes is lost."*

In the above extracts the IS designers consider interaction between users and designers as essential. In particular, the abilities of communicating understandably and taking another's perspectives into account form the core of these depictions. In this way the focus of reflection within this conception is directed towards mutual understanding which is

articulated with respect to knowledge sharing that occurs during systems development, both in formal meetings and informal conversations. In an exceptional description, a designer further specifies the human features that she considers important with respect to mutual understanding during ISD. According to this account, in addition to the ability to communicate, an ability to bear failures and corrections is essential for mutual understanding:

> *R: "Have you ever come across a principal that could be considered a bad one?"*
>
> *D: "Yes, there have been such clients. I have explored clients' satisfaction with our work, and yes there have been such people."*
>
> *R: "I see. What are these people like, to your mind?"*
>
> *D: "Well, I noticed – although in the background there were also fine theories concerning whether people are satisfied or not – that it is due to the way people face each other. Particularly, how close they get to each other and how much they bear failures and corrections – this work is the type where when something is developed it does not work immediately. It is also due to how they get to communicate with each other."*

In the expressions connected to this category of description the IS designers' focus of reflection is on the human ability of mutual understanding, which is delineated with respect to sharing knowledge concerning the development of IS. In this way the structural aspect of this conception concerns how mutual understanding is delimited from and related to shared knowledge of ISD. The emerging internal horizon is mutual understanding and the external horizon consists of shared knowledge. Therefore, the referential aspect appears as the knowledge-sharing human being (Figure 20).

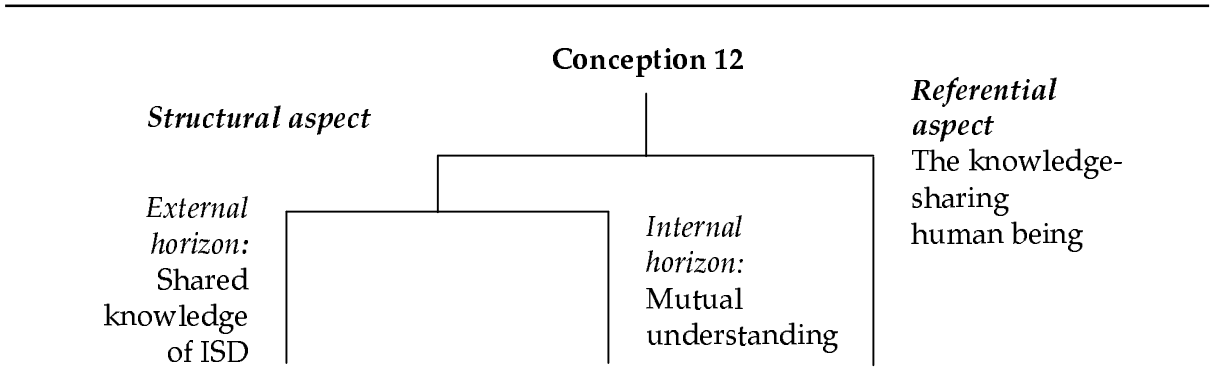

FIGURE 20. The meaning structure of the twelfth conception.

This conception adds to the previous knowledge-related conceptions in that the descriptions of knowledge are expanded from technical knowledge to shared knowledge. Respectively, human features inherent in the ability of mutual understanding are seen as essentials factor in regard to the relationship of designers and users. This implies that the IS-

user relationship is intended to build on actual users' needs and behaviour. In this way this conception extends the view of both knowledge and humans in comparison to the two previous conceptions. Therefore, this conception is the most comprehensive work-centred conception within the categories of description and, thus, it is referred to as holistic.

In the following sections the human-centred conceptions are further described by illustrating the conceptions focussed on emotion.

6.5 The emotional human being

In this section the IS designers' human-centred conceptions are further described by introducing the emotion-related conceptions. Common to these conceptualisations is that the human being is seen in regard to emotions, such as attitudes and subjective feelings. These conceptions differ in the ways that emotions determine the interaction between humans and IS. This category of description is comprised of three distinctive but associated understandings of the human being. These conceptions are the computer-anxious human being, the techno-enthusiast human being, and the emotionally coping human being.

6.5.1 Conception 13: The computer-anxious human being

The most characterising feature of this conception is that in the expressions incorporated in this category of description the human being is depicted in terms of negative emotions towards technology. Typical of these characterisations is that software, user interfaces, and IS, i.e., computers in general, are seen to cause negative emotional arousal in users:

> *R: "How do you think people are disposed to new software?"*
>
> *D4: "Some have a different attitude in that they have this resistance to change, so that their attitude is negative already from the beginning, even though it* [system] *could then facilitate their work."*

> *R: "How in your mind do people learn to use software?"*
>
> *D6: "… and I have also met users who have so much fear of the user interface that they do not dare to explore or try anything, they just do the familiar and safe things."*

> *R: "Do you think that somebody could be afraid of new software?"*
>
> *D2: "…in one organisation there were people who did not agree to use computers."*
>
> *R: "Why didn't they agree?"*
>
> *D2: "That I don't know but obviously there was a kind of fear of not knowing what to do or they just experienced the situation as rather unpleasant."*

In the above extracts the designers bring out views according to which IS cause negative emotional arousal in users. These reactions are shown as negative attitudes, resistance, fear and discomfort in situations where people are confronted by a planned future use of computers or in situations in which people are learning to use software. Noteworthy is that, according to some expressions, people tend to retain their negative feelings towards computers despite the potential usefulness of IS. In some cases the designers depict situations in which people's dislike of computers is connected to changes in working life:

R: "Do you think that an information system has impacts on people's work?"

D7: "Yes, it does."

R: "In what way?"

D7: "Well, I know people from my earlier life who voluntarily left their jobs because their work became more and more technical. That is to say, there were people who – some already in the mid 80's – did not use computers at all and they felt that when the depression hit the pace of work became more and more strained and systems were used increasingly, and also dependency on the systems increased. So some people changed occupation and some retired early."

In addition to the above cases in which computers are seen to cause negative feelings in humans, in an exceptional extract a designer raises a viewpoint according to which mistrust between humans has an impact on the accessibility of the functions of software:

R: "Do you think that restrictions [of use] *like that are a matter of information security, or what is the reason they are made?"*

D15: "I don't think it is a question of information security but the users are not trusted and therefore those restrictions are put in place."

To sum up, in the expressions associated to this conception the IS designers' focus of reflection is predominantly on the negative emotional reactions such as fear, anxiety and discomfort that people show with respect to computers. Another negatively shaded attitude that is expressed is mistrust between people concerning the use of IS. Therefore, within this conception, the structural aspect concerns how negative emotions are delimited from and related to the use of computers. The negative emotions form the internal horizon of this conception whereas computers and their use constitute the external horizon. The referential aspect, therefore, reflects the human being as a computer-anxious creature. The meaning structure of this conception is illustrated in Figure 21 below.

Within this conception, the relation of the internal horizon and external horizon emerges as separatist in that the relation between users and IS is seen to be prevented by negative emotional feelings. These feelings are seen to be occurring between users and computers as well as between humans, causing restrictions in the use of computers.

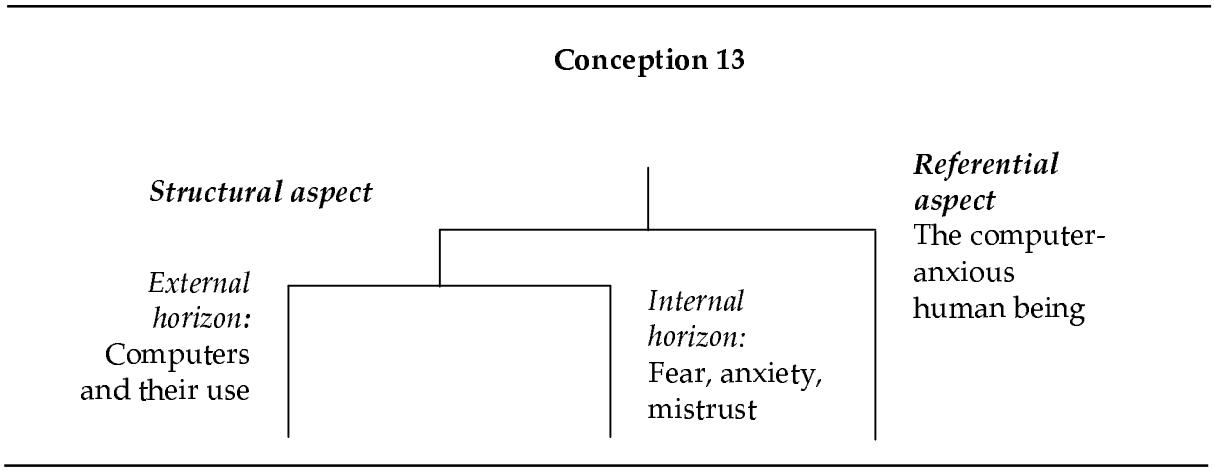

FIGURE 21. The meaning structure of the thirteenth conception.

6.5.2 Conception 14: The techno-enthusiast human being

As in the previous conception in the utterances within this category of description the IS designers reflect humans in regard to emotions. However, in contrast to the preceding conception, in this conception the human being is seen as reacting positively to computers. These kinds of views are displayed in utterances in which positive attitudes and enthusiasm are seen as central features in people:

> *R: "Do you think there are common features in those people for whom you have built systems?"*
>
> *D17: "Well, at least during the very recent years, it has been enthusiasm."*

> *R: "How, in your opinion, do people react to new software and hardware?"*
>
> *D6: "Well, of course there are these technology buffs who get excited whenever something new appears, like twenty megahertz more powerful processors, new operating systems and such like."*

According to the above extracts, the designers depict positive emotions such as enthusiasm and excitement as essential features in humans. In particular, within these descriptions these positive emotional reactions in people are seen to be aroused by technology, such as software and hardware. The relation between positive emotional arousal and technology is seen without any other factors that may influence positive predispositions in people. In some utterances, however, the emotional characteristics of humans are seen, on the one hand, as a prerequisite for using IS successfully or, on the other hand, connected to expectations of the usefulness of a certain system:

> *R: "So do you think that people easily learn to use new software and hardware?"*

D18:"…I myself think that it is a matter of attitudes, when one goes to the web so one surfs there and goes out in search of an adventure. Then the attitude must be kind of adventure-loving."

R: "What kind of good or bad characteristics have you noticed in them?

D20: "The good aspects mainly are in that they are often enthusiastic about the system being built, or they feel that it will be useful."

To summarise, in the utterances associated with this category of description the IS designers' focus of reflection is on the positive emotional characteristics of the human being. These characteristics are seen to be aroused both by technology and by expectations of the technology's usefulness. In this way the structural aspect of this conception is concerned with how positive emotions are delimited from and related to computers and their use. The internal horizon is formed by positive emotions such as enthusiasm and the obvious external horizon is technology, particularly computers and their use. The internal and the external horizons merge with each other in a way that elevates the referential aspect as the techno-enthusiast human being. The meaning structure of this conception is depicted in Figure 22 below.

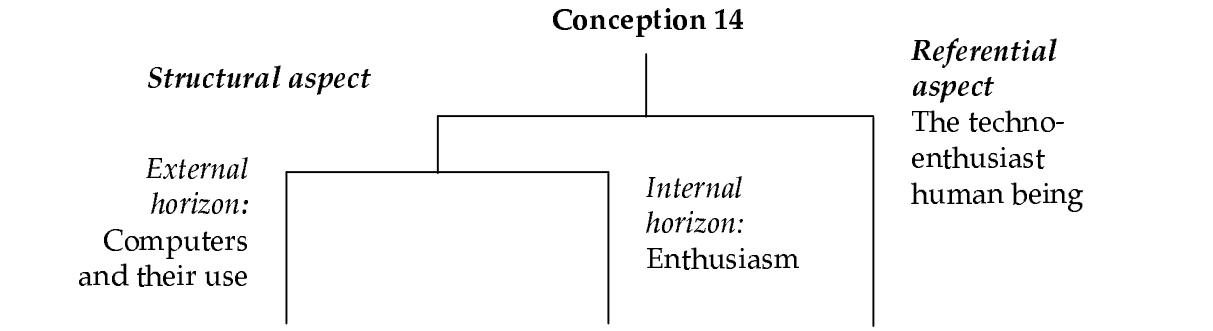

FIGURE 22. The meaning structure of the fourteenth conception.

In this conception, the use of computers is seen to require positive emotional arousal in humans. This conception does not add to, but differs from, the previous emotion-centred conception in that the nature of the emotions emerging between humans and computers is positive. In this way the IS-user relationship is seen as viable, unlike in the preceding separatist conception. Thus, the view of the human being in relation to IS is seen as functional, assuming though that positive emotions emerge in humans as a prerequisite for successful use of computers.

6.5.3 Conception 15: The emotionally coping human being

As in the previous two emotion-related conceptions the IS designers' focus of reflection in the expressions adjoined to this category of description is on humans in regard to emotion.

However, in contrast to the previous conceptions, within this conception descriptions of emotion are expanded from the distinctive feelings of either negative or positive emotions into emotional coping. This kind of predisposition is evident in utterances in which balanced emotional behaviour is emphasised. The following extract illustrates these kinds of views:

> *R: "What is a skilful user like?"*
> *D8: "… a skilful user always has such peace of mind and attitude. S/he kind of has a better tolerance for stress, and an ability to cope with contradictions in a better way than others. For some reason this kind of attitude leads to a particular resourcefulness and an ability to utilise the system in a more natural way, compared to a person who has some negative emotional features, fear or hostility towards the system, and who then ends up having difficulties with the system due to her/his heavy attitude".*

In the above extract the IS designer considers a skilful user as a human who is able to deal with contradictions, i.e., things that may cause conflicting feelings, and who appears as well as behaves (with the system) in a peaceful, balanced manner. This refers to a human who evidently is able to regulate his or her emotions successfully through thought and behaviour in a particular situation. In this way the designer's focus of reflection is directed towards an individual's coping with emotions. In a similar vein, conceptualisations which imply human's emotional coping are found also in expressions in which the designers refer to humans' abilities to make long-term commitments. Then emotional behaviour is considered from the point of view of being able to maintain long term emotional attachments to the process of ISD, which requires an ability to stand changing emotional behaviour, such as enthusiasm at the beginning and possible frustrations during the process:

> *R: "What is a bad principal like?"*
> *D6: "…one who does not commit to the thing that s/he is ordering. One has to be committed during the whole process* [of ISD]*, during definition as well as implementation."*

In brief, in the expressions connected to this category of description the IS designers' focus of reflection is on emotional behaviour, particularly on the human ability of emotional coping. In this way the structural aspect of this conception concerns how emotional coping is delimited from and related to the situations within the process of ISD. The emerging internal horizon is emotional regulation and the external horizon consists of the process of ISD. Therefore, the referential aspect appears as the emotionally coping human being (Figure 23).

This conception adds to the previous emotion-related conceptions in that the descriptions of emotion are expanded from a differentiation - either negative or positive feelings - into a balancing of different emotions, i.e., emotional coping. Respectively, balanced emotional behaviour is seen as an essential factor in regard to both the relationship between designers and users and the IS-user relationship. Therefore, this conception is the most comprehensive emotion-centred conception within the categories of description and, thus, it is referred to as holistic. Finally, in the next subchapters, the conceptions of the human being that are conceived through the designers' selves are described.

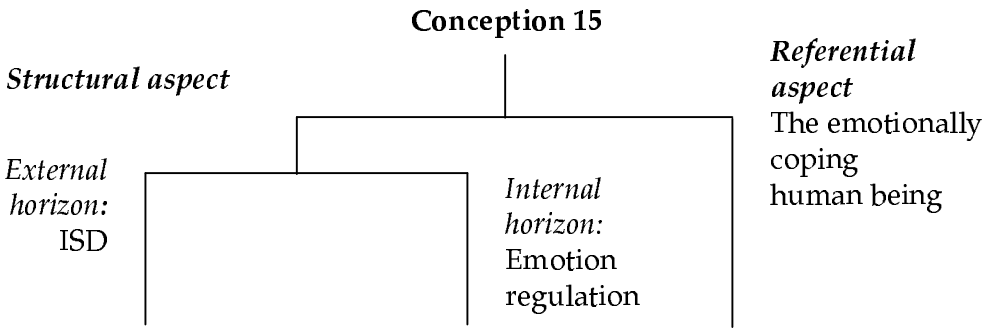

FIGURE 23. The meaning structure of the fifteenth conception.

6.6 The human being through self

In this section the IS designers' human-centred conceptions are further described by introducing conceptions within which the designers conceptualise humans through their own self. Common to these conceptions is that the human being is understood through the designers' selves. These conceptions differ to the extent that human characteristics are included in the described self-activity. This category of description is comprised of three distinctive but associated understandings of the human being. These conceptions are the human being through the physical self, the human being through self-activity, and the human being through the feeling of self-efficacy.

6.6.1 Conception 16: The human being through the physical self

The most characteristic feature found in the utterances attached to this category of description is that the designers reflect the human being through themselves. In particular, the IS designers describe human qualities by referring to their own physical feelings. Particularly, the depictions refer to physiological problems, especially muscular complaints:

> *R: "Do you think that an information system has an impact on people's work?"*
> *D10: "No doubt about it! You feel it in your neck. If I have to do a lot of work with the machine, I get a pain in my neck."*

> *D1: "If one does a lot of work with the computer, it is good to get your eyes focussed every now and then on something else than the computer screen. It might be some kind of relaxation."*

In the above extracts the designers describe physical problems such as tension in the neck and eye fatigue by referring to their own experiences with computers. Their focus of

reflection is on themselves, particularly on self-observations concerning physically signalled stress symptoms. These observations are reflected in regard to the computer as an artefact which forms the concrete physical counterpart for humans' physical mode of being. In this way the structural aspect of this conception refers to the way that the designers' selves as physical persons are delimited from and related to computers. The internal horizon is the stress symptoms of the physical self and the external horizon is the computer. Due to the way that the internal and external horizons merge with each other the evident referential aspect is the physically stressed human being.

The meaning structure of this conception indicates that the human being is experienced as a physical creature in regard to computers (Figure 24). In particular, the physical stress symptoms emerge as a factor that hinders a viable IS-user relationship. In this sense this conception is seen as separatist within the categories of descriptions concerning the designers' selves: the human being is seen in the light of factors that prevent people from using IS.

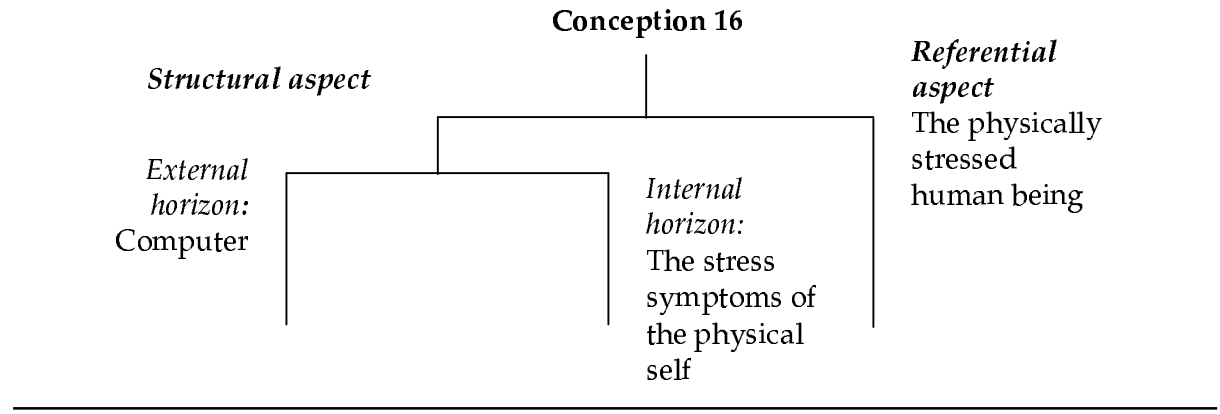

FIGURE 24. The meaning structure of the sixteenth conception.

6.6.2 Conception 17: The human being through the activity of self

As in the previous conception in the utterances incorporated in this category of description the designers reflect the human being through themselves. However, in contrast to the preceding conception, within this conception human activity is reflected in connection to information systems development. The most characteristic feature of this conception is that in the expressions associated to this category of description the IS designers draw on their own behaviour in regard to designing IS. Usually these kinds of conceptualisations are explicitly stated in extracts concerning building an information system according to the designers' own needs:

> *R: "When you're making an application, for whom do you think you're doing it?"*
>
> *D5: "The first thing that comes to mind is that in general I'm making it for myself. Although I'm working on projects I kind of make it for myself."*

R: "Well, then, if you think of a situation where you're building an application. For whom do you think you're doing it?"

D2: "It's difficult to say, I don't consciously think about anything else than that I'm building it as if I myself would like to use it. I don't necessarily know how to do it on anyone else's terms."

R: "When you're making an application, for whom do you think you're making it?"

D13: "I kind of think of myself as being an employee in the client firm and build it in that way."

In the above extracts the designers bring out viewpoints which denote that they design IS according to their own interests and skills. Then their thoughts are focussed on their own behaviour and preferred ways to use the system that they are building. In a few utterances this kind of tendency to conceptualise human behaviour through self-activity is revealed also in regard to how to learn to use the systems. Therefore, the designers' reflections of their own behaviour has implications also for the learnability of the systems that they design. The following extract, which developed out of the question *"How do you think people learn?"*, illustrates this kind of view:

D1: "I must admit that in general I just try out different things before I reach for the manual. I would like to go ahead with the things and try if I can make it [the system] *work:"*

In the above extract the designer is referring to his own activity as a basis for explaining how people learn. A preferred way to learn is to actively explore the different available properties of an IS and in that way to make the system work. This utilisation of self-activity in conceptualising humans' behaviour is similar to the previously presented interview extracts which indicated that the designers draw on their own actions with a prototype in order to make a design work. Therefore, in the expressions adjoined to this category of description, the IS designers' focus of thought is on their own behaviour as an information source for designing IS. The structural aspect concerns how the designers' self-activity is delimited from and related to the design of IS. The internal horizon is self-activity and the external horizon is the design of IS. The internal horizon is delimited from and related to the external horizon in a way that signifies the referential aspect as the human being through self-activity (Figure 25).

Within this conception, the IS designers describe human behaviour as referring to their observations of their own activity. However, they do not express any explicit manifestations of human characteristics in their descriptions. They refer to their own ways to use IS and to learn without explicitly mentioning any particular behavioural feature or human characteristic in their activity. Thus, the relation of the internal horizon and external horizon emerges as functional in that the relation of the designers' self-activity and the design of IS remains unexplained in terms of human behaviour. The main point is plain activity, not the human substance of it.

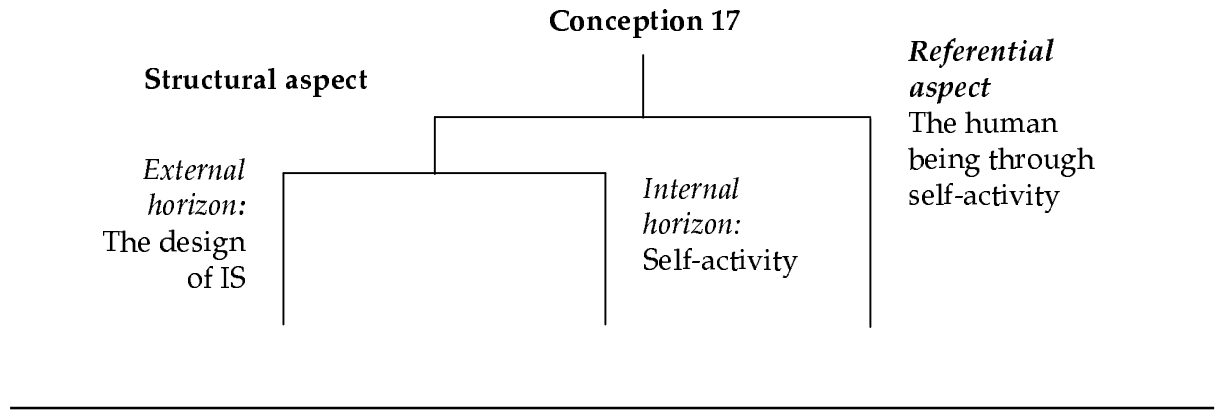

FIGURE 25. The meaning structure of the seventeenth conception.

6.6.3 Conception 18: The human being through the feeling of mastery

As in the two previous conceptions, within the utterances connected to this category of description, the IS designer's reflection is on the activity of self. However, in contrast to the previous conceptions, in this conception the designer is reflecting upon human characteristics within the IS-user relationship through self-observations. The following extract, which developed out of the *question "What kind of user interface do you think that people would want to use?"*, illustrates this conception:

> *D11: "Well, it should make my life easier so that I don't have to recall any of those things that I have put in it* [system] *to circulate. There should be this idea – particularly if we think about the whole organisation's action: if we have the information existing somewhere so we don't have to put the same information in from many places - that I could have a feeling that I am in control of my work with just that tool."*

In the above extract the designer is describing a user interface that has properties which attach several human features through the information system to both her individual work and the organisation's activity. It is also evident that the user interface is depicted in a way that it reflects a representation of the whole system to the designer. First, she mentions that the interface should help her in remembering things, i.e., reduce her cognitive load concerning memory functions, both in regard to her own information needs and with respect to the other workers in the organisation, i.e., interpersonal information needs. Second, she sums up the properties of the interface by referring to a feeling of being in control of her work with the system. That is to say, the properties of the system, in particular the interface, should contribute to a feeling of mastery. In this way the designer aspires to cognitive, emotional and social aspects within his/her interactions with the system. In this conception the designer's thought is focussed on her feeling of mastery, which includes cognitive, emotional and social aspects. These human features are reflected in regard to a user interface representing an information system. In this way the structural aspect of this conception is concerned with how

a feeling of mastery is delimited from and related to a user interface. The internal horizon is the feeling of mastery and the external horizon is a user interface. Due to the way these horizons merge with each other the emerging referential aspect is the human being through a feeling of mastery (Figure 26). The meaning structure of this conception indicates that the focus of thought is on several human features which are depicted in relation to an aspired user interface. In this way this conception is regarded as holistic within the categories of description concerning the human being conceived through the designers' selves.

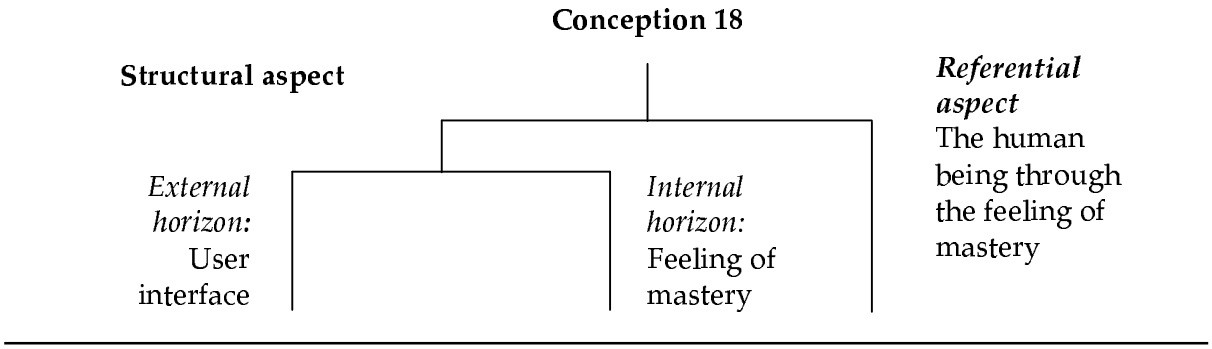

FIGURE 26. The meaning structure of the eighteenth conception.

7 The second layer: Different levels of understanding

In this section the IS designers' conceptions are described as different levels of understanding. This description delineates the specific contents of the previously depicted conceptions into a whole meaning structure, which is the second outcome of the analysis in this study. This structuring of the conceptions is in accordance with the primary idea of intentionality in phenomenography: some conceptions form a partial understanding of the phenomenon in question, and some form more comprehensive understandings. The different levels of understanding are associated with each other, i.e., the more comprehensive forms of thought often tacitly imply the understanding of the more partial understandings (Marton and Booth 1997). The resulted meaning structure is illustrated in Figure 27, which shows the relationships between the different conceptions.

In the following I first describe the separatist form of thought, secondly the functional form of thought, and finally the holistic form of thought. These different forms of thought signify three distinctive but associated ways in which the IS designers conceptualise the human being as a user of an IS.

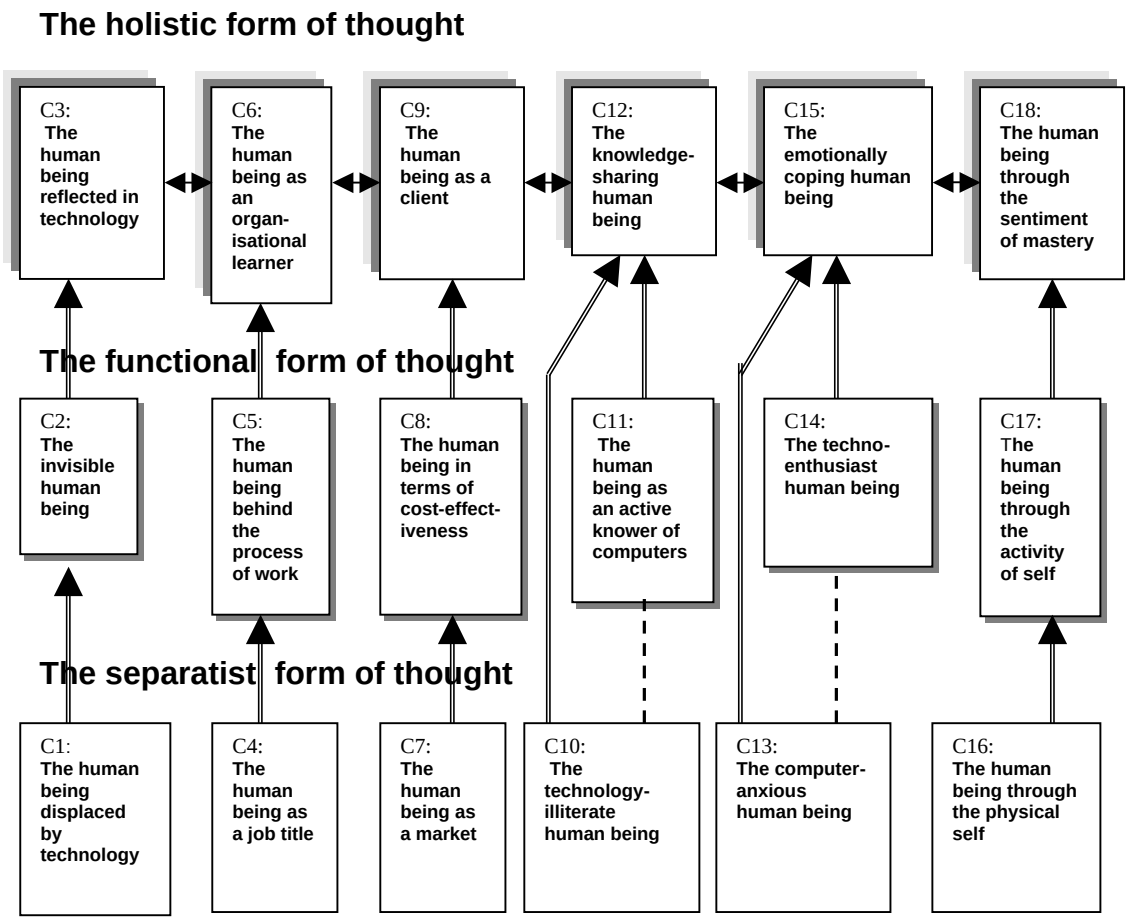

FIGURE 27. The three distinctive but associated forms of thought.

7.1 The separatist form of thought

The IS designers' most partial or limited way to conceptualise humans as users of IS is the separatist form of thought. It appears as separatist in two ways. First, the designers do not connect human characteristics to the phenomena they are describing but refer to non-human features with the intention of depicting humans. Second, the designers do recognise a few human characteristics that separate humans from viable interactions with both the designers and IS. These two ways signify conceptualisations according to which the human being is understood as separated from IS and their development.

According to the first separatist way of conceptualising humans, the IS designers depict people in terms of technology, job titles and expected sales profits. In these understandings a dualistic distinction is evident: when humans are depicted in terms of non-human phenomena, it is assumed that people can be understood independent of human characteristics. This also implies an objectivist understanding in that the knowledge of the nature of the human being is separate from humans and can be found through separate sources, i.e., the features of technology, job titles, and market mechanisms. The most common separatist conception is *'the human being displaced by technology'* which indicates that humans are understood in

terms of technology even to the extent that the traditional term 'user', which is meant to refer to human beings in the context of IS, transforms into a technical term. Then the human being becomes defined by technology instead of defining technology in terms of human characteristics. Therefore, this form of thought is separatist in that the human being and technology as elements of an IS are delimited as separate entities with the focus only on technology. Consequently, there is no relationship seen between humans and IS, nor are there any human characteristics depicted.

Further, the conception of '*the human being as a job title'* suggests that humans are understood also in terms of job titles. Then the actual human features are not described and, thus, it is assumed that people exist according to their job titles. The dualistic distinction is actualised in that human characteristics are seen as separate from job titles, which are the actual determinants of people. In this way this view is also objectivistic: knowledge of human nature is seen as independent of people but inherent in the properties of various job titles. Therefore, this form of thought is also separatist in that the human being and work activities are delimited as separate entities with the focus only on formal job descriptions.

This same dualistic-objectivistic pattern is evident also in the conceptualisations in which humans are seen in terms of sales profits. As implied by the conception of *'the human being as a market'* the actual human characteristics are not described and, therefore, it is assumed that people can be defined according to the market mechanisms. That is, the IS designers' conceptualisations suggest understanding humans in terms of the sales profit that can be gained from the mass of users that buy IS. This understanding is separatist in that the relation of economic gain and humans as buyers of IS is not depicted with respect to human characteristics, such as the human features that could be a prerequisite for getting the IT products sold. Instead, the human being and market mechanisms are delimited as separate entities with the focus only on potential sales profit. Humans are seen only as featureless consumers who are thought of only in regard to their potential monetary contribution to the IS firms.

However, humans are understood in a separatist manner also as a result of their own characteristics, and are not just conceived through dualistic-objectivistic conceptualisations. This separatist feature in the IS designers' conceptualisations reveals the notion that humans by their nature are not adaptable to IS without problems. That is to say, human characteristics are seen to include features that constitute humans as not easily adapting to technology. According to this second separatist way of understanding humans, the IS designers depict human characteristics with respect to features that separate humans from viable interactions with both the designers and IS. These separating features are lack of technological knowledge, negative emotions and physical stress symptoms.

The conception of *'the technology-illiterate human being'* indicates that a discrepancy between users and designers in terms of technological know-how is a common separatist way to conceptualise humans. In other words, the discrepancy is a separating element that intertwines the interaction between users and designers as well as the IS-user relationship. In addition, the conception of *'the computer-anxious human being'* reveals that negative emotions such as fear, anxiety and mistrust are often seen as features that separate humans from viable interactions with the system and with the designers. Moreover, as suggested by the conception of *'the human being through the physical self*', humans are described as physical creatures through the physical stress symptoms that the designers themselves

experience. That is to say, physical stress symptoms emerge as factors that hinder a viable IS-user relationship.

The above mentioned conceptualisations are in line with a separatist form of thought in two ways. On the one hand, the designers do not recognise any human features but describe people in terms of non-human phenomena. On the other hand, the designers do recognise a few human characteristics that prevent humans from being users of IS. In addition, these ways of understanding humans refer to objectivism, which appears as a remote form of thought in order to be able to recognise human characteristics and behaviour. Moreover, the human features that are recognised within this form of thought refer to negatively shaded and often problematic situations. To summarise, within the separatist form of thought the human being is seen in the light of factors that separate people both from actual human characteristics and IS as well as from their development. In other words, the relationship between users and designers as well as the IS-user relationship is seen as non-feasible. In the next section I describe the second form of thought which indicates more comprehensive understandings of the human being as a user of an IS than the separatist form of thought.

7.2 The functional form of thought

The IS designers' second way to conceptualise humans as users of IS is the functional form of thought. It appears as functional in that the designers recognise human behaviour but refer to it in an insubstantial manner indicating functional understanding of human characteristics. This way signifies conceptualisations according to which the human being is understood as behaving functionally, i.e., carrying out a certain task without a full human substance. However, this form of thought adds to the previous separatist way of thinking in that humans are depicted as performing tasks with computers, whereas in the separatist form of thought the conceptualisations omit human features or humans are seen as not able to use computers. In addition, the human feature that is recognised in this form of thought appears as positive – even though functional - by nature. Therefore, this way of thinking is more comprehensive than the previous separatist form of thought in two ways. First, it recognises human activity although inherent human characteristics are predominantly lacking. Second, it includes observations of one inherent human characteristic – emotion – conceptualised in a positive manner. Thus, within this form of thought the human being is seen in a way that renders the relationship between users and designers as well as the IS-user relationship viable, yet in a functional manner.

The functional form of thought is comprised of conceptualisations in which humans act in an insubstantial manner, adapting themselves to the functions of technology, the tasks included in work processes, a cost-effective way of using IS, and to the way that the IS designers themselves use IS. In addition, humans are understood in a functional way in that they are assumed to be knowledgeable concerning the functions of software while using computers. Then the content of people's consciousness is seen to consist of the functions of the software. Further, computers are seen to evoke positive emotions in people, and in particular, the use of IS is seen to require positive emotional arousal in humans. Thus, the view of the human being in relation to IS is seen as functional, assuming that positive emotions emerge in humans as a prerequisite for successful use of computers.

This form of thought is associated with the previous one in that it implies in several ways a tacit understanding of the preceding separatist way of thinking. First, the conception of *'the invisible human being'* which denotes people as using the functions of IS in an insubstantial way, implies that the designers are aware of the functions of those systems. Second, as implied by the conception of *'the human being behind the process of work'*, human behaviour as understood as functions inherent in work tasks suggests that the designers are cogniscent also of the job titles of those humans. Furthermore, within a business framework pursuing economic benefits, understanding the human being in terms of cost-effective use of IS, as suggested by the conception of *'the human being in terms of cost-effectiveness'*, acknowledges the possibility that a user is also a part of the market for IT products. Within these conceptualisations, the external horizon is expanded towards more human-centred notions from that of the preceding conceptions, i.e., the human being is included in the descriptions in a more focussed manner than in the previous form of thought. Therefore, the relationship between the functional and separatist understandings is hierarchical. This expansion appears as three kinds of transitions. First, from reflecting technology to considering technology as used by people without a full human substance. Second, from thinking about people's job titles to focussing on their work tasks. Third, from considering the market of IT products to conceptualising the cost-effective use of those products.

Moreover, an association between the separatist and functional forms of thought is inherent in the utterances within the conception of *'the human being through self-activity'*, in which the human being is conceptualised through the designers' self-activity. This understanding implies that the designers may be aware of more than just the physical features of their own actions within their interactions with IS. In these conceptions the internal horizon expands from one human feature – physical – to activity indicating the possibility of conceiving more than one implied human feature with respect to the characteristics of the designers themselves. Also, the nature of the IS-user relationship is seen as viable rather than hindered by physical stress symptoms. In this way the relationship between the separatist and the functional conceptions is hierarchical.

Finally, horizontal associations between the preceding separatist form of thought and the functional way of thinking appear within the conception of *'the human being as an active knower of computers'*, which emphasises humans as active knowers of the functions of software. Then it is implied that there may be an opposite possibility for regarding humans as not knowing those functions. Similarly, humans understood as being exclusively enthusiastic about technology, which is revealed in the conception of *'the techno-enthusiast human being'*, suggests that there may be views concerning people's opposite kinds of experiences. Within these conceptualisations, the internal horizon does not expand from that of the preceding conceptions but raises a related alternative view, i.e., the relationship between the functional and separatist understandings is parallel to a structural point of view. This appears as parallel negative-positive dimensions concerning the conceptualisation of the phenomenon in question. That is, negative emotions in relation to positive emotions, and ignorance in relation to knowing. However, these parallel structures embody referential aspects that render these conceptions as separatist or functional with respect to the human being as a user of an IS.

To sum up, within the functional form of thought the designers understand human behaviour in an insubstantial manner that signifies a functional understanding of human characteristics. This form of thought incorporates conceptualisations according to which the

human being is understood as behaving functionally. In other words, humans are seen to carry out certain tasks without a full human substance, adapting to the external affordances inherent in the functions of technology, work tasks, and the way that the IS designers themselves use computers. Within this adaptation, positive emotions are required in order to create and sustain viable interactions with IS. In this way the IS-user relationship is seen as unidirectional: the human being is seen to be determined by her external environments, and role of human emotion is to facilitate this process of external determination. Finally, in the next section I describe the form of thought which indicates the most comprehensive understandings of the human being as a user of an IS compared to the two preceding trains of thought.

7.3 The holistic form of thought

The most comprehensive way that the IS designers conceptualise humans as users of IS is the holistic form of thought. It appears as holistic in several ways (Figure 28). First, unlike in the preceding forms of thought, the designers recognise a number of human characteristics in regard to technology, work, business, knowledge, emotion, and the designers' selves. Second, these observed human features are often seen to co-exist or intertwine with each other. Third, the conceptualisations suggest that the relationship between users and designers as well as the IS-user relationship is a reciprocal process including characteristics typical of human behaviour as a primary substance. Fourth, human characteristics connect the different conceptions within this form of thought. Last, the conceptualisations within this form of thought imply a tacit understanding of the previous functional way of thinking.

The holistic form of thought is comprised of conceptualisations in which human features such as intelligence, human-like figures, and communication as a socio-cultural characteristic are seen to be incorporated in technology. In addition, the human ability to learn is understood as included in organisational work activities, and a human feeling of contentment is seen as a background feature for a sustainable customer relationship. Further, humans are conceptualised as mutually understanding each other, showing emotionally balanced behaviour, and aspiring to a feeling of mastery concerning the activities of the designers themselves through technology.

These conceptualisations indicate that within this form of thought the observed human characteristics are seen to co-exist or intertwine with each other in numerous ways. Besides being rich in human characteristics, these conceptualisations refer to understandings according to which the interactions between users and designers as well as users and IS have a variety of human substance. To begin with, in the conception of *'the human being reflected in technology'*, which denotes human characteristics incorporated in technology, human cognitive features such as intelligence and reasoning, a social characteristic referred to as communication, and a cultural aspect concerning different notions of preciseness are recognised, even though as properties of technology. In addition, human-like figures are depicted in a manner that renders technology as having emotionally shaded features, as bringing a 'human sense' to technology. These depictions of human features in technology reveal understandings that suggest that human features built into technology render the

interaction between users and IS as resembling the interplay of cognitive, emotional, social and cultural aspects that occur between humans.

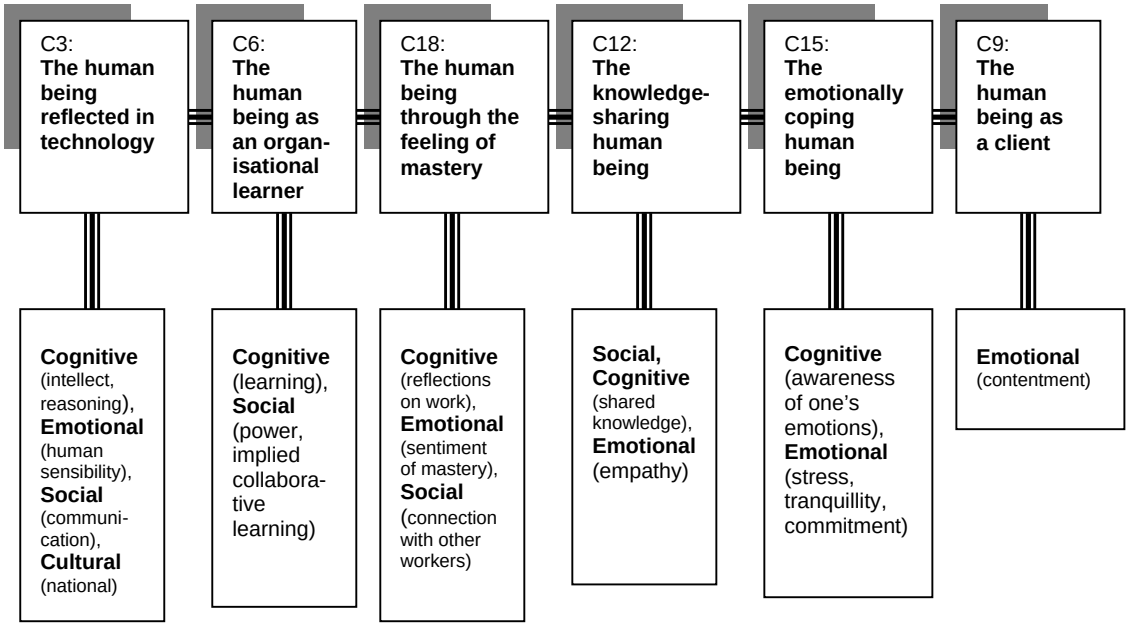

FIGURE 28. The holistic form of thought.

Secondly, the conception of *'the human being as an organisational learner'*, which highlights people as organisations which learn about their own work processes, refers to learning which stresses both cognitive and social human features. Collective cognitive features are referred to as an organisation's ability to form new insights into its work processes. Social features are revealed in that power inherent in different organisational positions is acknowledged. A social dimension is also implied when people are described as supposed to learn as an organisation. These conceptions signify understandings according to which social and cognitive human features emerge in individuals and within the interactions between humans.

Thirdly, as implied by the conception of *'the human being through the feeling of self-efficacy'*, the designers' own aspirations for a feeling of mastery gained through an IS, particularly a user interface, emphasise cognitive, emotional and social aspects in the interaction between users and IS. These above-mentioned aspects are seen as a reduced cognitive load, interpersonal information management and a feeling of mastery promoted by the system. Fourthly, human cognitive, emotional and social characteristics are evident in the conception of *'the knowledge sharing human being'*. Then the cognitive characteristic is referred to as understanding, the emotional aspect is empathy that is evident in being able to take another's perspectives into account, and the social feature is denoted as interpersonal knowledge sharing. Fifth, the conception of *'the emotionally coping human being'* refers to an ability to regulate both negative and positive subjective feelings. In addition, a cognitive aspect is seen as inherent in emotional coping in that it requires individuals' cognisance of their different emotional experiences. Finally, emotional human feature is emphasised in the conception of *'the human being as a satisfied client'*, which signifies contentment as a

particular human feeling. Contentment is then seen as a major factor in the sustainability of customer relationships.

In the above-mentioned way the holistic form of thought is comprised of conceptualisations that regard human cognitive, emotional, social and cultural features as inherent in people, incorporated in technology, and emerging within the interactions of humans and IS. These human features also bring the different conceptions together. That is to say, the conceptions belonging to this form of thought embody similar basic human modes of being as shown above. However, the aforementioned basic modes of being emerge in these conceptions as different behavioural affordances. Therefore, the conceptions are distinctive but yet associated in that the cognitive mode of being is seen as intellect, reasoning, learning, reflection, understanding and awareness of something. Similarly, the emotional mode of being is conceptualised as empathy, stress, tranquillity, commitment, contentment, and a feeling of mastery. Further, the social mode of being is referred to as a need for communication, group learning, interpersonal power and connection as well as knowledge sharing. The cultural mode of being is understood as the difference that technology conveys to the working methods of employees from different nationalities.

Further, the holistic form of thought is associated with the previous form of thought in that it implies in several ways a tacit understanding of the preceding functional way of thinking. For one thing, the holistic view of the human being as reflected in technology indicates that the designers are aware of both the features of that technology and human characteristics, instead of focussing on technology. For another thing, human activity as understood as organisational learning implies an awareness of the functions inherent in work tasks and the job titles of those humans. Furthermore, conceptualising humans as satisfied customers suggests that more non-human business related understandings of people, such as understanding the human being in terms of cost-effectiveness, are possible. Within these conceptualisations, the external horizon is expanded from that of the preceding conceptions, i.e., the relationship between the functional and holistic understandings is hierarchical. This expansion appears as three kinds of transitions towards conceptions within which human characteristics are recognised. First, from reflecting an insubstantial use of technology to considering human features incorporated in technology. Second, from thinking about people's work tasks to focussing on their learning of those work tasks. Third, from considering the cost-effective use of IT products to recognising a human characteristic that ensures sustainable customer relationships. In this way the relationship between the separatist and the functional conceptions appears as hierarchical.

Moreover, an association between the holistic and functional forms of thought is inherent in the conceptions in which the human being is conceptualised through the aspirations experienced by the designers for the feeling of mastery. This understanding implies that the designers are aware of their own cognitive, emotional and social needs in addition to reflecting their own activities in regard to interactions with IS. In these conceptions the internal horizon expands from insubstantial self-activity to behaviour indicating cognitive, emotional and social human features that are in accordance with the designers' experienced aspirations.

The final associations between the preceding separatist and functional forms of thought and the holistic way of thinking appear within the descriptions that emphasise humans in regard to knowledge and emotions. First, the conception of the knowledge sharing human being contains an assumption that any one of the humans engaged in knowledge sharing may

be either knowledgeable or ignorant concerning technology. Respectively, humans understood as capable of emotional coping suggests that those people are experiencing many kinds of subjective feelings, either negative or positive in nature. Within these conceptualisations, the internal horizon expands from that of the preceding conceptions by combining the phenomena of focal awareness of the separatist and functional conceptions, i.e., the relationship between the holistic form of thought is equally hierarchical to the functional and separatist understandings.

To summarise, within the holistic form of thought the designers understand humans in accordance with the cognitive, emotional, social and cultural modes of being. These modes of being are seen as behavioural affordances indicating human intellect, reasoning, learning, reflection, understanding and awareness of something. Further, the emotional mode of being is conceptualised as empathy, stress, tranquillity, commitment, contentment, and a feeling of mastery. Moreover, the social mode of being is referred to as communication, group learning, interpersonal power and connection, as well as a need for knowledge sharing. The cultural mode of being is understood as a difference that a technology embodies in the working methods of workers from different nations. These affordances are seen as incorporated in technology, appearing between humans, or within the interaction of humans and IS. In the next section, I discuss the third layer consisting of the designers' individualised forms of thought.

8 The third layer: Individualised forms of thought

In this section I present the IS designers' individualised forms of thought which highlight how they conceive as the human being as a user of IS in relation to how they conceptualise those humans. That is to say, these forms of thought express the third level between the general intersubjective level and the individual's own level, a level of personal modes of thinking in regard to the collective habits of conceptualisation. In addition, the individualised forms of thought express how individual designers' thinking differs with respect to levels of understanding: these ways of conceptualising the human being reveal a one-way hierarchy of different levels of understanding. This hierarchy of the IS designers' individualised conceptions is the final outcome of the analysis in this study.

On the basis of the results of this study, the IS designers' personal modes of conceptualisation support the proposals for the hierarchical nature of conceptions. This hierarchy of conceptions is revealed in two ways. For one thing, the hierarchy is implied by the referential aspects of the more comprehensive conceptions, which tacitly suggest an understanding of more partial conceptions, as is emphasised by Marton and Booth (1997). As pointed out above, this is evident in that the separatist form of thought is a part of the functional manner of thought which, in turn, forms part of the holistic form of thought. Notably, this order is in accordance with a one-way relation: the holistic mode of thinking implies a tacit understanding of the more partial trains of thought, but the reverse order is not possible. For another thing, the hierarchy is evident in that within the more comprehensive individualised forms of thought there simultaneously appear less comprehensive modes of thought, as is highlighted by Sandberg (2000). This is revealed in that the IS designers who

embrace a holistic form of thought also express less comprehensive conceptions. Respectively, the designers holding a functional form of thought express also separatist but not holistic conceptions. The designer expressing predominantly separatist conceptions does not refer to functional or holistic conceptions. These personal modes of thought indicate that the twenty designers embrace four different but interrelated patterns of conceptualisation (Figure 29). In what follows I briefly present these four individualised forms of thought, which are comprised in a hierarchical manner of the range of the IS designers' conceptions[4].

The final phase of the analysis revealed that only one designer (D12) remains within the separatist train of thought with, nevertheless, some functional orientations. However, this designer does not fully express functional conceptions and totally lacks holistic ideas. Twelve of the designers embrace the functional form of thought (D1, D2, D3, D4, D5, D9, D13, D15, D16, D17, D19 and D20). Also, these designers express separatist conceptions but not holistic conceptualisations. Only one of them does not fully reveal separatist conceptions (D3). Two designers adopt the functional mode of thought with some holistic features and also express separatist conceptions (D10 and D18). Five designers embrace the holistic level of understanding and also possess functional and separatist conceptions (D6, D7, D8, D11 and D14).

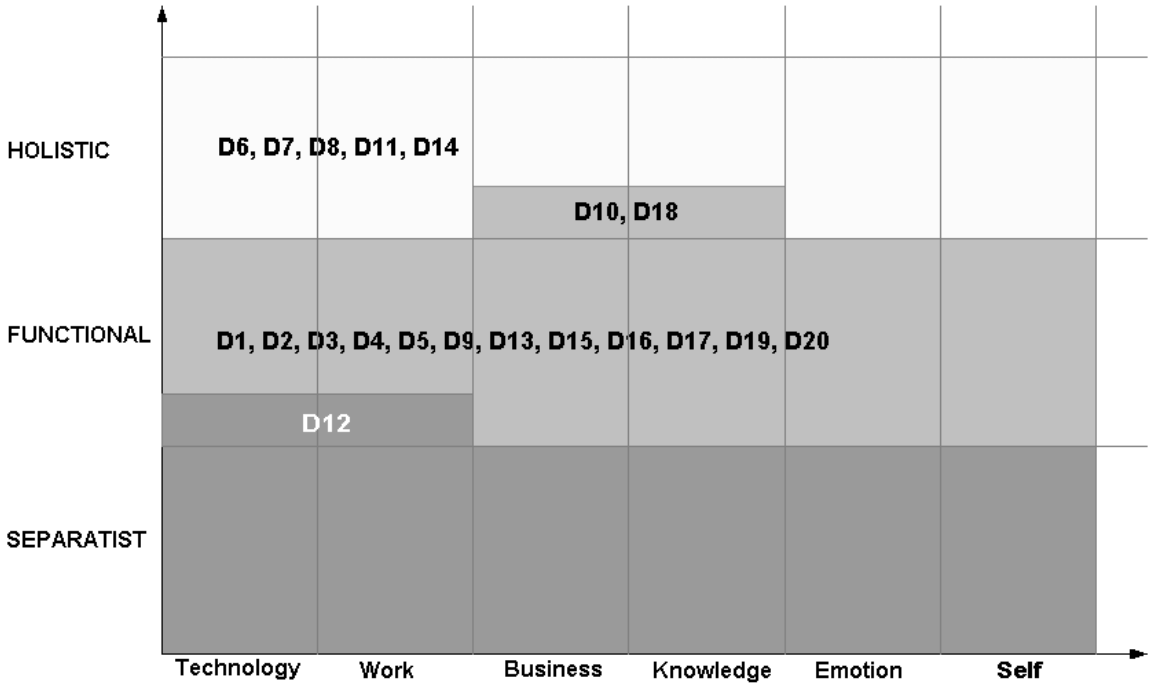

FIGURE 29. The hierarchy of the IS designers' individualised forms of thought.

The designer holding a separatist form of thought also embraces technology- and work-related context-centred functional orientations. Also, this individual totally lacks holistic ideas. A technocentric predisposition is a prevailing feature of his form of thought. The most central conception is *'the human being displaced by technology'*, which suggests that humans are understood in terms of technology; sometimes even to the extent that the traditional term 'user', which is meant to refer to human beings in the context of IS, transforms into a

[4] The tables indicating the individualised form of thought of each designer are in Appendix 3.

technical term. This predisposition implies that the human being and technology as elements of an IS are conceived as separate entities with the focus only on technology. Therefore, it seems that human features are not recognised and no relationship between humans and IS is seen. However, the simultaneous occurrence of the conception of *'the invisible human being'* augments this particular designer's thoughts towards the functional form of thought, nevertheless, in a technology-centred manner which does not fill out this predisposition in terms of human characteristics.

Further, typical of this separatist form of thought – as suggested by the conception of *'the human being as a job title'* - is that human characteristics are seen as separate from job titles. The actual human features are then not described and, thus, the human being and work activities are understood as separate entities with the focus only on formal job descriptions. A departure from the separatist work-related conceptualisation is this designer's reference of the conception *'the human being behind the process of work'* which slightly opens the separatist conceptualisation tendency towards the contemplation of work tasks that are assigned to people. However, the focus remains on the context rather than on humans, as is also the case with the inclusion of the conception of *'the human being as a market'*, in which humans are seen in terms of sales profits. Again, the actual human characteristics are not described and, therefore, it is assumed that people can be imagined as constituting a market for IT products. Humans are then seen only as featureless consumers, who are thought of only in regard to their potential monetary contribution to the IS firms.

In addition to the above mentioned context-centred ideas the designer recognises some human characteristics which, however, are seen as preventing humans from using IS. The separatist conceptions of *'the technology-illiterate human being'* and *'the computer-anxious human being'* are elements of this designer's form of thought and, consequently, humans are seen as incompetent users of IS because they are technology illiterate and afraid of computers. The human features that are recognised within this form of thought imply negatively shaded predispositions. The conception of *'the human being through the physical self'* is the only separatist view that is missing from this particular designer's conceptualisations. However, this conception is revealed in the other designers' conceptualisations.

Twelve of the designers embrace the functional form of thought. With the exception of one predominantly functionally oriented individual, these designers also reveal separatist conceptions but not holistic conceptualisations. In this way this form of thought expands the intellectual space of these designers. This expansion becomes apparent both in the associative transitions that connect the separatist and functional conceptions and in the simultaneous revelation by these designers of both separatist and functional conceptions. First, the conception of *'the invisible human being'*, which denotes people as using the functions of IS in an insubstantial way, implies that the designers are aware of the functions of those systems. Second, the conception of *'the human being behind the process of work'* signifies human activity, understood as functions of work tasks, and suggests that the designers are cognisant also of the job titles of those humans. Third, understanding the human being in terms of cost-effective use of IS, as suggested by the conception of *'the human being in terms of cost-effectiveness'*, acknowledges the possibility that a user may also be a part of the market for IT products. Fourth, as indicated by the conception of *'the human being through self-activity'*, from conceptualising humans through their own physical constraints to reflecting on their own actions and interests concerning the use of IS in order to adjust their designs to human behaviour. Finally, loose associative transitions that connect the separatist and functional

conceptions are also suggested by the conceptions of *'the human being as an active knower of computers'* and *'the techno-enthusiast human being'*. Then it is implied that, in addition to regarding people as knowledgeable of computers, there may be an opposite possibility for considering humans as ignorant of technology. Similarly, humans understood as being exclusively enthusiastic about technology implicitly raises the question of whether there are views concerning people's opposite kind of experiences.

Moreover, the intellectual expansion from separatist to functional forms of thought becomes apparent also in that these twelve designers simultaneously reveal both separatist and functional conceptions (Figure 29, see also Appendix 3). Noteworthy is that this simultaneous appearance corroborates the implied associative connections between separatist and functional forms of thought despite the obvious variance in the degree of remoteness of such associative connections. That is to say, although the associative connections between the different levels of understanding are implied in a more or less remote way, the individual designers seem to actually embrace such modes of conceptualisation. Consequently, in addition to having separatist predispositions, the twelve designers understand people and their behaviour in a manner that suggests a functional understanding of human characteristics. As described earlier, this form of thought incorporates conceptualisations according to which humans are seen to perform certain tasks without a full human substance, adapting to the external affordances inherent in the functions of technology, work tasks, and the way that the IS designers themselves use computers. Within this adaptation, positive emotions are required in order to create and sustain viable interactions with IS. In this way the IS-user relationship is seen as unidirectional: the human being is seen to be determined by his or her external environments, and the role of human emotions is to facilitate this process of external determination. This suggests also that these designers' focus of reflection concerning IS design is on the issues external to human beings.

Two of the designers that predominantly adopt the functional mode of thought also express two holistic conceptions. Aside from embracing the functional and separatist forms of thought these designers also reveal the conceptions of *'the human being as a satisfied client'* and *'the knowledge-sharing human being'*. They emphasise clients' satisfaction that ensures sustainable customer relationships, and regard mutual between users and designers understanding during ISD as essential. In this way their functional manner of thought is broadened to include understandings of creating and maintaining collaboration.

Five designers reach the holistic level of understanding and also reveal functional and separatist conceptions. Their intellectual space is expanded beyond the previous forms of thought in that they recognise a variety of human substances. As described above, the holistic form of thought reveals conceptions which are rich in human characteristics. First, the conception of *'the human being reflected in technology'*, which denotes that human characteristics, such as intelligence and reasoning, a social characteristic referred to as communication, and a cultural aspect concerning different notions of preciseness, are recognised, even though as properties of technology. In addition, human-like figures are considered to render technology as having emotionally shaded features. Second, the conception of *'the human being as an organisational learner'*, which highlights people as organisations that are learning about their own work processes. Here collective cognitive features are referred to as an organisation's ability to form new insights into its work processes. In addition, social features are revealed in that power inherent in different organisational positions is recognised. Third, as implied by the conception of *'the human*

being through the feeling of self-efficacy', the designers' own aspirations for a feeling of mastery gained through an IS, particularly a user interface, emphasises cognitive, emotional and social aspects in the interaction between users and IS. Fourth, human cognitive, emotional and social characteristics are evident in the conception of *'the knowledge sharing human being'*. Then the cognitive characteristic is referred to as understanding, the emotional aspect is empathy, which is evident in being able to take another's perspectives into account, and the social feature is denoted as interpersonal knowledge sharing. Fifth, the conception of *'the emotionally coping human being'* refers to an ability to regulate both negative and positive subjective feelings. In addition, a cognitive aspect is seen to be inherent in emotional coping in that it requires individuals' cognisance of their different emotional experiences. Finally, feature of the emotional human is emphasised in the conception of *'the human being as a satisfied client'*, which signifies contentment as a particular human feeling. In this way five of the designers' reveal understandings that refer to a capacity for taking human characteristics into account in ISD.

In the following chapter the results of the present study are further discussed.

PART V: DISCUSSION

In this chapter I discuss the results of the present study, and, in particular, what the results tell us about the question examined in this thesis. The results –IS designers' conceptions of the human being – shed light on the ways that Finnish IS designers are cognisant of humans and their behaviour as users of IS. In so doing, the findings may correct certain common assumptions that prevail in the practice of contemporary systems development. Moreover, they have implications for the ways that humans are taken into account as users within the different situations of ISD. Therefore, the IS designers' conceptions also provide an insight into the extent to which the current construction of IS adequately accounts for the subsequent humanised use of IS. In other words, these conceptions demonstrate how Finnish IS designers see the presence of human action within the affordances and constraints of contemporary IS and their development.

From the human-centred perspective adopted in this study, emphasis is placed on the behaviour that emerges from the basic human modes of being within interaction between humans and the technical world. Respectively, the interaction between humans and IS emerges as fluid and coherent when the IS allows users to act in conformity with their basic modes of being. Therefore, understanding human action requires insight into the physical, organic, mental, social and cultural modes of being and their implications within the dynamic interactions that occur between humans and IS as well as between users and IS designers during the process of ISD. However, the results indicate that the IS designers conceptualise humans both in a context-centred and in a human-centred manner. Within the context-centred conceptions the IS designers' focus of reflection is on the context of people, whereas the actual human qualities recede into the background. Humans are then conceptualised in terms of technology, organisational work, and business. Within the human-centred conceptions the designers focus their reflections on human characteristics such as the ability to embrace knowledge, emotions, and on the designers' selves. The contexts in which these human qualities are delineated are common in ISD: technological knowledge, computers and ISD activities. The conceptions resulted from this study reveal three distinct but associated forms of thought which express three different levels within the IS designers' understandings of the human being. First, the separatist form of thought signifies ways that the human being becomes separated from viable interactions with both the designers and IS. Second, the functional form of thought indicates ways in which the human being is understood to act predominantly without a human substance, i.e., in a functional manner. Third, the holistic

form of thought denotes ways that the IS designers understand humans in terms of the cognitive, emotional, social and cultural modes of being.

Respectively, the separatist form of thought uncovers constraining factors, the functional form of thought demonstrates functional affordances, and the holistic form of thought illustrates human affordances within the interactions of people and IS as well as between IS designers and users. These different levels of understanding represent also a hierarchy which grows from a partial way of thinking to a stance representing functional affordances, and finally, to a extensive form of thought that embraces explicitly numerous human affordances and, thus, indicates a standpoint which is likely to contribute to the humanisation of IS. Unfortunately, the results also suggest that the separatist and functional forms of thought are more common than the holistic form of thought.

This chapter is constructed as follows. First, I discuss the results of the study in the light of other relevant studies in order to illustrate the essence of the different forms of thought. In so doing, I aim at generalising the findings by providing a rich picture of the IS designers' conception of the human being as a user of IS (cf. Walsham 1995). Second, I discuss the different forms of thought in regard to human-centred ISD. Third, I discuss the limitations of this study and make some suggestions for further research. Fourth, I suggest certain implications raised by the results, and finally, I discuss certain principles for evaluating the conduct of this study.

9 The separated human being

The separatist form of thought elucidates how the IS designers see humans within the affordances and constraints of contemporary IS and their development as separated from fluid and coherent interactions. Within this form of thought, the human being is outside the IS designers' awareness through objectivist conceptualisations. In this way humans become intellectually separated from IS and their development. In addition, humans become separated attitudinally from IS and their development due to a presumed lack of technological knowledge, and thus, are forced to encounter disparaging attitudes. Furthermore, the IS designers give descriptions of humans which reveal both negative emotional and physical characteristics in individuals that appear as separating people from viable IS-user interaction. The following section describes these separating constraints.

9.1 Objectivism and disparaging attitudes

According to the IS designers' conceptions a common way that the human being becomes separated from IS and their development is a tendency to conceptualise humans in terms of non-human phenomena such as technology, job titles and sales profits. These kinds of notions imply understandings according to which the nature of the human being is separate from humans and can be found through the features of information technology, formal job descriptions, and mechanisms of economy. Actually, the designers' depictions reveal a tendency to think in accordance with beliefs often referred to as objectivism which posits that

reality exists independent of humans and can thus be understood independent of humans, and that the real world is fully and correctly structured so that it can be modelled (e.g., Lakoff 1987, 158).

Objectivism is claimed to be common within the field of IS. It has been found to be the dominant perspective in IS research (Orlikowski and Baroudi 1991), computing (Grundy 1998), and is also a prevailing assumption underlying computing professionals' codes of ethics (Vehviläinen 1997). Considering that the separatist technology-centred conception '*the human being displaced by technology*' is clearly the most frequent and '*the human being as a job title*' is also a numerous conception within the 18 IS designers' conceptions resulting from this study, the objectivist features of the separatist form of thought suggest that objectivist perspectives are common also in the current practice of ISD. Further, this gives reason to presume that a particular way of developing IS referred to as the Cartesian approach (Ehn 1988, 51-54) is still in use. The Cartesian approach is based on the version of rationalism originally formulated by René Descartes and it rests on a dualistic ontology and epistemology inherent in objectivism. Cartesian IS designers are observers who do not participate in the world they are studying. Instead, they chart the course for IS development by deduction from the objective facts that have been gathered. The appropriate basis for building systems is found in detached reflection by means of rationalist reasoning. Then the IS designers consider the world as objective facts that do not depend on the activity and interpretation – or even presence – of users.

This rationalistic orientation has long-established traditions in science in general and its implications for ISD, such as the Cartesian approach, have significantly influenced the field of IS (cf. section 2.1.1). Winograd and Flores (1986, 16) illustrate the weight of this influence by stating that the rationalist tradition is regarded as the very paradigm of what it means to think and be intelligent. Moreover, Bødker and Greenbaum (1993) shed light on the nature of objectivist features in ISD by arguing that within rationally oriented systems development a separation of people from things is made by incorporating formal sets of procedures for investigating things identified as data. Within this method of developing IS the designers' focus of reflection is directed to abstract models of reality from which people are excluded. Burrell and Morgan (1979, 105) regard such investigations as abstracted empiricism, which represents a situation where an objectivist methodology is used to test a theory which, in turn, is based on an ontology, an epistemology, and a theory of human nature of a more subjectivist kind. In other words, the espoused methodology is then inconsistent with the nature of the object of investigation. As suggested by Bødker and Greenbaum (1993) and the conception of '*the human being displaced by technology*', the consequence is that while the IS designers are using the methods of traditional rationalist systems development, they learn to think accordingly about the objects of their designs. That is to say, they implicitly learn to assume that humans are associated with fully structured things that may be acknowledged as data, or in phenomenographical terms, they learn to assume that the internal horizon of conceptualisations in ISD concerns abstracted and structured things, whereas ill-definable issues, such as human behaviour, form the external horizon. In this way the human being disappears from the IS designers' awareness through objectivist conceptualisations. This claim is corroborated by the findings of Eteläpelto (1998, 79), who asserts that the adoption of IS methodologies determine IS students' opportunities to acquire relevant expertise. If they use human-centred methodologies, they evidently acquire tools for taking the users' perspective into account. In contrast, if they use traditional methods, they will tend to adopt

these methods in the future, even if their theoretical studies included human-centred standpoints. Considering the above suggested prevalence of the rationalist tradition, it is in some respects understandable that the IS designers do not always recognise any characteristics typical of humans, although they are building IS for people.

Nevertheless, the most striking shortcoming of the Cartesian approach is, according to Ehn (1988, 54), that it renders people's subjectivity and, especially, their skills invisible. This is evident in objectivist conceptualisations within which humans are excluded from consideration and, thus, also their skills are omitted. This feature is in line with the IS designers' conceptualisations of humans as technologically naive. The separatist knowledge-centred conception of '*the technology illiterate human being*' produces accounts according to which the most distinct characteristic of humans is that they are ignorant of technology, specifically computers, software and ISD methodologies. In particular, this illiteracy is seen as a contrast to the IS designers. Beath and Orlikowski (1994) report similar findings in their analysis of a relatively new representative of the ISD methodologies' rationalist tradition, Information Engineering (IE). According to the analysis, the IE text creates and sustains both implicitly and explicitly a dichotomy between users and IS designers by characterising the users as technologically ignorant in regard to the use of technology. When operationalised, these characterisations are likely to generate non-viable and unsatisfactory interactions between users and IS designers. If the designers treat the users as ignorant, it is fairly probable that the users feel themselves to be neither equal participants in ISD nor taken into account as humans.

Contrasting understandings, particularly with the disparaging attitudinal predisposition suggested by the IS designers' conception of '*the technology illiterate human being*', is an obvious source of tension and hindrance during ISD. Research findings that support this assumption are provided, for instance, by Orlikowski and Gash (1994), who report that different understandings and values in regard to technology held by IS designers and users result unintentionally and unknowingly in misaligned expectations, contradictory actions, and unanticipated organisational consequences during IS implementation. Further, Newman and Noble (1990) found that during systems development, conflicts are partly due to a semantic gap which makes it difficult for the involved parties, i.e., users and designers, to understand the others' point of view, and partly to a conflict of interest, the users being concerned with their work and the designers adhering to their design considerations. More recently, Davidson et al. (2001) argue that contrasting orientations, such as assumptions, values and expectations, between technical people and other professional users may have the most extensive influence on decisions and actions that lead to conflict during IS development.

Moreover, Beath and Orlikowski (1994, 366) find it contradictory that in portraying the designers as knowledgeable and the users as ignorant, the IE text does not explain why IS designers should be better prepared to develop IS than users. This is significant since the procedures that are designed during ISD are traditionally often concerned with the functions of a user organisation such as business logic, work practices and information flows, subjects which users normally are more knowledgeable about than designers. Forbearance of this kind mirrors a considerable technocentric predisposition towards users: they are conceived solely in terms of their relationship with technological knowledge rather than as important actors shaping and building IS, of which technology is just one part (Jones 1991).

It is also obvious that the designers do not consider the weaknesses in users' knowledge and thought as an issue that should be taken into account as an object for design. However,

from a human-centred point of view or when the human being is included in the design considerations, the weaknesses and flaws in people's thinking should be understood as natural human behaviour that can be appropriately aligned or even prevented by adequate design. The best-known stance of this kind is that of Norman (1989, 153-164), who distinguishes numerous types of errors and mistakes that people are prone to make with computers due to the natural functioning of human cognition. IS designers should be aware of such errors and realise that they are due to unconscious cognitive biases which serve to reduce and combine mentally cumbersome quantities of information (Robillard 1999, see also Anderson 2000). Also, Kirs et al. (2001) point out that cognitive biases should be recognised within ISD. They develop a process model for designers to identify ISD situations in which such biases are likely to occur. The idea is that designers should be aware and recognise these erroneous tendencies in users in order to implement IS planning and design that aims at preventing humans from engaging in faulty actions during computer use, rather than conceptualising users as ignorant of technology.

In addition to the technocentred objectivism depicted above the IS designers hold objectivist views also when conceptualising humans in terms of job titles and market mechanisms. By depicting humans by their job titles the designers express understandings that are in accordance with formal job descriptions. However, as has been pointed out by Argyris and Schön (1978) as well as by Brown and Duguid (1991), formal depictions of work do not correspond to the way that people actually perceive and structure their performance in the constantly changing conditions of modern work. Formal notions of work, expressed for example as job titles, are abstracted from work practices to an extent that they do not enable clear understandings of the actual human action in different practices. Objectivism is evident in these abstracted conceptions of work in that they assume work and the working human being to be separate entities. Furthermore, in line with the rationalist tradition of building IS, Sandberg (2000) considers objectivist delineations of work competence to be incorporated in a rationalist way of defining competence in firms. Then managers or consultants apart from the actual work practices define the criteria for competent action at work. Subsequently, it is assumed that the people who actually perform the work in question adapt their way of working to these predefined criteria, even if they conceive of these criteria as the best way of performing a particular working task or not.

In the same vein, by conceiving of humans in terms of market mechanisms the designers express understandings that are in accordance with views that are abstracted from actual human characteristics to the extent that they appear as objectivist. Within the conception '*the human being as a marke*t' the IS designers make use of expressions which show that their intention is to build products that are profitable and, therefore, easy to sell. Yet they do not base their intentions upon human features that could be a prerequisite for selling their products. However, understanding people's behavioural features in regard to their consumption habits is regarded as important in order to sell products (e.g., Chen and Wells 1999). For example, Mitchell and MacNulty (1981) reported some twenty years ago that humans were changing as consumers. Instead of responding primarily to the norms of others, people began to be motivated by their own inner wants and desires, such as preserving nature for their offspring and being athletic. Furthermore, yet somewhat unsurprisingly, Bellman et al. (1999) found that people who buy online have a 'wired' lifestyle which is predominantly indicated in that they order from catalogues using the Internet, search for product info online, make heavy use of e-mail, click on banners, and like being first to use new technologies.

Hoffman and Novak (1996), in turn, argue that it is important to understand humans' spontaneous and mood-related online behaviour in addition to more normative and goal-directed behaviour with respect to people's tendencies to make purchasing decisions. Nevertheless, in contrast to the notions that emphasise understanding human consumption behaviour, the IS designers adhere to a conception according to which humans are seen as a featureless mass of consumers forming the market for IT products. Because this conception does not incorporate any human characteristics but refers to a mass market, it makes a clear distinction between the market and the features of the people that are assumed to form the market. For this reason, the conception appears as objectivist. In this way the IS designers' conception of '*the human being as a market*' also implies a predisposition according to which current development of IS as an industry is that of rationalised institutions which produces mass culture by reducing humans to members of a mass (cf. Slater 1997, 71-73).

As described above, within the separatist form of thought the human being is absent from the IS designers' awareness through objectivist conceptualisations. In this way humans become intellectually separated from IS and their development. In addition, humans become separated attitudinally from IS and their development due to a presumed lack of technological knowledge. Furthermore, in some statements the IS designers emphasise standpoints which reveal both emotional and material characteristics in individuals that appear to separate people from viable IS-user interaction. In the following section these human constraints are described.

9.2 Emotional and physical constraints

According to the separatist form of thought, constraining behavioural affordances that separate humans from IS are negative emotions and physical stress symptoms. The conception of '*the computer anguished human being'* reveals views according to which IS cause negative emotional arousal in users. These reactions are shown as negative attitudes, resistance, fear and discomfort in situations where people are confronted by a planned future use of computers or in situations in which individuals use computers. According to some expressions, people tend to retain their negative sentiments towards computers irrespective of the suggested potential usefulness of IS. These conceptualisations are consistent with the statements concerning the commonness of technophobia.

Based on an earlier review, Brosnan and Davidson (1994) estimate that between one quarter and one third of the population of the industrialised world suffers to some extent from technophobia. Generally technophobia refers to people's negative affective and attitudinal reactions within the interaction of humans and computers (e.g., Rosen and Maguire 1990). Specifically, with respect to computer avoidance, the main elements of technophobia are claimed to be computer attitude and computer anxiety (Brosnan and Davidson 1994). In addition to these emotional and attitudinal components technophobia incorporates also more explicit behavioural features such as resistance to talking about computers or even thinking about them (Jay 1981). It is often seen to be due to the fact that technology appears as irrational to the people that suffer from technophobia (Brosnan 1998a, 10).

Technophobia is an essential phenomenon in regard to ISD because it clearly emerges as a factor that separates humans from contemporary IS and their development. Although user

resistance has been generally acknowledged as a disadvantage in ISD, it has not been fully accepted that it may be due to an actual phobia which forms a severe obstacle for some people to engagement in ISD projects or the use of computers (see, e.g., Friedman and Cornford 1989). It seems that user resistance has been treated as a minor attitudinal hindrance rather than a real problem. However, the IS designers' conceptualisations of '*the computer anguished human being*' give reason to assume that people are currently experiencing real computer-related anxiety within the activities of ISD. According to Barlow et al. (1996), experiencing anxiety refers to being in a negative affective state with a sense of uncontrollability focused on a possible future threat, danger, or other upcoming, potentially negative events. Incorporated in this negative affective state is a strong physiological component, which emerges as tension and arousal of the central nervous system. This state may be experienced without the necessity of conscious, rational appraisal, i.e., people may experience anxiety in a tacit manner.

Besides being an obviously unpleasant and undesired experience, negative emotions such as anxiety and fear make people's behaviour withdrawn and elusive by narrowing their action (Fredrickson and Branigan 2001). Respectively, computer anxiety has detrimental impacts on people's computing behaviour. For instance, Brosnan (1998b) found that computer anxiety directly relates to performance outcome in a database-searching task, causing anxious individuals to obtain more incorrect responses than less anxious individuals. Moreover, in another study Brosnan (1999) reports that the level of computer anxiety has a significant impact upon word-processing usage and perceived usefulness. That is to say, less anxious individuals perceived computers as more useful than individuals experiencing a higher level of computer anxiety. This result is in accordance with the IS designers' observation that people who have negative feelings towards computers tend to retain these sentiments despite the suggested usefulness of IS.

Furthermore, the designers depict situations in which people's negative sentiments towards computers are connected to changes in the environment of computing, such as the work environment, rather than to the technology itself. Then people's resistance and anxiety towards technology is seen as the fear of being replaced by machines and losing their jobs (Conde Vieitez et al. 2001). Another issue of this kind of environmental rather than technology-related computer anxiety that does not unfold in the designers' conceptions is gender differences in computerphobia. According to Brosnan and Davidson (1994), a major body of the literature concerning computer phobia asserts that women more often feel uncomfortable with computers than men. They maintain, however, that a number of inconsistencies in the research literature suggest that the nature of the interaction between gender and the computing environment appears to be more at issue concerning gender differences in computer phobia. As the socialisation processes within both training and working life imply a 'male' computing culture (Vehviläinen 1997), computer-related discomfort and anxiety experienced by women may be an issue of social environment in computing rather than technology itself (Brosnan and Davidson 1994).

Another human characteristic that appears as a constraining behavioural feature in the IS designers' conceptions is physical stress symptoms. According to the conception '*the human being through the physical self*'' the designers describe physical problems such as tension in the neck and fatigue in the eyes by referring to their own experiences with computers. These self-observations are reflected in regard to computers and visual display terminals (VDTs) as artefacts which form a concrete physical counterpart to humans' physical

modes of being. This conception underlines the fact that musculoskeletal disorders related to computerised office work have been increasing along with the distribution of computers, and are a significant health concern at the time. As Pan and Schleifer (1996) point out, these kinds of disorders rank first among work-related illnesses. For example, in 1984 musculoskeletal disorders accounted for 18% of all occupational illnesses in the United States, whereas by 1992, these illnesses accounted for 61% of all reported occupational disorders. Also the Australian epidemic of repetitive strain injuries among VDT operators during the 1980s is often referred to in order to explain the vast growth of computer-related musculoskeletal disorders (e.g., Lindgaard and Caple 2001). Physical stress symptoms such as neck pain and other indicators of musculoskeletal disorders are usually due to the sustained maintenance of specific human postures inherent in the use of ordinary workstations (McLean et al. 2001), especially VDTs (Psihogios et al. 2001) and keyboards (Lindgaard and Caple 2001), and also notebook computers (Horikawa 2001, Kelaher et al. 2001).

The recent vast growth in humans' computer-related physical problems gives reason to assume that the implications of the human modes of being, both physical and organic, such as the functions of the human sensory and motor systems, have not often been recognised as necessary design issues in the development of IS. Respectively, it seems that ergonomic design principles and guidelines have often not been embraced by the IS designers in regard to human-computer interfaces. Raisamo (1999, 4) illustrates this deficit by referring to Buxton's (1986) description of a future anthropologist's conclusions about humans based on the discovery of a fully stocked computer store with all the used equipment and software in an earlier working order: *"My best guess is that we would be pictured as having a well-developed eye, a long right arm, a small left arm, uniform-length fingers and a 'low-fi' ear. But the dominating characteristics would be the prevalence of our visual system over our poorly developed manual dexterity."* In its felicitousness this description also highlights the fact that the computer equipment that we currently use seems to be designed for beings that have physical characteristics that differ a lot from ours. A more probable explanation, however, is that characteristics typical of the human being have not been taken into account in the design of current computers. In particular, not even the most concrete and visible human characteristics, the implications of the physical mode of being, have been regarded as an important issue of design. This omission has also been seen as a hindrance for the successful diffusion of IS. Gaver (1996), for instance, argues that computerised office systems failed to meet with the expectations of paperless offices because the differences within the affordances of VDTs and paper in regard to the human visual sensory system were not acknowledged. The overlooked differences between paper and electronic documents have to do with their affordances for the display of information. For one thing, paper has a resolution that is far higher compared to computers. Thus, paper allows far greater subtlety and expression in the symbols and marks it displays than can be achieved on VDT screens. For another thing, paper conveys information by gradations of reflected light, not emitted light, which allows paper to merge with its surroundings more effectively than computer displays do. Due to these differences, Gaver (1996) asserts, paper and computers appear as complementing media to people, and they need to use them both. Partly due to the fact that the above-mentioned different affordances were not acknowledged at the dawn of office systems too excessive epochal expectations were set for the effects of those systems.

Although the inclusion of physical ergonomics design in ISD are traditionally lacking (see, e.g., Friedman and Cornford 1989), new technological innovations are expected to raise

the need for such design. Nichols (1999), for example, found several problems inherent in the use of a virtual reality system (VR), due to which traditional ergonomic design principles need to be applied. First, the VR users experienced discomfort in their shoulders, which may be caused by the prolonged static posture required to complete a VR task and by the weight as well as the design of a hand-held input device. Second, users experienced discomfort while wearing a head mounted display because of the weight – and its uneven distribution – of the headset and its poor fit. Third, non-intuitive design and the need for unnatural postures lead users into difficulties in using a hand-held input device. Fourth, users were distracted while using the VR system due to defects in the visual display. Lastly, the users were afraid of becoming tangled in the connecting cables, which were long in order to allow maximum user movement. Nichols (1999) concludes that an awareness of the physical ergonomics issues relevant to VR use and their consequences will lead to fewer problems and, thus, more effective use of VR systems. Yet improvement in physical ergonomics does not necessarily bring about improvements in 'emotional ergonomics', i.e., reducing or removing the fear that the users experienced during the use of the VR system.

Besides being an evident need in designing VR systems, the need to consider the design of IS from the point of view of physical human characteristics is revealed in the IS designers' conception of '*the human being through the physical self*'. This gives an additional reason for the IS professionals to pursue new innovative interaction techniques, such as two-handed interaction (Raisamo 1999), which broaden the physical affordances within the interaction of humans and computers. Moreover, it seems obvious that ISD efforts would benefit from incorporating ergonomics analyses, in particular computer-aided analysis techniques (Mattila and Karwowski 1992, Feyen et al. 2000), into the design of IS. Further attention should also be paid to the emotional ergonomics or emotional usability of IS.

In summary, according to the IS designers' conceptions that form the separatist form of thought, the human being becomes separated from viable interactions with both the designers and IS. This is due to a tendency to objectivist conceptualisation which blurs the designers' thought to such an extent that humans are not recognised as humans. Further, humans become separated from the development of IS due to disparaging attitudes inherent in the designers' understandings of users as technologically ignorant. Moreover, the separatist form of thought prioritises explicit human characteristics such as negative emotions and physical discomfort that are seen as an obstacle to viable IS-user relationship. In addition, within this form of thought, the designers do not express awareness of any other human characteristics than negative emotions and physical problems. Due to this lack of awareness of human mental, social and cultural characteristics, humans are not taken into account, and thus become separated from IS and their development in an implicit manner. Therefore, within this form of thought, the relationship between people and IS is non-existent in addition to being not seen as viable.

In the next section the functional form of thought is examined.

10 The functional human being

The functional form of thought elucidates how the IS designers see humans as engaged in functional interactions with contemporary IS and their development. This form of thought appears as functional in that the designers acknowledge humans and their activity but refer to it in an insubstantial manner. This signifies conceptualisations according to which the human being is understood as behaving functionally, i.e., carrying out a certain task without a full human substance, adapting to the external affordances incorporated in the functions of technology, work tasks, and the way that the IS designers themselves use computers. Within this adaptation, positive emotions are required in order to create and sustain viable interactions with IS. In this way the IS-user relationship is seen as functional: the action of humans is seen to be determined by their external environments, and the role of human emotion is to facilitate this process of external determination. For these reasons, the different conceptions that build up this form of thought reveal a behaviourist understanding of the human being.

However, this form of thought adds to the previous separatist way of thinking in that humans are depicted as performing tasks with computers, whereas in the separatist form of thought the conceptualisations omit human features or humans are seen as unable to use computers. In addition, the human feature that is recognised in this form of thought appears as positive – even though functional - by nature. Within this form of thought the human being is seen in a way that renders the relationship between users and designers as well as the IS-user relationship viable, yet in terms of behaviourism. In the following two subsections the features characterising this form of thought – applications of behaviourism and positive emotions – are discussed.

10.1 Applications of behaviourism

The functional form of thought is comprised of conceptualisations in which humans act in an insubstantial manner adapting themselves to the functions of technology, the tasks included in work processes, a cost-effective way of using IS, and to the manner that the IS designers themselves use IS. In addition, humans are understood in a functional manner in that they are assumed to be knowledgeable about the functions of software while using computers. Then the content of people's consciousness is seen to consist of the form and functions of software. The overarching idea that connects these conceptions into this form of thought is in conformity with behaviourism.

According to Hirsjärvi et al. (1982), behaviourism posits that the relationship between inherent human features and environmental impacts remains constant and quantifiable. That is to say, behaviourism rejects inherent human qualities such as activities of consciousness or a need for social relations as explanations for behaviour and aims to objectivity by concentrating the focus of investigation onto externally observed behavioural changes which, in turn, are direct consequences of environmental impacts. Probably the most best-known behaviourist theory is that of Skinner (1938/1991), which is often referred to as the 'black box'-theory. According to this theory, human behaviour is seen as physiological responses or reflexes that are caused by particular stimuli of the external environment. In this way

Skinnerian behaviourism treats individuals as 'black boxes', i.e., only physical-organic entities with no other human characteristics that could have an impact on human behaviour (Figure 30). In a similar manner, the functional form of thought discloses conceptualisations that depict humans and their behaviour as direct responses to particular stimuli of their task environments.

To begin with, the IS designers' conception of *'the invisible human being'* denotes humans as using IS in an insubstantial manner. Typical of this conception is the belief that there is a user who uses an IS. Yet the user is not characterised further but is assumed just to use the system. A functioning relation between people and IS is thus acknowledged but this does not include any features originating from the mental, social or cultural human modes of being. In other words, humans and their behaviour are understood as purely physical-organic responses to technology, as established in the tenets of Skinnerian behaviourism.

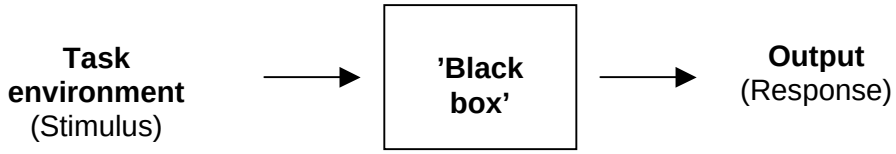

FIGURE 30. Skinnerian behaviourism.

Secondly, within the conception of *'the human being in terms of cost-effectiveness'* people are seen to be important only as objects for improving the efficient use of IS. Explicit delineations of human qualities are not included but the cost-effectiveness of IS is considered in terms of individuals' efficient use of those systems. The efficiency of a person's activity in regard to IS often concentrates on keystroke efficiency, which aims at increasing the motor efficiency of a user's performance, and thus, reducing the time needed for that performance (Gerlach and Kuo 1991). In this way humans are understood as physical-organic entities whose actions are motor responses to technology. Individuals' efficient use of computers is related to the cost-effectiveness of IS in that labour is often paid by time and, therefore, entrepreneurs are sensitive to productivity that is calculated with time as a determinant (cf. Lee and Liebenau 1999). Respectively, users' time-related performance has been considered in regard to the design of IS. A well-known model referred to as the Keystroke-Level Model was developed by Card et al. (1980) to facilitate IS designers in predicting the time-related motor performance of users. Besides defining users in terms of physical-motor features the model signifies a behaviouristic predisposition towards humans in that the IS-user relationship remains very much constant and quantifiable.

The Keystroke-Level Model asserts that the accomplishment part of a task can be described in terms of four dissimilar physical-motor operators: K (keystroking), P (pointing), H (homing), and D (drawing). In addition one mental operator (M) by the user, and a response operator (R) by the system are included in the model. The time (T) for performing a task is the sum of the time for each of the operators ($T_{execute} = T_K+T_P+T_H+T_D+T_M+T_R$). Most operators are assumed to take a constant time for each occurrence, only operators D and R are treated somewhat differently. In other words, human activity such as pressing a button, pointing to a target on a display with a mouse, homing the hands on the keyboard or other

device, and preparing mentally for executing physical actions are considered always to occur within a constant time sequence. Some flexibility is given to the drawing activity and to the response of the system. The IS designers' conception of *'the human being in terms of cost-effectiveness'* discloses a similar behaviourist understanding of individuals as users of IS that is embedded in Card's et al. (1980) model.

The Keystroke-Level Model, however, extends the Skinnerian physical-organic view of humans to include also a mental element. According to Atkinson (1988), a stance of behaviourism that incorporates human cognition into the physical-organic features of the 'black box' is referred to as logical behaviourism. Logical behaviourists insist that for each mental predicate that can be used in a psychological explanation, i.e., in an account concerning humans' mental states, there must be at least one description of behaviour to which it bears a logical connection. This means that all existing terms referring to mental states can be directly transferred to terms referring to behaviour, without any loss or change of meaning. Because the relationship of mental states and behaviour is regarded as equivalent, the opposite is also regarded as true: people's observable behaviour is understood as their mental states (Figure 31). For example, happiness would be merely the facial gesture of a smile.

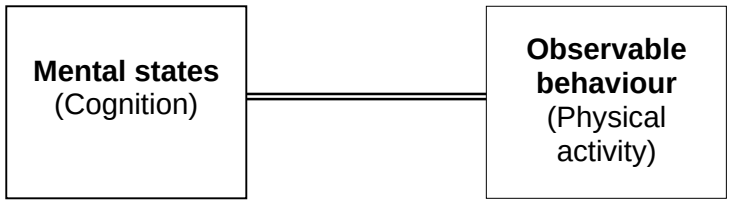

FIGURE 31. Logical behaviourism.

The IS designers' conception of *'the human being as an active knower of computers'* reveals understandings that embrace both Skinnerian and logical behaviourism. Typical of this conception is that humans are considered solely as being active knowledgeable users of computers. Because people are seen as knowing about computers it is assumed, on the one hand, that people's mental states and, thus, behaviour conform to the operation of computers. On the other hand, the designers delineate action as the essential factor in learning, i.e., humans' observable actions while using computers are seen as essential to being knowledgeable about computers. Then the emphasis is that human activity and, therefore, cognition are equivalent to the functions of computers. Consequently, people are knowledgeable about computers in that the content of their consciousness is equivalent to the operation of computers and, at the same time, physically they act accordingly. It is then assumed that, to acquire skill in the use of an IS, people must learn to acknowledge, directly and without intermediate reasoning, the qualities and characteristics of computers that they apprehend through the tacit sensations of the physical interface in their hand (cf. Schön 1987, 23). The logic that is simultaneously needed is acquired directly from the computer, without any reasoning or other explicit presence of mental processes. Learning is seen as totally lacking social interaction, complex cognitive processes and emotional or cultural aspects. Human knowledge creation is seen as cognitive-physical activity which involves acquiring

knowledge directly as it is presented, rather than actively interpreting or constructing it. A similar notion of learning is put forward by the behaviourist tradition of programmed learning. In the models of programmed instruction, learners are offered a preplanned sequence of stimuli in order to yield a particular response (Häkkinen 1996).

In the same vein, the IS designers' conception of *'the human being behind the process of work'* denotes humans in conformity with behaviourist thinking. Within this conception individuals are seen in terms of their work tasks or organisational work processes. Characteristic of these conceptualisations is that the people performing the tasks are not portrayed further but are assumed merely to use IS according to the task flows. It is emphasised, then, that human activity and, thus, cognition are equivalent to the task flows offered by IS. From the point of view of the interaction between individuals and computers these understandings centralise on the external tasks that people get involved in while using IS, rather than analysing the mental states of the performers of those tasks. However, in order to accomplish fluid and coherent interaction designs between humans and computers in regard to particular tasks, the users' mental models should also be analysed. For instance, Preece (1994, 409-429) stress that tasks have different aspects that should be considered in IS design. On the one hand, tasks refer to the structure of certain tasks. This aspect may be analysed and structured as an external task identified and defined by IS designers as part of a particular work process included in an organisation's actions (e.g., Diaper 2001). The analysis is then concerned with determining an accurate description of the sequence of actions that a person is assumed to use in order to accomplish a task from the point of view of work processes. On the other hand, tasks include knowledge that users require in order to accomplish a task. Then the essential issue of design is the way that humans intellectually confront computerised tasks, i.e., their mental models of those tasks. Especially important is to identify users' mental models concerning their goals and intentions with respect to a particular (computerised) task, and then design the system accordingly (Norman 1989, 201-305). Riley (1986), with reference to Greeno (1978), highlights that with respect to the learnability of systems it is of utmost importance that the IS designers align both the action structures and syntactic structures of systems functions in conformity with users' mental models of those systems. This is essential because users seem to act on the basis of their mental models even if these models do not facilitate their actions. Sinkkonen (2001), for instance, found that if individuals have formed strong mental models of how a particular device works, but this model does not help them to use the device, they still tend to rely on their mental models rather than begin to create a new model of the device. The point here is that in addition to the accurate definitions of external work tasks IS designers should base their designs also on analyses of humans mental models, in particular the task knowledge that people possess. Smith (1997, 54-55) asserts that the aim of these analyses should also be to fulfill the motivational and social needs of users in addition to the functional needs that refer to the accomplishment of specific tasks, which are submitted to users in operational situations. Without the inclusion of analyses of inherent human qualities, in particular their mental models, the design of computer-supported work tasks yields behaviourist designs which treat users as receivers of preplanned sequences of stimuli with the intention to produce a particular response.

From the point of view of the interactions between groups of people and IS, a number of statements that betray the features of both Skinnerian and logical behaviourism in regard to deploying IS in organisational work processes have been reported. One of the earliest remarks is made by Nurminen (1986), who criticises the traditional systems theoretical view of IS as a

rational closed system for its way of integrating humans into a technical system. This depicts people though they are tied to an automated assembly line. This is due to the assumption that the individuals actually performing the work do not have opportunities to define the contents of their work or to determine the way in which the system would best support their work. Rather, they are assumed to submissively act upon the tasks that are structured and scheduled by the system (Nurminen 1986). Behaviourism is evident here in that people are offered preplanned sequences of work tasks with an expectation that they respond accordingly, without any intermediate reasoning of their own.

Further, Zuboff's (1988) well-known distinction between 'automating work' and 'informating work' highlights the difference between implied behaviourist and non-behaviourist assumptions concerning human action in computerised work. Automating work refers to deploying technology in ways that increase the self-acting and self-regulating capacities of technical systems which are expected to minimise human intervention. Because human intervention is minimised and machines perform the work tasks, interactions between individuals and computers become determined by the structure and sequence of computerised workflows to which, in turn, humans are supposed to respond. Zuboff's (1988, 9-10) expression of automating work implies, thus, a behaviourist assumption of humans and their behaviour. Quite the opposite is suggested by the term informating work, which adds to the automating view of work in that information technology can be used to automate, but even as this occurs, it has the ability to translate the automated activities into a form that renders work processes, objects, events and behaviours visible, knowable and sharable for people. That is to say, within the interaction of humans and computers, people actively observe, interpret and share that information which is mediated to them by IS. They do not just respond like marionettes to the information offered by IS but actively construct their own conceptions of the computer-mediated tasks and act according to their own interpretations of the particular situation.

Moreover, Kling and Jewett (1995) contrast computerised work environments as rational and natural systems of organisational behaviour. In regard to the rational system, they claim that often systems analysts picture organisations as streamlined task systems. In this picture, organisations are seen as relatively "well-oiled machines" in which jobs are well-defined. Computerised systems of this kind aim at improving efficiencies, in particular people's methods of effectiveness. These features of a rational system bear a resemblance to the behaviourist view implied in the IS designers' conceptions of *'the human being behind the process of work'* and *'the human being in terms of cost-effectiveness'*. First, if organisations are seen as machines consisting of streamlined task systems, it is suggested that these systems are designed in terms of work flows comprised of external tasks, as is usual within the rational tradition of ISD (e.g. Bødker and Greenbaum 1993). Second, the aim of these "well-oiled" systems is to improve effectiveness, in particular people's methods of effectiveness with respect to work tasks. The design concerns, then, an accurate description of the steps that are required in order to complete a task but not the workers' conceptualisations of those steps because humans are regarded solely in terms of effective performance. Consequently, it is implied that delineations of human mental, social or cultural qualities are not included in the design rationale but the focus is on keystroke efficiency, which is assumed to accelerate people's action efficiency, i.e., the motor efficiency of users' performance. In other words, the rational systems view is in line with behaviourist features in that they are designed in terms of external tasks and the motor efficiency of users. This leaves out of the system other human

characteristics than physical movements and the direct organic responses to information. In contrast to the rational systems view of organisational behaviour, Kling and Jewett (1995) introduce a view of natural systems which goes beyond the rational systems view by emphasising the social relationships and action tendencies in organisations. This view also goes beyond the behaviourist view of users implied by the rational systems model in that it emphasises the inclusion of humans' social features in systems design and, respectively, defines the consequences of the computerisation of work processes as by-products of socio-technical configurations.

A special application of behaviourism within the functional form of thought that excludes users' full human characteristics from IS design rationales is implied by the IS designers' conception of *'the human being through self-activity'*. Within this conception the IS designers conceptualise human features in regard to their designs by drawing on their own behaviour and needs. It is argued that drawing on the designers' selves as a way of conceptualising users in regard to IS design is a common procedure. According to Akrich (1995), the mental models that IS designers make of users whenever they develop IS for people are either explicit or implicit. Explicit user representations are created with the aid of special skills or qualifications, such as market surveys or testing software on consumers, in the area of defining or interpreting user representations. Nevertheless, Akrich (1995) asserts that implicit models are more common and powerful than explicit ones. Implicit user models are unconscious and are frequently constructed by relying on personal experience referred to as the "I-methodology": designers implicitly understand themselves as representative of users (Rommes 2000). The I-methodology incorporates designers' characteristics into the systems by a process often referred to as 'inscription' which relies on the ideas of the social construction of technology (e.g. Grint and Woolgar 1997, 18-25). Technology is then seen as constructed within social interactions. The dominant interests within those social interactions render technology as reflecting those interests in its form and functions (Orlikowski 2000, 405). Thus, as suggested by the I-methodology, the IS designers' self-activity is the dominant perspective and influences what kind of people the systems are adapted to. Notably, the focus in defining user representations inherent in I-methodology is solely on the social characteristics of humans. Users are described then in regard to a social context of dominance often based on race, class, and gender (e.g., Vehviläinen 1997, McDonough 1999, Rommes 2000). However, in this study users are seen with respect to the physical, organic, mental, social, and cultural features of humans. Therefore, the IS designers' conception of *'the human being through self-activity'* is interpreted against a broader view of human characteristics than is assumed within I-methodology. In addition, the method of incorporating human characteristics into IS designs is treated differently than within the method of 'inscription'. In their utterances drawn on in this study the IS designers explicitly state that they are imagining themselves as users when they aim at humanisation of their designs. Therefore, the procedure of 'self-design' is conscious rather than unconscious.

Accordingly, the IS designers' conception of *'the human being through self-activity'* suggests that the mental, social and cultural features of users are left out of IS design. This is because, first, it is not likely that the users share the same views of the systems' use as designers (Orlikowski and Gash 1994, Davidson et al. 2001). Second, they share neither the same mental models of the tasks that are supported by IS (Beath and Orlikowski 1994, Norman 1998), nor the same kind of feelings towards the systems as the designers (cf. section 8.1.2). Third, the designers are not likely to represent the social and cultural features of

humans in a similar manner as the users (McDonough 1999, Rommes 2000). Thus, the mental, social and cultural features of the designers are not in conformity with those of users to an extent that could lead to valid designs with respect to the people who are assumed to take the systems into use. Consequently, only the designers' physical and organic features of behaviour bear a sufficient resemblance to the characteristics of users. In this way this conception implies a behaviouristic stance towards users: they become included in systems design only with regard to physical-organic behaviours.

In summary, within the functional form of thought humans and their behaviour are understood in conformity with behaviourist stances. Human behaviour is then seen as purely physical-organic responses to technology, as is established in the tenets of Skinnerian behaviourism. The interaction between humans and IS is seen to remain very much as occurring within constant time sequences. In addition, people's mental states and behaviour are appreciated as equivalent to the function and form of computers as well as to the task flows offered by IS. People are assumed then to submissively act upon the tasks that are structured and scheduled by IS. In addition, individuals become included in systems design only in regard to physical-organic behaviours. Yet this form of thought is comprised also of emotional human characteristics: positive emotions are seen to be required in the use of computers. The next subsection illustrates the functional role of such emotional features.

10.2 Functionality with the aid of positive emotions

Aside from behaviourism, another feature that makes up the functional form of thought is the way that positive emotions are drawn on. According to the functional form of thought the human being is understood as behaving functionally, i.e., carrying out a certain tasks without a full human substance, thus adapting to the external affordances incorporated in the functions of technology, work tasks, and the way that the IS designers themselves use computers. Positive emotions are seen to be required in order to create and sustain viable interactions between humans and IS as well as between users and designers.

Within the IS designers' conception of '*The techno-enthusiast human being'* the designers depict positive emotions such as enthusiasm and excitement as essential features in humans. In particular, positive emotional reactions in people are seen to be induced by technology, such as software and hardware. The relation between positive emotional arousal and technology is seen without any other factors that may influence positive predispositions in people. Such views imply a sort of computer addiction, which denotes extremely intensive computer use grounded on enthusiastic sentiments (Shotton 1989). In some expressions, however, the positive emotional feelings are seen particularly as a prerequisite to the successful use of IS. These conceptualisations uncover a functional understanding of positive emotions.

Whereas negative emotions are associated with specific tendencies, such as an urge to escape or to avoid disquieting things, positive emotions seem to spark changes in cognitive activity in addition to producing behavioural tendencies (Fredrickson and Branigan 2001). Therefore, the IS designers' accounts of positive emotions as a prerequisite for the use of computers imply an understanding of human emotional features as a function of that use. In other words, positive emotional contributions are seen to be necessary in order to render

people's use of technology successful. This seemingly simple distinction between negative and positive emotional arousal in humans with respect to computer technology is of the utmost importance in that it renders the relationship between humans and IS either viable or non-viable. Recent research shows that effective personal use of computers is not just a matter of knowing what to do but that subjective feelings or emotions play an important role in this and in other kinds of human activity. This stance is corroborated by numerous studies on the consequences of emotion in relation to different human activities. For instance, recent research shows that subjective feeling or emotions play an important role in human performance such as in cognitive processes (Sternberg 1990), artistic and scientific problem-solving (Feist 1994), learning (Pintrinch et al. 1993) as well as in the creation of organisational knowledge (Nonaka et al. 2000). Consequently, positive emotions seem to provide a guarantee also for successful use of IS.

A positive feeling often emerging within this conception is referred to as playfulness. Fredrickson and Branigan (2001) ascertain that playfulness is inspired by feelings of joy, and often arises in contexts appraised as safe and familiar. It is often triggered by events construed as signs of progress towards an individual's goals. According to the IS designers' conception of '*the human being enthusiastic about computers'*, playfulness is seen as a prerequisite for explorative use of systems. This view is reinforced by results of a study by Glynn and Webster (1992), who found that playfulness relates positively to exploratory behaviours and to individual creativity during interactions with tasks. Further, a more specific construct of playfulness is defined by Webster and Martocchio (1992), who state that situation-specific microcomputer playfulness is an important predictor of efficient use of computers. Starbuck and Webster (1991), in turn, assert that playful behaviours often occur at work and they may have varying economic consequences in that, on the one hand, they may lead to wasted time, and on the other hand, playfulness may contribute to high-quality results in experts' work. In addition, Fredrickson and Branigan (2001) state that playfulness appears to have reliable outcomes, for example, social play builds and strengthens friendships and attachments as well as develops human socio-affective skills.

A playful attitude is also regarded as important in ISD. Ehn et al. (1992) constructed an approach known as Design-by-playing to complement traditional participatory design strategies. They found that systems development was boring to many users and therefore the key issues, such as work organisation, skill requirements, division of labour and co-operation in the work processes, were treated superficially. The idea of design as playful engagement was also seen to lead to sufficient commitment and, by so doing, it highlights the actual rules of social interaction and co-operation that can then be used as a guiding principle in ISD. In addition to drawing on people's feelings of playfulness, the evoking of positive emotions in general is seen as a useful means also in other IS activities. For instance, Heng et al. (1999) found that the organisational champions of IT innovation, i.e., individuals who make decisive contributions to IT innovation by promoting its progress through critical organisational stages, utilise the feelings of enthusiasm and trust as they are shepherding the innovation through the organisational bureaucracy.

In cases like these individually sensed emotions are intertwined with interpersonal relationships and thus broaden into a particular type of emotional behaviour within a group of people. Hatfield et al. (1994) assert that emotions are 'contagious' in that people's subjective emotional experience is affected by the activation and/or feedback from facial, vocal, postural, and movement mimicry. Thus, people tend to be infected by the emotions of others.

The nature of these emotions then, according to Rafaeli and Sutton (1989), forms a basis for occupational, organisational, and even societal norms concerning emotional behaviour and people's enduring attributes as well as inner feelings. Orlikowski (1991) argues that norms of emotional behaviour are utilised by an organisational form of control referred to as impression management, which may be enabled by the deployment of information technology. Impression management sustains norms for emotional behaviour in that it requires individuals to induce or suppress their feelings in order to maintain an outward countenance that produces the proper state of mind in others. However, Van Maanen and Kunda (1989) state that managing one's emotions in accordance with the norms for successful role performance is often not an easy task. Thus, the utilisation of people's emotions in order to impose a particular organisational image may not always yield the desired consequences. In particular, utilising intense positive affects as a driving force in human performance may yield subsequent counterbalancing negative feelings with equal intensity (Diener et al. 1991).

In summary, within the functional form of thought the designers understand human behaviour in an insubstantial manner that signifies a functional understanding of human characteristics. This form of thought incorporates conceptualisations according to which the human being is understood as behaving in accordance with the tenets of behaviourism. In other words, humans are seen to carry out certain tasks without a full human substance, adapting to the external affordances inherent in the operations of technology, work tasks, and the way that the IS designers themselves use computers. Within this adaptation, positive emotions are required in order to create and sustain viable interactions with IS.

In the next section I describe the form of thought which indicates more extensive and multifaceted understandings of the human being as a user of an IS than the two preceding trains of thought: the holistic form of thought.

11 The multifaceted human being

The holistic form of thought discloses how the IS designers see humans in terms of human characteristics and behaviour. This form of thought appears as holistic in that, first, the designers acknowledge human action and characteristics, and second, they show diverse understandings of those characteristics. Thus, the human being is seen as a multifaceted phenomenon. Human cognitive features and rules of communication are seen to be embedded in technology, and technology is seen to convey cultural characteristics. With respect to learning, people are regarded from interpersonal and organisational perspectives. Finally, emotions are highlighted within human activity as cognitive-emotional-physical phenomena, which facilitate for people the task of balancing their behaviour within technological environments. In this way the holistic form of thought also adds to the two previous ways of thinking: human features are acknowledged diversely. Within this form of thought people are seen in a human-centred way that renders the relationship between users and designers as well as the IS-user relationship as including characteristics typical of human behaviour. In the following three subsections the characterising features of this form of thought – deliberate and emergent anthropomorphism, humans as knowledge sharers and organisational learners, and balancing emotions – are discussed.

11.1 Deliberate and emergent anthropomorphism

One thread of the holistic form of thought is that the IS designers reveal technology-centred anthropomorphist conceptualisations while describing human qualities. Thus this form of thought also discloses a tendency to adhere to technology while acknowledging human characteristics. IS are then considered to embody human features such as intelligence, human-like figures or avatars, communication, and precision. An essential distinction in these descriptions is the explicitness with which these human qualities are seen to be materialised in IS. On the one hand, the IS designers describe human characteristics as being deliberately embedded into the form and functions of IS. These conceptualisations reveal deliberate anthropomorphist predispositions. On the other hand, the designers refer to IS as conveying human qualities rather than explicitly including them. These descriptions signify understandings according to which human interpretation of the form and function of IS plays a central role. These latter views reveal emergent anthropomorphist orientations. The designers bring out these kinds of views within their conception of *'the human being reflected in technology'*.

Anthropomorphism or metaphorical personification refers to the ascription of human-like attributes and characteristics to an otherwise non-human object (Stebbins 1993). The designers reveal such conceptualisations when understanding intelligence and reasoning as properties of technology. These comprehensions mirror views common in the field of Artificial Intelligence (AI), which traditionally has aimed to incorporate human cognitive capabilities, such as problem solving, reasoning and learning, into computers (e.g., van Someren and Reimann 1995). Traditional AI researchers focus on developing systems, such as reasoning programs and rule-based expert systems, which imitate cognitive human qualities in their functions (Lewin 2001). Then human characteristics are deliberately built in as embodied parts of IS. In other words, human-like cognitive features are coded into the software and cached into the computer's memory structure. A more recent stance within AI emphasises the inclusion of human emotions into IS. Picard (1997), for instance, stresses that emotions are essential to people's intelligent day-to-day functioning, and thus, computers need to be able to recognise and respond to humans' affective signals in a real-time way in order to function with intelligence and sensitivity toward humans. This aspiration necessitates the inclusion of emotion into computers or robots in a concrete form, such as software architecture for recognition and synthesis of affective patterns as well as for expressing affect according to those patterns (Picard 1997, Michaud et al. 2001).

Furthermore, the IS designers describe human-like figures or avatars in user interfaces in an anthropomorphist manner that renders technology as having emotional features, as bringing a human sense to technology. Often this is the particular goal for constructing computer interfaces with human-like features: the interaction between people and computers is then seen to be enriched with dialogues that convey both the rational and emotional meaning of the information in question (e.g. Nakazawa et al. 2001). These views suggest that human features which are deliberately constructed into computers render the interaction between users and IS as resembling the interplay with the cognitive, emotional, and social features of the interaction that occurs between humans. However, recent research has

produced inconsistent results as to whether people perceive the anthropomorphic features of systems, such as gaze, gestures and vocal inflection of the virtual agents, as providing human-computer interaction with human characteristics in a similar manner that is expected in human-human interaction. For example, Fogg and Nass (1997) found that flattery generated by a computer can produce the same general effects in people as flattery experienced within communication between humans. That is to say, the participants in their experiment perceived emotionally shaded information emanating from a computer in a similar manner to that emanating from humans.

However, opposite findings are provided, for instance, by Bonito et al. (1999), who questioned the results of prior research suggesting that on average humans are more likely to be influenced by computer agents than by human partners. In their experiments they found that in a decision-making task interaction with humans was more expected and valued than interaction with computers including human-like qualities. Even the addition of anthropomorphist features to interfaces did not increase positive evaluations of computer interaction (Bonito et al. 1999). In other words, people did not find anthropomorphic features of computers similar enough to the aspects that were experienced when interacting with humans. This gives some reason to assume that people do not always perceive human features that are deliberately incorporated in software in a human-like sense similar to that which was intended by the designers of those systems.

Another case of deliberate anthropomorphism within the designers' conception of *'the human being reflected in technology'* is suggested by the fact that IS are understood to convey different ways of communicating. Then the human need for communication is seen as various document templates, keyboards and other such technical devices. Yates and Orlikowski (1992) combine human communicative action with technology with the concept of genre. They define a genre in the context of organisational communication as a typified communicative action invoked in response to a recurrent situation. The recurrent situation is seen as a socially defined need that includes the history and nature of established practices, social relations, and communication media within organisations. Similar substance and form typify a genre, which results as a response to the socially defined need. Substance refers to the social motives, themes, and topics being expressed in the communication whereas form denotes the observable physical and linguistic features of the communication. Form is seen as structural features of a genre, such as lists and fields for delineating text, as communication medium, e.g., face to face, and as language or a system of symbols, which would include linguistic features, such as formality and the specialised vocabulary of technical jargon. Yates and Orlikowski (1992, 302) illustrate the above definition by describing the meeting genre. The substance of such a genre consists of the participants' joint execution of assigned tasks and responsibilities. The form includes the prearrangement of time and place, the face-to-face medium, and an agenda as well as the chairperson's role as structuring devices. In other words, the genre of organisational communication incorporates the human need for communication in social activity, which is mediated through particular media.

Yates and Orlikowski (1992) stress the social nature of genres by positing that genres are enacted through social rules, which associate appropriate elements of substance and form with particular recurrent situations. These genre rules may operate tacitly, through socialised or habitual use of communicative form and substance, or they may be codified into specific standards. In particular, genre rules may be standardised and embedded in a medium, such as electronic document templates with particular structural features, by making the tacit genres

explicit, i.e., hardening the genres (e.g., Karjalainen and Salminen 2000). In this sense genres elucidate a case of deliberate anthropomorphism: rules of human communicative action are explicitly and deliberately embedded in technology.

In the above anthropomorphism appears in a concrete form: technology, such as software agents and electronic documents, is deliberately and explicitly built to embody human-like features and action. Yet features of emergent anthropomorphism are also revealed in the IS designers' conception of *'the human being reflected in technology'*. Here the designers associate human-like attributes and characteristics with technology which, however, may not be constructed on purpose to include those qualities. Instead, the designers' experience of human characteristics in technology emerges from their interpretations concerning the features of that technology. Referring to such interactions between humans and IS, Lyytinen and Ngwenyama (1992) define an interpretive mode of use, which implies that the semantics of data are not fixed beforehand and coded in the system's formal structure but that the meaning of data originates from users' interpretations of those systems. This is evident in a statement according to which a design methodology, SAP/R3, is seen to convey different culturally rooted types of action. In particular, the designer criticises the methodology for forcing all the designers in a multinationally operating firm to design systems in a way that is typified as German precision. Because SAP/R3 is intended particularly for process optimisation and aimed at global markets, and is not equipped with deliberately incorporated cultural features (Information Technology Toolbox, Inc. 2001), this conceptualisation may be considered as an explication of information technology's capacity to inform its users of the nature of those activities, events and objects that they encounter when using that particular technology (cf. Zuboff 1988). In nature, then, this conceptualisation resembles emergent rather than deliberate anthropomorphism.

Here the designer's experience of the cultural characteristics that are conveyed by a certain technology emerge from his interpretation concerning the use of that technology. That is to say, human qualities are not seen to be deliberately actualised in technology but - as suggested earlier in this study with the aid of Cook and Brown (1999) – they get a new form within the human-technology interaction which is shaped according to the dynamic affordances on the one hand offered by the human modes of being, and on the other hand, supported or neglected by the features of a technology. Obviously, the designer had been engaged in an activity which was informed or 'disciplined' by knowledge, i.e., the use of theories, rules of thumb, and concepts concerning the purpose of building IS with the help of SAP/R3. In addition to possessing and using this knowledge, the designer clearly had been simultaneously engaged in an activity of knowing, which makes use of tacit knowledge as a tool for action (Cook and Brown 1999). In this case the design activity appeared as a process within which the conscious goal of that activity was less tacitly intertwined with the cultural human mode of being because the designer, as an outcome of the design activity, had created a conception concerning the cultural features of the technology in question. Thus, the activity of using SAP/R3 dynamically afforded the Finnish IS designer the opportunity to acquire the conscious idea of German precision incorporated in that technology.

In a similar vein, but with respect to the social mode of being, Orlikowski (2000), with reference to Giddens (1984), asserts that while technology can be seen to embody certain symbol and material properties, it does not embody social structures because these are only instantiated in human activity inherent in particular social practices. Rather, social structures that emerge within humans' use of technology are constituted as people regularly interact

with particular properties of technology. The resulting recurrent social practice then produces and reproduces certain social structures within the use of that particular technology. In other words, human activity is seen to be shaped within human-technology interaction in terms of the acts of use based on humans' interpretations of the features of that technology, which may then be understood as having social features. It is worth noticing, however, that while Orlikowski (2000) assumes the use of technology as happening recurrently, as a fluently ongoing process, the designer criticises the cultural features implied in SAP/R3 in a way that suggests dissatisfied or even terminated use of that technology.

In brief, within the holistic form of thought, the IS designers associate human-like characteristics with technology. These conceptualisations appear as anthropomorphist in two different ways. Deliberate anthropomorphist conceptualisations denote a conscious and purposeful way of incorporating human features in technology, which may, however, be interpreted also in ways that were not anticipated by the designers of those technologies. Emergent anthropomorphist conceptualisations, in turn, signify that humans interpret human meanings conveyed by IS, which have been built without the intention to embody human features. This implies, as suggested by Zuboff (1988) and also Orlikowski (2000), that while an IS automates certain activities, it has the ability to translate the automated activities into a form that renders work processes, objects, events and behaviours so that they become visible, knowable and sharable for people. That is to say, within the interaction of humans and IS, people actively observe, interpret and share the information which is mediated to them by IS. As was suggested previously in this study, this interpretation occurs in the context of task information and is influenced by various implications of the human basic modes of being.

The following section discusses further the holistic form of thought is by introducing the designers' conceptions regarding human learning ability.

11.2 Humans as knowledge sharers and organisational learners

Another thread that is woven into the holistic form of thought is the IS designers' conceptualisations of humans in regard to knowledge sharing and organisational learning. The human being is then understood in accordance with the cognitive, emotional, social modes of being. In particular, the behavioural affordances revealed within these conceptualisations refer to different features considered inherent in the activity of learning. Moreover, the designers express two different perspectives on the level at which learning is seen to happen: organisational and interpersonal.

Within their conception of *'the human being as an organisational learner'* the designers depict changes in organisational work processes which are due to the learning that occurs during ISD: the examination of work processes teaches the involved organisation about its own activity and, thus, a new insight into the processes of work is created. Here human behaviour is described by referring to organisational work-related learning, in which the organisational process of work is the source, learner and outcome of learning. In other words, learning is seen to occur beyond the individuals who make up the organisational process of work. Rather, it is considered that the learner is to be the organisation. This conception is in conformity with the perspective adopted by Robey et al. (2000), who define learning as an organisational process, and regard an organisation's own experiences as providing a base of

knowledge for guiding the deployment of IS effectively. Then the examination of an organisation's own processes is seen to provide appropriate knowledge for developing IS and their use in the organisation, as suggested by the IS designers. However, as underlined by Fiol and Lyles (1985), considering organisations as learners suggests that organisations are cognitive entities, capable of observing their own actions, and modifying their actions according to their observations (Robey et al. 2000). This notion raises again the question that emerged within the pilot inquiry of the present study: are organisations human entities in their own right? Particularly, are organisations capable of learning independently of individuals and their learning, and thus, possessing a cognition of their own?

Jones (1995) does not accept that organisations are disembodied cognitions and identifies three possible types of such organisational learning that can be differentiated from individual learning. The first of these highlights organisations as the site of learning, which denotes organisations as the environment for learning, rather than as the learner itself. The second type signifies organisational learning as a metaphor, which is derived from theories of individual learning in order to provide a reflection ground for developing the notion of organisational learning (Kim 1993). The third type regards all learning as social, being shaped by an individual's social context. Lave and Wenger (1991), for example, regard learning as equal to changes in the ways that an individual participates in social practices. They assume that learning is more effective when an individual's participation in a community of practice is emphasised. Recent approaches to organisational learning or learning at work, however, stress that learning occurs simultaneously at multiple levels, that is, at individual, group, and organisational levels. In addition, organisations are not seen to possess cognitions of their own but information and knowledge may be stored and accessed in a number of repositories, both human and artefact (Walsh and Ungson 1991). Consequently, organisations and their learning are not seen as independent of individuals but as a combination of individual, group and organisational learning.

For instance, the notion of distributed cognition highlights a process in which cognitive resources are socially shared – in face-to-face situations or virtually - in order to extend individual cognitive resources or to accomplish something more than what individuals could achieve alone (Cobb and Bowers 1999). Crossan et al. (1999) stress that organisational learning occurs within four processes, intuiting, interpreting, integrating, and institutionalising, which link together the three levels of individual, group and organisational learning. These processes aim to make tacit knowledge explicit, which is the main idea of organisational knowledge creation defined by Nonaka and Takeuchi (1995), who emphasise that an organisation creates new knowledge through converting tacit knowledge into explicit knowledge in shared collaborative situations. Further, Järvinen, A. and Poikela (2001) extend the model of Crossan et al. (1999) by incorporating elements of experiential learning in it. The resulting model defines learning at work as context-dependent, and thus, as content-specific intertwined processes which combine individual, group and organisational learning.

A particular feature that is often overlooked in the theories of organisational learning is, nevertheless, recognised by the IS designers: power relations inherent in organisational activity influence learning. Similarly, Huysman (2000) argues that, contrary what is often assumed within studies of organisational learning, people in organisations are not always free to choose what to learn. The dominant coalitions within organisations have a stake in deciding what knowledge will be considered as an appropriate target for organisational learning. The designers also depicted situations in which the actual issues for IS development expressed by

the users are often displaced with other interests by the users' superior.

Furthermore, the IS designers' conception of *'the knowledge sharing human being'* opens up their view of learning by specifying interaction between users and designers as essential. In particular, the capabilities of communicating understandably and taking another's perspectives into account form the core of this conception, which highlights knowledge sharing as a particularly important instance within the processes of organisational learning. Knowledge sharing is the link between individual and group learning, and signifies the expansion of individuals' cognitive maps into shared understandings (Crossan et al. 1999). The ability to take the perspective of others into account is an indispensable prerequisite for knowledge sharing (Boland and Tenkasi 1995). Buber (1993) ascertains that in order to be able to fully take into account others' perspectives, i.e., to share authentic information with other persons, one has to treat others as equal human beings and respect the current circumstances of others. The equal relationship between humans is then actualised as an I-You relationship, which refers to authentic mutual understanding within an interaction in which humans face each other with respect to the entire human being. In these kinds of relationships emotional features, such as care, trust, and security, need to be acknowledged and combined with cognitive and social abilities (Nonaka et al. 2000, von Krogh et al. 2000). Similarly, Häkkinen et al. (2000) state that mutual respect and the experience of equality are essential in authentic relationships, which build up the processes of collaborative learning. In this way empathy is an important feature of knowledge sharing. Also, it seems that the designers embracing this conception have overcome adherence to superfluous self-interest which is, according to Constant et al. (1994), a common factor that reduces willingness for knowledge sharing.

In summary, within the holistic form of thought the designers conceptualise humans with respect to learning. On the one hand, they consider learning as an organisational process, which enables the improvement of organisational work processes. On the other hand, they regard mutual understanding and empathy as important in human relationships that aim at knowledge sharing. However, these conceptions do not include features of individuals' cognitive learning processes. For example, how much knowledge or how well organised knowledge individuals seem to possess or acquire in ISD situations, or, how the information needed for knowledge construction is obtained (cf. Anderson 2000). This defect within the holistic form of thought is seen also in the current theories of organisational learning in that they do not clarify what kind of knowledge is being learned. Instead, these theories concentrate on the questions revealed by the analysis of Huysman (2000): who learns and how in organisational situations, as well as when and why learning occurs.

Finally, in the following section the holistic form of thought is discussed further by introducing the IS designers' conceptions which highlight emotions as balancing factors within human activity in technological environments**.**

11.3 Balancing emotions

A final thread within the holistic form of thought is that the IS designers conceptualise humans with respect to emotional characteristics. This is evident in that the continuity of customer relationship is regarded as relying on the client's satisfaction or contentment, and

that skilful users are seen to behave in a peaceful, balanced way. Also, the aspiration of a designer regarding user interfaces reveals a need for a feeling of mastery gained through an interface. These conceptualisations disclose understandings of the human being as an emotionally diverse phenomenon with respect to IS and their development. In particular, humans are seen to cope with varying feelings, and these emotional experiences, in turn, seem to have the potential for facilitating the task people face in constructing a positive image of themselves within technological environments. In this way emotions are also seen to be linked with cognition. Within this form of thought, emotions have a balancing role within human activity, unlike in the preceding forms of thought in which emotions were seen either to separate people from the use of IS, or to play an excessive role within human experience by acting as a driving force for people to become adjusted to technology.

Within their conception *'the human being as a satisfied customer'* the IS designers emphasise the significance of customer satisfaction in regard to the continuity of the customer relationship. A similar notion has been presented by Koivumäki (2001), who found that customer satisfaction predicts customer retention and the amount of purchases in an on-line environment. Aside from strengthening customership within electronic commerce, the feeling of satisfaction or contentment has significance in regard to the interaction between humans and their life situations. As Fredrickson and Branigan (2001) point out, the positive emotion referred to as contentment is of special importance because it prompts individuals to savour their current life circumstances and recent successes, and helps people to integrate recent events as well as achievements into their overall conception of themselves. Thus, the feeling of contentment may appear as a balancing factor also between humans, their increasingly technological life circumstances and their self-perceptions. This is implied also in that the changes in human behaviour sparked by contentment are more cognitive than physical in nature (Fredrickson and Branigan 2001, 131).

Another conception which emphasises the adapting role of people's emotions in the interaction between the technical environment in which an individual operates, his or her cognitive-emotional perceptions, and behaviour, is *'the human being through the feeling of mastery'*. Within this conception, the designer is describing a user interface that has properties which attach a human feature referred to as a feeling of mastery through IS to both her individual work and the organisation's work activities. The designer mentions that the interface should help her in remembering things, both in regard to her own information needs and with respect to the other workers in the organisation, i.e., interpersonal information needs. She sums up the properties of the interface by referring to a feeling of being in control of her work with the system. That is to say, the properties of the system, in particular the user interface, should contribute to a feeling of mastery, which is due to individuals' perception of the successful accomplishment of particular tasks within a certain technological environment. In this way the designer is aspiring for a positive sentiment of computer self-efficacy.

Computer self-efficacy (CSE) refers to a continuous triadic interaction between the technical environment in which an individual operates, her cognitive-emotional perceptions, and behaviour (Compeau and Higgins 1995, Compeau et al. 1999). CSE derives its roots from the concept of self-efficacy, which originates from Bandura's (1986) social cognitive theory. Self-efficacy (SE) is a generative capability in which cognitive, social, emotional and behavioural subskills must be organised and effectively orchestrated to facilitate the various actions of individuals. Individual self-efficacy beliefs operate as a key factor in the generative system of human competence. Thus, skills can be easily overruled by self-doubts to the extent

that even highly talented people make poor use of their capabilities within circumstances that impair their beliefs in themselves (Bandura 1997, Brosnan 1998).

CSE as a self-perception about one‘s efficacy is based on four principal sources of information: enactive mastery, vicarious experiences, verbal persuasion, and physiological state (Bandura 1986, 399-401; Bandura 1997, 79-113; Brosnan 1998, 62-63; Marakas et al. 1998). These factors occur simultaneously and intertwine within a person‘s experience while using computers. The first factor, enactive mastery, refers to cognitive appraisal of enactive performance accomplishments. It seems to be an influential source of efficacy information because it is based on authentic mastery experiences, and is also aspired to by the designer. Yet information that is relevant for evaluating one‘s capabilities with respect to IS – whether conveyed enactively, vicariously, persuasively, or physiologically – is not informative of its own accord; it becomes such only through humans‘ thought (Bandura 1997, 79). The felt CSE will depend on cognitive appraisal of a number of informative factors, which in this case are perceived through a user interface. The most commonly established are the difficulty of the task, the amount of effort expended, the number of situational supports and the rate and pattern of success. Successes raise efficacy appraisals and, respectively, failures lower them. Efficacy appraisals are partly influenced by vicarious experiences, which are mediated through modelled behaviour, i.e., people tend to model their behaviour according to others‘ successful performance. This is the case particularly in situations where there are no absolute measures of adequate performance. Respectively, organisational support has been found to have a strong direct effect on CSE (Igbaria and Iivari 1995). Often standard norms of how well representative groups perform certain activities are used to determine one‘s relative standing (Bandura 1997, 88-90). In this case the interface should convey this kind of informative traces to the user. For instance, social navigation techniques rely on guiding users by other people‘s actions and the traces they leave in the information space under navigation (Munro et al. 1999). Moreover, groupware applications and other software serving as organisational memories may include several social affordances for users, as well as act as a support for an individual’s memory (cf. Walsh and Ungson 1991). However, vicarious experiences are often less influential than enactive experiences (e.g., Marakas et al. 1998).

Verbal persuasion contributes to perceived self-efficacy in that people who are persuaded to believe that they have the capabilities to master given tasks are likely to mobilise greater sustained effort than if they have self-doubts (Bandura 1997, 101). However, the influence of social persuasion alone to create enduring increases in CSE is dependent on whether the heightened appraisal is within realistic bounds. Recent research shows that persuasion may also be included in software in various ways. This is because technologies may include several persuasive features or employ persuasive methods, designed either deliberately or unintentionally (Berdichevsky and Neunschwander 1999).

The emotional nature of CSE is evident in that people form their beliefs about CSE on the basis of their physiological state, which means that individuals interprete their capabilities according to their emotional arousal (Bandura 1997, 110-111). This arousal may be a concern of stress, fear reactions or anxiety in taxing situations. However, positive emotional arousal builds up a positive sentiment of CSE (Webster and Martocchio 1992). A special feature regarding CSE which the designer embraces but which is not usually included in the study of CSE is that usually CSE has been studied as individual reactions to computers in different environments while the role of technology’s features has not been incorporated in the

analyses (cf. Marakas et al.1998). However, as aspired to by the designer, CSE should be examined also with respect to the features of a user interface.

Further, a third notion which emphasises the balancing role of people's emotions in the interaction between their environments, their cognitive-emotional perceptions, and behaviour is revealed within the conception of *'the emotionally coping human being'*. Here the IS designers consider a skilful user as a human who is able to deal with contradictions, i.e., things that may cause conflicting feelings, and who appears as well as behaves (with IS) in a peaceful, balanced manner. In this way the designers see emotional coping in the light of positive outcomes (cf. Folkman and Moskowitz 2000). While ISD is often seen as a stressful process which requires an ability to endure changing emotional experiences, such as interest and frustration (Newman and Noble 1991) in recurrent situations of failure and subsequent success (Robey and Newman 1996), it is understandable that the designers regard as skilful people who are able to regulate their emotions successfully in particular in ISD situations. According to Pulkkinen (1994), emotion regulation refers especially to the internal cognitive-affective, but also external social and cultural, factors that redirect, control, and shape emotional arousal in such a way that an individual is able to act adaptively in emotionally activating situations. Within this interaction involving internal and external factors, the internal processes of emotion regulation consolidate and stabilise during human development as traits of personality (Pulkkinen 1996). However, despite its significance for human presence and behaviour, the often tacit ability of emotion regulation is not usually regarded as a skill because the concept of skill has no referent in describing the functions of emotion systems and stabilised patterns (Izard et al. 2000).

In addition, conceptualisations that imply human emotional coping are also found in expressions in which designers highlight people's abilities to make long-term commitments. Thus, the designers emphasise people's balanced cognitive-emotional behaviour as essential in order to maintain long-term attachments to the process of ISD. In the same vein, Abrahamsson (2001) underlines that users' ability to sustain commitment is of utmost importance in order to endure the hardships of a process improvement effort.

In summary, within the holistic form of thought the human being is seen in a multifaceted way. Cognitive features and rules of human communicative action are seen to be deliberately embedded as explicit features of technology. The interaction between humans and IS is seen in the light of emergent human characteristics, the conceptualisation of which flows from users' interpretations of the form and functions of IS. Within such interactions, IS are also seen to have the potential of facilitating people's task of constructing a positive belief of their capabilities with computerised tasks. In this way the designers reveal understandings which imply that IS are positioned more as human-like actors than as merely machines or 'neutral' tools. Further, the designers consider learning as an organisational process which enables the improvement of organisational work processes. They also regard mutual understanding and empathy as important in human relationships that aim at knowledge sharing. Moreover, human emotion is understood as a diverse phenomenon with respect to IS and their development. People's emotional experiences are seen to result in positive sentiments such as contentment and commitment in regard to ISD. In addition, humans are regarded as skilful in coping with varying feelings.

Because IS designers' thought is regarded as an important tool for ISD in this study, the three distinctive but associated forms of thought described above and resulting from the present study are briefly discussed in regard to ISD in the next section.

12 The individualised forms of thought in ISD

As mentioned previously in this study, the IS designers forms of thought revealed in the results of this study are regarded as important tools for ISD. Moreover, they are seen to have implications for the ways that humans are taken into account as users within the different situations of ISD. These different situations refer to the phases of ISD such as planning, design, implementation, use and maintenance. The phases are cyclical and intertwining (e.g., Beynon-Davies et al. 1999), but planning is regarded as most crucial for the success of IS (e.g., Marakas and Elam 1998). In the following the designers' capabilities to perform IS planning and design with respect to the individualised forms of thought are briefly examined.

Planning refers to initiation and requirements analysis actions including client contacts and definition of user requirements. During this phase the greatest degree of interaction occurs between users and designers (cf. Newman and Noble 1991, Marakas and Elam 1998). In order to accomplish requirements analysis, i.e., define the system's context of use, the designers should understand many technical and human issues. Goguen (1996), for instance, regards culture, organisational structure, legal and economic constraints, users' work practices, and marketing strategies as essential issues for such definitions. Vidgen (1997) stresses the emergent nature of requirements in that they tend to evolve during systems development when the current and future requirements are pondered. In addition, much of the IS literature drawing on Critical Social Theory emphasise that the most crucial social elements that need to be taken into account are power and control (e.g., Klein and Hirschheim 1993, Päivärinta et al. 2001).

Design denotes procedures where the user requirements are refined and turned into specifications and finally software. In addition to converting the results of requirements analysis into specifications, an essential task in the design phase is the design of a user-interface (UI). Then three perspectives should be used: functional, aesthetic, and structural (Johnson 1992, Smith 1997). The functional perspective is concerned with the interface's applicability for the intended purpose of the system, whereas the aesthetical perspective includes the pleasantness of the visual appearance of the system. The structural perspective refers to technical issues, in particular the reliability and maintainability of the system. Winograd (1995), as well as Preece (1994), ascertain that the properties of a user interface should meet with the social, cognitive and aesthetic needs of people in addition to technical requirements. Stephanidis (2001) specifies that, within new ubiquitous technological environments, the design of human-computer interaction should focus, in addition to social and cultural features, on individuals' perceptual, cognitive and emotional space.

How would the designers then perform according to individualised forms of thought? The designer (D12) holding a separatist form of thought also embraces technology- and work-related functional orientations. His strength would be technical knowledge, especially the ability to fluently conceptualise issues of design in accordance with objective definitions, a skill that is needed in creating formal specifications. In regard to understanding users his conceptualisations imply a narrow orientation of defining work in terms of formal organisational positions rather than understanding the actual work practices of users. He also has a sense of economic gain. An obvious disutility would be a tendency to treat users as technologically ignorant, which implies incompetence in social relationships with users.

Twelve of the designers (D1, D2, D3, D4, D5, D9, D13, D15, D16, D17, D19, and D20) embrace the functional form of thought. In addition to possessing technical knowledge, and valuing such knowledge in users, these designers would focus on formal job descriptions, external work tasks and individuals' task productivity. A deficit from a human-centred perspective would be the tendency to overlook human issues and to focus instead on the functional purposes, i.e., external task information. Often such definitions are regarded to yield Tayloristic designs, which underestimate the social context (e.g., Lyytinen and Ngwenyama 1992). However, they possess competence in functional and structural UI design. The strength of these designers would be that they emphasise positive emotions, i.e., regard that the development and use of IS should be fun.

Two of the designers (D10, D18) that predominantly adopt the functional manner of thought emphasise also clients' satisfaction, which ensures sustainable customer relationships, and regard mutual understanding during ISD as essential between users and designers. In this way their functional manner of thought is broadened to include understandings of creating and maintaining collaboration. Their strength would be increased social competence with respect to other designers embracing the functionalist form of thought. In particular, they fulfil the demand for mutual understanding, which is regarded of utmost importance in ISD (e.g., Lyytinen and Ngwenyama 1992, Klein and Hirschheim 1993). It seems also likely that they have competence in IS planning which aims at the improvement of organisational processes, which are identified as functional, such as sales and purchasing processes, and emphasise mutual understanding (e.g., Päivärinta et al. 2001). Also, they understand how to maintain customership instead of just visioning economic gains or focusing on people's task productivity.

Five designers (D6, D7, D8, D11, and D14) reach the holistic level of understanding and also bring out functional and separatist conceptions, which is their overall strength. Their competence would include functional, structural and human perspectives on design. Besides possessing technical competence, these designers would be able to consolidate definitions of formal and external work tasks into human issues. They also seem to have the potential for recognising contentment in clients, and thus, maintaining customership. A particularly significant capability would be to understand the process of organisational learning, which is essential in order to adjust the evolving requirements during the process of ISD (e.g. Vidgen 1997). Further, these designers also recognise power in social situations, and emphasise mutual understanding with users. Moreover, they value balanced emotional behaviour, and thus, intuitively grasp the possible dangers of relying on superfluous emotional behaviour. These designers also have potential for understanding human-computer interaction in terms of human features, either explicit or implicit. An additional capability with respect to UI design is revealed in that a designer would pursue a design that supports the sentiment of computer self-efficacy.

In summary, the separatist form of thought provides designers predominantly with technical perspectives and a capacity for objectifying things. However, the validity of objectifying design issues is dependent on the focus of such definitions. From a human-centred perspective valid definitions would require being theoretically sensitive to human activity and deriving second-order conceptions from that activity (see Walsham 1995), rather than creating objectivist conceptualisations, which overlook humans and their behaviour. The functional form of thought focuses on external task information and task productivity, nevertheless, with the help of positive emotions. The holistic form of thought provides

designers with competence in human-centred ISD, while all the aspects of the richness of the human condition are not revealed. However, the above described competencies are described assuming that the designers employ that level of understanding which is the most extensive within their conceptualisations.

In the next section I shall make an attempt to critically evaluate the present study.

13 Evaluation

The quality of research can be discussed from many perspectives (Yin 1994, Davenport and Markus 1999, Järvinen 1999). As asserted earlier, the perspective adopted in this study is interpretive, i.e., it focuses on human interpretations and meanings (Walsham 1995) by making an attempt to understand the phenomenon of the human being as a user of an IS through the meanings that the IS designers assign to that phenomenon (Orlikowski and Baroudi 1991, Klein and Myers 1999). In other words, the underlying assumption in this study is that individual knowledge creation requires giving meaning to the phenomenon under observation, and thus, the aspects of reality are not seen as objective facts but need to be given meaning by the humans being investigated. Therefore, the criteria by which the present study needs to be scrutinised should be in accordance with principles that rely on the grounds of interpretivism. Such criteria are provided by Klein and Myers (1999), who define seven principles for evaluating the conduct of interpretive field research. In the following these principles are discussed in order to evaluate the accomplishment of the present study.

First, *the fundamental principle of the hermeneutic circle* suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is also fundamental to all the other principles in that it is a meta-principle upon which the six other principles expand. The idea of the hermeneutic circle is that we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships. In this inquiry this principle was actualised in that the theoretical underpinnings of this study include the notion of human understanding as comprised of interdependent parts, i.e., what and how-aspects. Further, this principle is in conformity with phenomenographical analysis, which requires several iterative circles of analysis focusing, first, on comparisons between meanings in single statements and the surrounding statements, and the data as a whole, and second, on the interdependencies of these meanings. It is revealed then also in the whole meaning structure of the designers' understandings: it is formed of parts and their interrelationships. The parts emphasise variation in what the designers regard as human features, and the interrelationships build variation into how the designers conceptualise humans. Together these parts form the whole layered understanding of the IS designers. The idea of the hermeneutic circle also guided the use of the software utilised for data analysis.

Second, *the principle of contextualisation* requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged. An attempt is made to meet these requirements by raising the problem of the humanisation of IS as a recurrent concern. The historical perspective is highlighted by reviewing ISD methodologies, training and administrative

actions aiming to improve the human-centred focus on ISD, as well as IS designers' ethical codes as traditional strategies for humanising IS. The current need for humanisation is discussed in regard to human-centred concerns pointed out by IS researchers, and is seen in an implied runaway problem in IS practice, which still suffers from users' rejections of IS. However, these issues are dealt with as global concerns, without presenting any aspects that are typical of Finland and current Finnish IS development. Despite the commonness of views concerning the globality of IS research, practice and business, it may be argued that this study falls short in describing its specific cultural backgrounds, and thus, does not adequately explain the emergence of the current situation particularly in Finland. However, this may be a defect only with respect to possible foreign readers, the researcher being as Finnish as the respondents.

An additional feature concerning this principle is that, for the purposes of this study, the ontology of the human being that is revealed by the analyses of the IS schools of thought is critically reflected upon. This is due to the focus of this study: it takes a stance also on the ontology of the phenomenon that the conceptions being investigated concern. In this way the principle of contextualisation reveals also the situation with respect to the content of the forms of thought that the IS schools' of thought embrace in regard to the ontology of the human being.

Third, *the principle of interaction between the researchers and the subjects* requires critical reflection on how the data were socially constructed through the interaction between the researchers and participants. The issue of authentic interaction between the interviewees and myself is an essential concern in this study. Therefore, I conducted a pilot study in order to gain experience of the particular topic under investigation in a real workplace situation in an IS firm. The results and experience from the pilot study facilitated the planning and refinement of data collection in terms of authentic interaction. The observed discrepancy between my preconception of the human being and the designer's conceptualisations was revealed as a particular concern. Therefore, selection of the respondents and data collection were carefully considered in regard to authentic interaction in order to promote a dialogue in which I could recognise alternative knowledge claims and – directly or indirectly - negotiate them with the respondents. As a result I had to aim to make myself familiar with the designers' educational backgrounds, work histories, and current jobs. In the selection of the respondents I familiarised myself with different Finnish IS companies' web pages in order to find human-centred business concepts, and then found appropriate respondents from these companies.

Further, before data collection, I asked the designers by e-mail to describe their educational and work histories, their current work tasks and to give a short description of the company they worked in. Issues concerning the designers' current work were also the topic of the first opening question during the interviews. The actual data collection plan comprised question types which aimed to adhere to the context of ISD, and particularly, to promote the designers' own reflections, which were also supported by the follow-up questions. During the interviews, I avoided appearing too self-conscious but refrained from offering my own preconceptions as a 'correct' answer to the respondents. In other words, I concentrated on the designers' views and bracketed away my own ideas. In this way the conduct of interviews deviated from usual phenomenographical interviews, which aim at 'leading' the interviewees to the topic of interest in question (cf. Francis 1993).

Fourth, *the principle of abstraction and generalisation* requires relating the ideographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action. The aim is that the principle of abstraction is met by describing and illustrating in detail the way that the designers' statements were interpreted and categorised first into conceptions, then into interdependent collective forms of thought, and finally, into hierarchical individualised forms of thought. In this way the research process is made explicit. The principle of generalisation is pursued by discussing the research results in relation to generalised ideas and concepts that originate from earlier research, and thus apply to multiple situations. A rich insight into the nature of the research results is pursued by discussing the findings also in the light of contrasting ideas from earlier research in addition to relating the findings to ideas that are in line with the results.

Fifth, *the principle of dialogical reasoning r*equires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings with subsequent cycles of revision. In conformity with the principle of confessional writing (Schultze 2000), I have made explicit my theoretical preconceptions by proposing an ontological assumption of the human being, and by describing the principles of phenomenography. I also revealed the considerations that the designers' alternative knowledge claims evoked during this study, from pilot study to discussing the final outcome of the study. In so doing, my intention is to give readers the possibility to follow how my preconceptions and the designers' conceptions intertwine and contrast with each other, thus consolidating the research results. Particularly, the way the preconceptions were modified with respect to the phenomenographical what-aspect during the study is revealed in the formation of the idea referred to as coding paradigm, and in that the results indicate context-centred conceptions in addition to human-centred ones. Also, from the resulting three forms of thought only one, the holistic form of thought, includes conceptualisations that are in line with the preconceptions.

In addition, I have presented my own educational background, work tasks and interests in a way similar to which I introduced the respondents. In this way I also aim to justify having dissimilar views than the designers, whose backgrounds, especially work histories and tasks, differ my own.

Sixth, *the principle of multiple interpretations* requires sensitivity to possible differences in interpretations among the participants, which are typically expressed in multiple narratives or stories of the same sequence of events under study. This principle is inherent in the theoretical underpinnings of this study. As noted before, phenomenography aims at relating individual conceptions to a collective way of understanding phenomena. Multiple perspectives are then evident in that multiple respondents are necessary for a collective view. In addition, it is stressed in phenomenography that the collective understanding is revealed through the variation of the respondents' different conceptions. Then multiple perspectives are pursued within an individual's thoughts, which are subsequently connected as a collective view. Therefore, this study aimed at multiple perspectives at collective and individual levels.

To maximise multiple interpretations within a group of IS designers, Glaser and Strauss's (1967, 46) notion of theoretical sampling was applied. Then 23 designers were selected as potential respondents, but the variation in their statements concerning the phenomenon under study seemed uniform after 10 interviews. However, altogether 20

designers were interviewed in order to ensure that no new views appeared in the respondents' statements. This procedure is in line with that of Sandberg (2000), who points out that in previous phenomenographical studies (more than 50 doctoral theses and between 500 and 1000 research reports) the variation of a phenomenon reached saturation at around 20 informants, after which no new conceptions emerged. In order to promote multiple interpretations within individual designers' conceptualisations, opening questions with different perspectives into the process of ISD were incorporated into the interview framework.

Finally, *the principle of suspicion* requires sensitivity to possible 'biases' and systematic 'distortions' in the narratives collected from the participants. Instances of this principle emerged during the interviews in regard to both the respondents and the researcher. During the pilot study the respondent showed a minor tendency to answer in a way that he considered being the kind of answer that the interviewer wanted to hear. Therefore, projective questioning was included in the final interviews in order to minimise this kind of bias. By necessitating voluntary participation the aim was to avoid possible attitudinal or organisational constraints.

Further, a suspicion caused by the researcher emerged during the interviews when the notion of theoretical sampling was applied. As mentioned above, 23 designers were selected as potential respondents and the variation within their statements seemed uniform after 10 interviews. Yet a total of 20 designers were interviewed in order to ensure that no new views appeared in the respondents' statements. This was because the sampling strategies applied in the selection of respondents focused on yielding a group with a capacity for human-centred orientations. This was necessary because IS designers' work tasks may vary, and may be concentrated solely on technical issues. Because the aim in this study is to reveal IS designers' understandings concerning humans, it would not have been meaningful to select designers with (solely) technical orientations as respondents. However, during interviews the respondents' assumed uniform orientations needed to be broken down in order to promote variation within their conceptualisations. Therefore, despite the interview framework that was intended to support multiple perspectives, I suspected the validity of my observation that the data obtained after 10 interviews was theoretically saturated and continued interviewing until I had discussed with 20 designers. This instance may, nevertheless, reflect also the uncertainty of a novice researcher - which at the time I was - than solely the principle of suspicion.

Moreover, a more genuine instance of suspicion is implied in the way that the respondents' alternative knowledge claims are pondered. Particularly, the content or what-aspect of the conception of the human being was examined in the pilot study, and subsequently in the formation of the coding paradigm. The core of this suspicion concerns whether the IS designers' statements about humans that in my view did not refer to human characteristics could be treated as conceptions of the human being, or whether they should be treated as 'false' conceptions. Also, if they could be treated as misconceptions, should they be left out of the data? The solution that arises from these suspicions originates in the phenomenographical notion regarding the structure of a conception, and is seen in the inclusion of both context-centred and human-centred conceptions in the whole meaning structure resulting from the analysis. This solution was justified also by the fact that within conceptions in the holistic form of thought, such as '*the human being reflected in technology*', the designers reveal conceptualisations within which humans and their contexts are

intertwined in such a way that it would have been more 'false' to leave the statements associated with these context-centred conceptions out of the analysis.

Table 2 summarises the seven principles described above and their recognised actualisations in this inquiry. In what follows the limitations of this study are discussed, and issues for further research are suggested. Implications for IS designers training and Finnish IT business are noted.

TABLE 2. Summary of the evaluation.

Principles for Interpretive Field Research (Klein and Myers 1999)	**Actualisation of the principles in this study**
1. The Fundamental Principle of the Hermeneutic Circle All human understanding is achieved by iterating between considering the inter-dependent meaning of parts and the whole that they form. This principle of human under-standing is also fundamental in that it is a meta-principle upon which the six other principles expand.	• The theoretical underpinnings of this study include the notion of human understanding consisting of inter-dependent parts (what and how-aspects) • Data analysis is in conformity with the idea of iterating first between the meaning of single statements, their surrounding statements and the data as a whole, and second, iterating between the interdependencies of these meanings. • Research results form a whole meaning structure consisting of parts and their interdependencies.
2. The Principle of Contextualisation Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.	• The historical perspective is highlighted by reviewing ISD methodologies, training and administrative actions aimed at improving human-centred focus on ISD, as well as IS designers' ethical codes as traditional strategies for humanising IS. • The current need for humanisation is discussed in regard to human-centred concerns pointed out by IS researchers, and is seen in implied runaway problems in IS practice, which still suffers from IS rejection by users. • The current situation is revealed also with respect to the content of the forms of thought that the IS schools' of thought embrace with respect to the ontology of the human being. • The study falls short in taking the particular situation in Finland into account.
3. The Principle of Interaction between the Researchers and the Subjects Requires critical reflection on how the research materials (or 'data') were socially constructed through the interaction between the researchers and participants.	• A pilot study enabled the researcher to get familiar with the nature of the phenomenon under investigation. • The selection of respondents and the data collection plan were made with the aim of achieving authentic dialogue in the given context. • During interviews authentic and mutual understanding was sought.

4. The Principle of Abstraction and Generalisation Requires relating the ideographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.	• Abstraction is showed by describing and illustrating in detail the way that the IS designers' statements were interpreted and categorised first into conceptions, then interdependent collective forms of thought, and finally, into hierarchical individualised forms of thought. • Generalisation is pursued by discussing the resulting categories of description in relation to generalised ideas and concepts that originate from earlier research, and thus apply to multiple situations.
5. The Principle of Dialogical Reasoning Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings with subsequent cycles of revision.	• The researcher makes her theoretical preconceptions explicit, and shows how these preconceptions intertwine and contrast with the designers' conceptions during the study and in the results. • A pilot study sensitised the researcher to recognise possible alternative knowledge claims. • While describing the respondents' intellectual backgrounds, the researcher reveals her own too.
6. The Principle of Multiple Interpretations Requires sensitivity to possible differences in interpretations among the participants, which are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.	• To maximise multiple interpretations within a group of IS designers, Glaser and Strauss's (1967) notion of theoretical sampling was applied. • To promote multiple interpretations within individual designers, opening questions with different perspectives on the process of ISD were incorporated in the interview framework.
7. The Principle of Suspicion Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.	• Projective questioning was included in the final interviews in order to minimise interviewer bias. • Voluntary participation reduces attitudinal or organisational constraints. • The observation of theoretical saturation of data after 10 interviews was questioned and altogether 20 designers were interviewed. • The question of whether the IS designers' conceptions are 'valid' or 'false' was reflected upon.

13.1 Limitations and suggestions for further research

The resulting forms of thought, which reveal the IS designers' conceptions of the human being, are seen to provide insight into the ways that IS designers within the practice of contemporary systems development understand humans and their behaviour as users of IS. Moreover, these conceptions are seen to guide the ways that the designers take humans into account as users within the different situations of ISD. Therefore, the IS designers'

conceptions also provide insight into the extent that the current development of IS adequately accounts for the subsequent humanised use of those systems. But to what extent do the identified forms of thought reflect the entire variation of conceptions regarding humans in the current practice of ISD? With respect to the appropriate amount of informants there are no normative guidelines within interpretive research, although multiple interpretations are required (Klein and Myers 1999). Despite the application of theoretical sampling during the interviews, it remains somewhat unclear to what extent the resulting conceptions of the human being cover all the possible interpretations. Therefore, it should be acknowledged that additional research might illuminate further aspects of what constitutes the IS designers' conceptions of the human being.

The primary tool for collecting research material in this study was interviews. However, other ways of obtaining data, such as video recordings of actual design situations and conceptual modelling as well as problem-solving tasks, would provide more detail about how the IS designers conceptualise humans during the process of ISD. Additional methods should be used to reveal in particular the IS designers' conceptions that are created in action, i.e., while the designers actually carry out a particular design that has significance with respect to the humanised use of IS. The current study was based solely on conceptions that were created by reflecting upon the interviewer's questions. By investigating conceptions that are produced in action and manifested in actual designs, concrete ways of taking the human being into account in ISD might be revealed. Then the focus of the conceptions would be directed at pragmatic design ideas rather than imagined knowledge. Moreover, further studies, which take into account the different aspects of knowledge, such as embodied, embedded, embrained, encultured, and encoded knowledge (Blackler 1995), would possibly reveal additional aspects of the IS designers' conceptions.

Another question that needs further attention concerns the extent to which the resulting forms of thought adequately account for the subsequent humanised use of IS. Relying on the explanations produced by science that people act on the basis of their thoughts (Marton and Booth 1997, Orlikowski and Gash 1994, Säljö 1994), the forms of thought provide insight into the designers' capabilities for building humanised IS. However, there is no guarantee that the users find the systems that are built humanised. It is worth noticing that the users' views should be clarified before a stance can be taken concerning their experience of humanised IS. That is to say, the use of such systems should be studied in order to know whether the designers are capable of building IS that appear humanised to people. Moreover, it should be clarified to what extent the different levels of understanding inherent in the designers' conceptions are actualised in the practice of ISD. The results indicate that the IS designers' forms of thought are hierarchical, i.e., the designers embracing the holistic form of thought embrace also functional and separatist ways of thinking. Respectively, the designers appropriating the functional form of thought also adopt separatist ideas. This means that those with more comprehensive forms of thought can intellectually move from more comprehensive conceptions to less comprehensive ones and vice versa.

However, it is not confirmed that the designers with holistic conceptions actually draw on these ideas while working. Since ISD is group work and usually organised as projects (Hirschheim et al. 1995), an individual designer's views may not necessarily inform the development work but the guiding principles originate from the group's collective view or from the project manager's ideas. There is a need for further research that aims to uncover how different conceptions are actualised in the work practices of IS development groups.

Especially, in order to know to what extent the resulting forms of thought adequately account for the subsequent humanisation of IS, it should be clarified how the holistic conceptions appear within a development group's work and thus influence the practice of ISD. Further, it should be investigated how viable the different forms of thought are in the practice of ISD. For example, can a designer with a holistic idea design more humanised systems even if the methodology and other resources places constraints on the design process? Moreover, are designers forced through context, methodology, and resources to be more separatist or functional?

In this study ISD was described with the assumption that it is a rather similar phenomenon within the industrialised countries. However, the informants and researcher were Finnish. This raises the question whether the resulting conceptions can be generalised to other countries. Further studies concentrating on cross-cultural comparisons of the IS designers' conceptions of the human being would clarify this.

Finally, it is considered that the results may correct common presuppositions in prior research. This is obvious because in prior IS research surprisingly little attention has been paid to the IS designers' forms of thought, particularly concerning the human being. Professional expertise is discussed predominantly in terms of methods and methodologies rather than IS designers' intellectual and craft competence (Eteläpelto 1998, 91). The need for further research is then in the study of IS designers' conceptions in general. Then the standpoint of regarding conceptions as intellectual capital which indicate competence would be useful.

13.2 Implications for practice

The notion that individuals' conceptions of human characteristics and action constitute competence in ISD with respect to the humanisation of IS suggests significant implications for competence development, i.e., IS students' education and IS designers' training. As conceptions form a basis for the creation of new knowledge (Uljens 1993) and developing competence (Sandberg 2000), the results of the present study may serve as descriptions of identified competence as a starting point for training activities.

As asserted earlier in this study, in order to humanise IS the designers should be capable of understanding humans and their behaviour as users of IS. Then, as pointed out by Ehn and Löwgren (1997) and Johnson (1992), the designers should be able to take into account the users' experience of using the system in addition to considering the structure (technology) and function (purpose) of IS. However, the present findings suggest that, in addition to considerations of technology, the majority of Finnish IS designers tend to focus their reflections on external task information and task productivity while designing IS. They also utilise positive emotions to facilitate users' adoption of IS. Thus, there is an educational need to provide the IS designers with an understanding of human behaviour, and with methods and tools that enable them to build humanised IS. This requires establishing curricula which concentrate on human-centred systems development and the study of users' experiences of IS use. Such curricula should highlight competence in delineating both the purpose of the system and human behaviour associated with that purpose as issues of design. A particular issue should be a transition from understanding the functional requirements of a system to

comprehending the corresponding human characteristics as intertwined aspects of design. Also, when delineating humans and their behaviour as objects for ISD, the designers should adopt competence in value-sensitive design that requires high ethical standards.

With respect to organisational structures, processes, and outcomes, the study suggests that it would be beneficial for organisational action if the designers were enabled to develop and expand their conceptions of users. In this way they could develop IS in a way that supports humans in the accomplishment of their activities in many ways, thus improving organisational action. This requires considerations of how human features emerge and intertwine with the purposeful use of technology in particular organisational situations, as well as subsequent designs accomplished with appropriate methods and tools, which associate human physical, mental, social, and cultural qualities with the features of those organisational processes that users make up. For example, in regard to human emotional features, by recognising how trust emerges within the interaction of people and technology, the designers could design systems that may have the potential for creating and sustaining trust in certain organisational processes. Similarly, by directing their attention to what people do with technology in their everyday practices, the designers could expand their understanding of humans, and, in particular, the facilities and frustrations that dynamically either afford or constrain particular behaviour in users. These kinds of considerations would also facilitate the understanding of the 'human side' of an enterprise, which often is an important managerial concern.

Considering the viewpoint that knowledge and expertise are key resources in contemporary IT companies (Nonaka and Takeuchi 1995), and, especially, that IS designers' conceptions are intellectual capital that yield wealth by producing new innovative products (Quinn 1992), the results suggest implications also for Finnish IT business. It seems that the majority of the IS designers are intellectually oriented to developing systems for streamlined organisational processes, but human activity that occurs outside of organisations' work processes remains out of their vision. This implies that the designers do not have competence in creating insight into new social activity practices which are attractive to people outside work settings. In this way a business line of new innovative applications of ICT may also remain out of the IT companies' sphere of activity. Further, by expanding their designers' intellectual spaces from seeing the technical and functional properties of IS to including understanding of the human experience of IS, firms could improve the usability and attractiveness of their products. A final note is that IT companies would benefit from acting in conformity with human-centred attitudes because maintaining customer-ship requires sensitivity to authentic interactions with clients.

Finally, in the next section, the contributions and conclusions of this study are listed.

PART VI: CONTRIBUTIONS AND CONCLUSIONS

As suggested in the introduction, this study aims at the humanisation of IS by investigating IS designers' conceptions of the human being as a user of an IS. There are several fundamental contributions made by this study. The first contribution is the application of interpretivism to study the IS designers' conceptions of the human being as primary tools for human-centred ISD. Second, I have continued the work of others not only, by criticising the focus of the prior analyses of the underlying assumptions of the human being within the IS schools of thought, but also, by outlining a theoretical framework which acknowledges the human being as a whole, and making an ontological assumption, which relates the human being as a whole to the form and functions of IS. Further, the IS designers' conceptions of the human being as a user of an IS result in three distinctive but associated forms of thought consisting of 18 conceptions that, in turn, reveal both context-centred and human-centred understandings of the human being. Moreover, the resulting separatist, functionalist and holistic forms of thought indicate different levels of intellectual competence in conceptualising humans as users of IS. In this way this study adds to the study of knowledge as a key resource in contemporary IT firms: the IS designers' conceptions are studied as intellectual competence, which may vary.

In this study the IS designers' understanding of human characteristics and behaviour is seen to have utmost importance with respect to designing systems for people. A core capability of contemporary IS designers is to understand and analyse humans and their behaviour as well as to interact with them in mutual understanding during the ISD process in order to build and disseminate humanised IS. In this way the development of IS is understood as knowledge work. It is an intellectual and personal process which takes its form according to the conceptions of the performers of the process. IS designers are then applying the ISD methodologies according to their own observations and thinking (Maddison et al. 1983, Avison and Fitzgerald 1994, Hirschheim et al. 1995, Mathiassen 1998). Then the most important tool for ISD and a key resource in contemporary IT companies is the IS designers' thought and insight (Quinn 1992, Nonaka and Takeuchi 1995). Particularly, with respect to the humanisation of IS, their conceptions of the human being as a user of an IS.

The conception of the human being reflects the characteristics of people. Understanding human characteristics requires both the conceptualisation of the basic nature of the human being and its implications for scientific as well as everyday comprehensions of humans. Although an individual's conceptualisation of the HB is an entity which may be comprised of assumptions concerning the basic nature of humans, scientifically defined knowledge as well as everyday beliefs, norms and values, the different aspects of the conception of the human

being need to be defined as separate but yet associated concepts (Wilenius 1978, Rauhala 1983, 13). In the context of this study, this means that the empirical inquiry concerning the IS designers' understandings of humans as users of IS rests both on the basic assumptions of the human being and on the academic body of knowledge reflecting IS practice. These perspectives need to be combined because the fundamental assumptions concerning the basic nature of the human being are beyond the reach of empirical science and thus also a philosophical question (Ropo 1985, 4).

In conceptualising the fundamental nature of humans in the context of ISD, the most significant prior analyses focus on using a framework comprised of a conceptual structure with both philosophically and empirically manifested concepts (Iivari 1991, Iivari et al. 1998). The scope of the framework was, however, found to be too narrow with respect to the different basic human modes of being. The defined deterministic-voluntarist -dimension regards will as the only essential characteristic concerning the human being. Incorporated with the assumptions of Theory X-Theory Y (McGregor 1960), the notion of will as the only essential human mode of being implies that human will is the key feature in exercising an effect on human performance in organisations. Moreover, since the basic idea in McGregor's theory is that human qualities are comprised of managers' conceptions of their employees and that these notions tend to become self-fulfilling prophesies in organisations (Bolman and Deal 1997, 105), the interaction between the management and employees is seen as one-directional: people adjust and express their human qualities in work according to the management's assumptions. The humanistic perspective generated by Nurminen (1986) challenges the above-mentioned analyses with respect to human-centredness. Yet delineations concerning the fundamentals of the human being as a whole are not mentioned.

An attempt to resolve the limitations of the prior delineations of the nature of the human being is made in this study by drawing on a holistic or monopluralistic notion of the fundamental nature of the human being. It assumes that the human being is actualised in physical, organic, mental, social and cultural modes of being, and these modes are fundamentally different. Without the simultaneous existence of all of the modes it is not possible to consider a creature as a human being. Therefore, each of the modes presupposes another in order to exist by itself. Thus, they cannot be reduced from one mode of being to another but need to be understood as a whole (Rauhala 1983, 19-21). Considering the human being as an actor, as a user of an IS, the basic human modes of being are understood as active elements through which the human being is adjoined to IS. According to this active view, the different basic modes of being each contribute to some extent to a continuum of an active process within which the human being as a whole is active with IS. Then the IS-user relationship consists of human action involving explicit and tacit affordances that emerge dynamically in the interaction between humans and IS. In other words, the static characteristics of humans and technology take on a new form within their intertwining activity, which is shaped according to the affordances which, on the one hand, the human modes of being embody, and which, on the other hand, the properties of IS support or ignore. Consequently, understanding humans and their behaviour as users of IS requires insight into these emerging human experiences appearing within the affordances and constraints of contemporary IS and their development.

The IS designers' conceptions of the human being as a user of an IS indicate three hierarchical and distinctive but associated forms of thought consisting of 18 conceptions that, in turn, reveal both context-centred and human-centred understandings of the human being.

The context-centred conceptions indicate an indirect understanding of the human being. Then humans are seen through other facets of an IS, its environments, or through the objectives of ISD. The human-centred conceptions denote a direct understanding of the human being and adduce explicit human features in the IS designers' conceptualisations. In the expressions associated with the context-centred conceptions the focus of reflection is on technology, work, and business. The human-centred conceptions concern knowledge, emotions, and designers' selves.

The resulting forms of thought indicate three different levels of intellectual competence in conceptualising humans as users of IS. This hierarchy of conceptions is revealed in two ways. For one thing, the hierarchy is implied by the referential aspects of the more comprehensive conceptions which tacitly imply the understanding of the more partial conceptions, as is emphasised by Marton and Booth (1997). As pointed out before, this is evident in that the separatist form of thought is a part of the functional manner of thought which, in turn, is a part of the holistic form of thought. Notably, this order is in accordance with a one-way relation: the holistic thought manner implies a tacit understanding of the more partial trains of thought, but the reverse order is not possible. For another thing, the hierarchy is evident in that within the more comprehensive individualised forms of thought there simultaneously appear less comprehensive modes of thought, as is highlighted by Sandberg (2000). This is revealed in that the IS designers who embrace a holistic form of thought also express less comprehensive conceptions.

The most limited level of understanding within the hierarchy of three distinctive but associated forms of thought is referred to as the separatist form of thought. Typical of this form of thought is that, on the one hand, the designers do not recognise any human features but refer to people in terms of non-human phenomena. On the other hand, the designers do recognise a few human characteristics, such as negative emotions and physical constraints that prevent humans from being users of IS. In addition, these ways of understanding humans refer to objectivism, which appears as a remote form of thought in order to be able to recognise human characteristics and behaviour. Within the separatist form of thought the human being is seen in the light of factors that separate people both from actual human characteristics and IS as well as their development. In other words, the relationship between users and designers as well as the IS-user relationship is seen as non-feasible.

The second level of understanding is referred to as the functional form of thought. It is comprised of conceptualisations in which humans act without a full human substance, adapting themselves to the functions of technology, the tasks included in work processes, a cost-effective way of using IS, and to the way that the IS designers themselves use IS. In addition, humans are understood in a functional manner in that they are assumed to be knowledgeable concerning the functions of software while using computers. Then the content of people's consciousness is seen to consist of the functions of software. Further, computers are seen to evoke positive emotions in people, and in particular, these positive feelings are seen as a requirement for using IS. The IS-user relationship is seen as unidirectional: the human being is seen to be determined by his or her external environments, and the role of human emotion is to facilitate this process of external determination. This form of thought adds to the separatist form of thought that humans are acknowledged, even though in an insubstantial way.

The third form of thought signifies the most comprehensive way that the IS designers conceptualise humans as users of IS. It is referred to as the holistic form of thought. It appears

as holistic in several ways. Unlike in the preceding forms of thought, the designers recognise a number of human characteristics in regard to technology, work, and business, as well as knowledge, emotion, and the designers' selves. These observed human features are often seen to co-exist or intertwine with each other. Further, the conceptualisations within this form of thought suggest that the relationship between users and designers as well as the IS-user relationship is a reciprocal process including characteristics typical of human behaviour as a primary substance. Moreover, the human characteristics connect the different conceptions within this form of thought. The conceptualisations within this form of thought imply a tacit understanding of the previous separatist and functional way of thinking.

With respect to the designers' individual orientations, the final phase of the analysis revealed that only one designer remains within the separatist train of thought with, nevertheless, some functional orientations. However, this designer does not fully express functional conceptions and totally lacks holistic ideas. Twelve of the designers embrace the functional form of thought. These designers express separatist conceptions but not holistic conceptualisations. Only one of them does not fully reveal separatist conceptions. Two designers adopt the functional manner of thought with some holistic features and express also separatist conceptions. Five designers reach the holistic level of understanding and also embrace functional and separatist conceptions.

The separatist form of thought provides designers predominantly with technical perspectives and a capability for objectifying things. However, it is worth noticing that the validity of objectifying design issues is dependent on the focus of such definitions. From a human-centred perspective valid definitions would require being theoretically sensitive to human activity and deriving abstracted conceptions from that activity rather than creating objectivist conceptualisations, which overlook humans and their behaviour. The functional form of thought focuses on external task information and task productivity, nevertheless, with the help of positive emotions. The holistic form of thought provides designers with competence of human-centred ISD, while all the aspects of the richness of the human condition are not revealed. Assuming that the designers employ that level of understanding which is most comprehensive within their conceptualisations, it seems that the majority of the designers are intellectually oriented towards designing IS for streamlined organisational processes consisting of external work tasks. Consequently, only few of the designers have the potential to contribute to the humanisation of IS.

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Appendices

1. Framework for pilot data collection
2. Framework for the interviews
3. Tables of each IS designer's individualised forms of thought

Appendix 1

Hannakaisa Isomäki

FRAMEWORK FOR PILOT INTERVIEW

The Conception of Human Being in Information Systems Development

PART I: INTERVIEW

1. KERTOISITKO NIMESI JA IKÄSI? Could you tell your name and age, please?

2. MILLAINEN KOULUTUS SINULLA ON? MISSÄ LAITOKSESSA OLET OPISKELLUT JA MISSÄ KOULUTUSOHJELMASSA? What is your educational background? In which institution you studied and in which training programme?

3. MINKÄLAISESSA YRITYKSESSÄ TYÖSKENTELET TÄLLÄ HETKELLÄ? In what kind of organization/enterprise do you work at present?

4. KUVAILE NYKYISTÄ TYÖTÄSI. MINKÄLAISIA SOVELLUKSIA TEET? Describe your current work. What kind of systems do you design?

5. KÄYTÄTKÖ JOTAIN TIETTYÄ METODOLOGIAA? MITÄ? Do you use some particular design methodology? If, what?

6. TYÖSKENTELETKÖ PROJEKTEISSA? MINKÄLAISTA YHTEISTYÖTÄ SINULLA ON MUIDEN KANSSA? Do you work in projects? What kind of collaboration do you have with other people?

7. KUVAILE LYHYESTI NIITÄ IHMISIÄ, JOILLE YLEENSÄ TEET OHJELMISTOJA. MITÄ HYVIÄ JA HUONOJA PUOLIA OLET HEISSÄ HAVAINNUT? Give a short description of the basic characters of the human beings for whom you typically design systems. What strenghts and shortcomings do they have?

8. VAIKUTTAVATKO NÄMÄ HEIKKOUDET TAI VAHVUUDET TAPAASI TEHDÄ SOVELLUSTA? How do these strenghts and shortcomings affect your design approach?

9. OVATKO ERITASOISISSA TEHTÄVISSÄ TOIMIVAT IHMISET MIELESTÄSI ERILAISIA? MITEN? Are there differences between human beings with different organisational positions?

10. MITEN SINUN MIELESTÄSI IHMISET HALUAVAT KÄYTTÄÄ TIETOJÄRJESTELMÄÄ? How do you think these people want to use information systems? For example, do they like to self control the system? Do they feel themselves comfortable with computers?

11. KUVAILE NIITÄ TEKIJÖITÄ, JOTKA MIELESTÄSI TEKEVÄT OHJELMISTOSTA KÄYTTÄJÄLLEEN SOPIVAN? Describe briefly some of the factors which you consider important in order to increase user satisfaction?

12. KUN TEET SOVELLUSTA, AJATTELETKO NIITÄ IHMISIÄ, JOILLE TEET SOVELLUSTA? MITÄ ERITYISESTI? When you design a system, in what ways do you think you are contributing to an increase in user satisfaction?

13. KUN TEET SOVELLUSTA, AJATTELETKO TEKEVÄSI SITÄ ORGANISAATIOLLE? When you design a system, in what ways do you think you are contributing to the well-being of the organisation?

PART II: A DESIGN TASK WITH THINKING ALOUD

NYT PYYDÄN SINUA TEKEMÄÄN SUUNNITTELUTEHTÄVÄN. ON EHDOTTOMAN TÄRKEÄÄ, ETTÄ AJATTELET ÄÄNEEN TEHDESSÄSI TEHTÄVÄÄ. VOIT PUHUA RAUHASSA MITÄ MIELESSÄSI LIIKKUU, HAASTATTELU ON LUOTTAMUKSELLINEN.

1. AJATTELE SITÄ TAPAA, MITEN TEET SOVELLUKSEN. KIRJOITA TÄLLE PAPERILLE TUO PROSESSI. (Haastattelija antaa haastateltavalle paperin ja kynän).

2. KIRJOITA SITTEN JOKAISEN PROSESSIN VAIHEEN KOHDALLE NE ASIAT, JOITA YLEENSÄ PIDÄT TÄRKEINÄ KÄYTTÄJÄN KANNALTA.

3. MERKITSE + NIIDEN ASIOIDEN KOHDALLE, JOITA PIDÄT KAIKKEIN TÄRKEIMPINÄ.

KIITOS!

In English:

Now I will ask you to do a design task. It is essential that you think aloud while accomplishing the task. You can speak what ever is on your mind. As you know, this interview is confidential.

1. Think the way you work when designing a system. Write down the work process to this paper. (the interviewer gives an empty paper and pencil to the designer).

2. Write down in every work phase the things that you usually consider important regarding to the user.

3. Mark + beside the factors that you consider to be most important.

Try to remember to think aloud through the whole task, please.

Thank you!

Appendix 2

Hannakaisa Isomäki

Conception of the the Human Being in ISD
FRAMEWORK FOR THE INTERVIEWS

OPENING QUESTIONS: CONTEXT AND QUESTION TYPES

OPENING QUESTIONS	**CONTEXT: ISD**					
	Current work	**Planning**	**Design**	**Implementation**	**Use and maintenance**	**General question**
QUESTION TYPES **Factual questions** **Descriptive questions**	Describe your current work: -what kind of systems do you build? - for which line for business? -for your own firm or outsiders? - do you work on projects? -do you use a certain ISD methodology?	-what organisational positions do the people have who usually order applications? -what kind of people are they? -are there differences?	-what kind of user-interface do you think people want to use? -describe those things that make software fit to it's user - what, in your opinion, is usability?	-how, to your mind, do people react to new hardware and software? (-do you think that somebody might be afraid of new software?)	-does an information system influence people's work in your opinion? (-how?)	- do you think there are any common features shared by those human beings for whom you've made systems?
Affective questions **Inner feelings**	- do you like your work? (-why)	- do you feel it is pleasant to be involved with the client?	- do you like making instructions for use or help-files?	-do you ever feel that the system restricts users too much or gives too many rights to them?	-do you like maintenance? (- why?)	
Attitudes	-is your opinion taken into consideration in your project group?	-do you prefer making tailored systems or other types? (- why?)	-when you are making an application, for whom do you think you are making it?	-do people easily learn to use new hardware and software? (- why?/how?)	-are you interested in users' problems after implementation?	
Values	- do you think you are doing important work? (-why?)	-what kind of is a good client? a bad?	- what is the most important thing in design?	- what is the most important thing in implementation?	-what is a good user like? a bad user?	

Appendix 3

IS DESIGNERS' INDIVIDUALISED FORMS OF THOUGHT

The way each individual designer's conceptualisations form a layered meaning structure concerning the human being as a user of an IS is illustrated in tables below. The numbers in the tables indicate the frequency of each designer's expressions associated with the analytical category in question. Missing number means missing expression(s).

DESIGNER 1: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	9	5	-
	Work	2	1	-
	Business	-	-	-
Human-centred	Knowledge	-	8	-
	Emotion	-	-	-
	Self	1	3	-

DESIGNER 2: Separatist-Functional

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	4	1	1
	Work	2	5	-
	Business	-	-	-
Human-centred	Knowledge	2	1	-
	Emotion	2	-	-
	Self	-	3	-

DESIGNER 3: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	1	4	-
	Work	-	-	-
	Business	-	-	-
Human-centred	Knowledge	-	1	-
	Emotion	-	1	-
	Self	-	2	-

DESIGNER 4: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	4	1	1
	Work	2	-	-
	Business	-	1	-
Human-centred	Knowledge	-	2	-
	Emotion	-	2	-
	Self	1	1	-

DESIGNER 5: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	3	3	-
	Work	5	-	-
	Business	1	-	-
Human-centred	Knowledge	6	2	-
	Emotion	7	9	-
	Self	-	1	-

DESIGNER 6: Separatist-Functional-Holistic

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	3	1	3
	Work	-	-	1
	Business	-	1	-
Human-centred	Knowledge	4	2	3
	Emotion	3	3	2
	Self	-	3	-

DESIGNER 7: Separatist-Functional-Holistic

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	4	-	1
	Work	4	9	-
	Business	-	3	1
Human-centred	Knowledge	1	2	1
	Emotion	-	4	2
	Self	-	1	-

DESIGNER 8: Separatist-Functional-Holistic

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	2	1	2
	Work	3	4	1
	Business	-	-	-
Human-centred	Knowledge	1	2	3
	Emotion	1	3	1
	Self	-	1	-

DESIGNER 9: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	9	1	-
	Work	2	1	-
	Business	-	-	-
Human-centred	Knowledge	3	4	-
	Emotion	2	1	-
	Self	-	1	-

DESIGNER 10: Separatist-Functional with a sense of collaboration

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	4	1	-
	Work	2	3	-
	Business	1	1	1
Human-centred	Knowledge	-	1	2
	Emotion	3	-	-
	Self	-	2	-

DESIGNER 11: Separatist-Functional-Holistic

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	4	4	1
	Work	5	3	-
	Business	1	1	-
Human-centred	Knowledge	-	1	6
	Emotion	1	3	-
	Self	-	-	2

DESIGNER 12: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	6	3	-
	Work	1	4	-
	Business	2	-	-
Human-centred	Knowledge	2	-	-
	Emotion	4	-	-
	Self	-	-	-

DESIGNER 13: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	1	4	-
	Work	3	1	-
	Business	1	1	-
Human-centred	Knowledge	4	2	-
	Emotion	-	1	-
	Self	1	1	-

DESIGNER 14: Separatist-Functional-Holistic

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	4	1	1
	Work	1	3	2
	Business	1	1	2
Human-centred	Knowledge	1	2	1
	Emotion	2	3	-
	Self	-	-	-

DESIGNER 15: Separatist-Functional

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	-	1	-
	Work	1	3	-
	Business	-	-	-
Human-centred	Knowledge	7	2	-
	Emotion	4	1	-
	Self	-	-	-

DESIGNER 16: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	8	6	-
	Work	4	-	-
	Business	2	-	-
Human-centred	Knowledge	-	5	-
	Emotion	3	3	-
	Self	2	-	-

DESIGNER 17: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	4	2	-
	Work	1	1	-
	Business	-	1	-
Human-centred	Knowledge	3	2	-
	Emotion	2	2	-
	Self	-	-	-

DESIGNER 18: Separatist-Functional with a sense of collaboration

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	3	2	-
	Work	3	1	-
	Business	-	-	1
Human-centred	Knowledge	-	2	1
	Emotion	4	-	-
	Self	-	1	-

DESIGNER 19: Separatist-Functional

What ↓ / How→		Separatist	Functional	Holistic
Context-centred	Technology	2	3	-
	Work	1	1	-
	Business	-	-	-
Human-centred	Knowledge	2	1	-
	Emotion	2	3	-
	Self	1	-	-

DESIGNER 20: Separatist-Functional

What ↓ / How →		Separatist	Functional	Holistic
Context-centred	Technology	-	1	-
	Work	4	-	-
	Business	-	1	-
Human-centred	Knowledge	-	1	-
	Emotion	1	1	-
	Self	-	-	-