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

Abstract
As information systems are increasingly pervading human life, the way information systems designers' conceptualize and carry out the relationship between computerised information systems (IS) and users has recurrently been brought forward as a significant question. In particular, a matter of utmost importance is how the IS specialists create the IS-user relationship from the point of view of humans, i.e. humanise information systems. In contrast to the prevailing methodology-driven views of information systems development, in this paper I propose a study which aims at examining how do the Finnish IS designers conceptualise human characteristics and behaviour.

1 Introduction

Recent development of information and communication technologies (ICT) has impacts on the nature of information systems (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 kind of views concerning information systems (cf. Paulos & Canny 1997; Bergqvist et al.1999; Fällman 1999). While the applications of ICT increasingly pervade all aspects of human life, the nature of information systems is changing especially with respect to the human being. Information systems 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. Therefore, an adequate manner to perceive information systems is to examine them in social and behavioural contexts. That is to say, information systems should be seen as constructed for mediating and supporting human behaviour, as is the case in approaches known as human-centred information systems development (ISD) (e.g. Eason 1988; Greenbaum & Kyng 1991; Pain et al.1993; Preece 1994; Ramey et al. 1996; Norman 1998).

Then the most important issue of ISD is to bend the applications of ICT to meet human characteristics and behaviour, i.e. humanise information systems.

The human-centred view of ISD is understood as an approach often referred to as the tool perspective. According to this view, humans construct their various work-related or other everyday activities using information systems as tools provided to them. For example, Davis (2000) contends that the human-centred perspective complements the traditional socio-technical approach (e.g. Mumford 1983) in that it assumes that improvement in organisational systems can be achieved if humans are provided with tools to support self-design of activities. In other words, the aim of the human-centred perspective is to support and mediate humans' natural behaviour rather than creating automated processes of actions in the systems. It is assumed that human actions concerning the use of IS cannot be designed in the systems as beforehand-determined procedures (cf. Suchman 1987). Instead, the design of IS is understood in the context of human behaviour. Then the central design issues arise from an understanding of how people behave when self-designing their daily activities.

Understanding human characteristics and behaviour is essential for IS designers for at least two reasons. First, the way IS designers' understand the human being is an important piece of knowledge within contemporary ICT based IS innovations. This is because new systems, especially commercial products, are not accepted by people 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 & Holtzblatt (1998), this is done by creating knowledge on 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 of a new activity practice, which is attractive to people. Only after this it is 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 sold successfully the IS designers are bound to understand human behaviour and characteristics.

Second, understanding human characteristics and behaviour is a question of value-sensitive design (cf. Friedman 1997). Then the human characteristics should be taken into account in ISD in order to foster human life and well-being. This is important, because people adapt to their environments during time. In this current situation, where ICT based applications are pervading almost all aspects of human life, people interact with technology in 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 (e.g. Erikson 1950; Bronfenbrenner 1979;Gibson & Levin 1975; Inhelder & Piaget 1980; Erikson, Erikson & Kivnick 1986). According to these theories, human development occurs in a deep and diverse interaction between an individual and her environment. While being in this interaction the individual is influenced by the elements of the environment. As the environment is becoming more and more technologically intensive, the developing individual is getting more technological responses into which adapt during the ongoing and recurrent situations of IS use. For example, when the everyday communication in the bank, in the market, or in the school is occurring via ICT applications and not in a face-to-face situation. This increased human dependency on information systems strengthens the need for information systems research and design that concentrate on the nature of the human being.

Thus, in the current societal situation, information systems 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 behaviour and characteristics. 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 avoids harming human life and well-being.

2 Conventional perspectives to the humanisation of information systems

The concern of the humanisation of IS is not a new one. Since the outset of computing, numerous strategies have been created in order to intertwine human action and information systems in a satisfactory manner. These conventional strategies are predominantly comprised of various design rules and methodologies (cf. Friedman & Cornford 1989; Hirschheim & al., 1995) as well as codes of ethics (Berleur & Brunnstein 1996).

The most common strategy aiming at the humanisation of information systems has been the development of various ISD methodologies. The first methodologies often referred to as the structured methodologies promoted the human-centred view of ISD in that their use made visible the original nature of human action which is not in every respect in conformity with a formal and objective world view. Ever since this observation, the evolution of ISD methodologies has been increasingly human-centred. Socio-technical and human-centred methodologies, such as ETHICS (Mumford 1983), Soft Systems Methodology (Checkland 1981), Scandinavian Collective Resources Approaches (e.g. Ehn 1988), and Human Computer Interaction approaches (e.g. Nielsen 1993; Preece 1994; Norman 1998) were developed to carry conceptual structures that aimed at providing means for the IS designers to analyse human action.

Another well-known strategy for promoting the humanisation of IS is the development of the codes of ethics for IS professionals. Two most central manifestations of IT 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 researchers.

Both of 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 by 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 same vein, the IFIP code of ethics binds the IS 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 the computerised workplaces. Particular threats to health are poorly designed human-machine interfaces, which are seen to cause stress symptoms. In this way the IS designers have affirmed their obligation to continually humanise information technology.

3 The focus of this study

As shown above, at the time understanding human characteristics and designing systems in conformity with them is an essential goal for the development of information systems. Thus, the humanisation of information systems is a central demand for current IS professionals in their work. A core capability of the 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 information systems. This central skill is being supported by an ever-increasing amount with different ISD approaches and methodologies. Respectively, the prevailing strategy of humanising information systems rely on the nature of ISD approaches and methodologies. The 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 the IS designers to achieve a human-centred goal.

Codes of ethics are formal documents that professional organisations, such as ACM and IFIP, produce for themselves in order to make known their stance and policy about 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 concerning professional performance (Argyris & Schön 1978; Brown & 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 ‘ethical’ theory. However, the code of ethics as an espoused theory indicates only a formal description of an organisation’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 & Schön 1978; Brown & Duguid 1991).

The point of view adopted in this study differs from the above-depicted view over the 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 information systems.

In this study the design 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 the IS professionals themselves; particularly their perceptions and conceptualizations of humans. This kind of point of view is stressed also by Maddison and al. (1983), who ascertain that the IS professionals are supposed to apply the methodologies according to their own thinking, not just blindly follow the steps and rules of the methods. In addition, the researchers of the Danish MARS project found in the early 1980's 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 & al. 1995 129). It has also been found that the 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 & Fitzgerald 1994). This kind of improvisation plays a central role within organisational action (Ciborra 1996), 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 (Greenbaum & Kyng 1991; Pain et al. 1993).

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

The research problem conveys a novel standpoint, according to which the user is defined as the 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. The traditional way to understand users is to specify them with different tasks or roles they have in relation to an information system. Friedman & Cornford (1989, 183-187), for instance, 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.

In a same vein, 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 tasks, which are seen to yield different information inputs and outputs for systems design.

This traditional view totally lacks the consideration of human behaviour. People are seen just 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 in 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 fundamental characteristics of the human being is needed. Thus, the focus in this study is on the human characteristics and behaviour. Then users are predominantly seen as acting according to the basic features of the human being while performing particular tasks with information systems (Figure 1). 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 are performing with information systems. Therefore, in the next section, the fundamental human characteristics are discussed and a framework for delineating these features is presented.

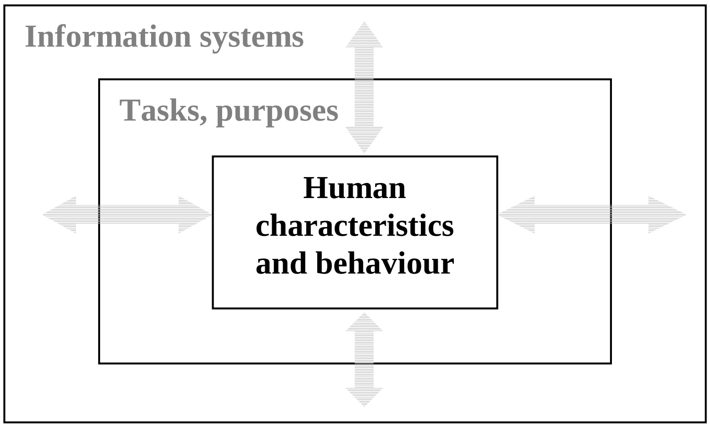


Figure 1. The focus of this study.

4 The Conception of the Human Being

Understanding human characteristics and behaviour refers both to the conceptualization of the basic nature of the human being (HB) and its implications for scientific as well as everyday comprehensions of people and their behaviour. Although an individual's conceptualization 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 (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 the 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 HB 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 the 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 have not had blood circulation before the year 1628. Hence, the clarification of the essence of the HB is primarily based on rational philosophical thought, i.e. ontological analysis. Consequently, scientific as well as workday activities directed towards people as, for example, developing information systems 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).

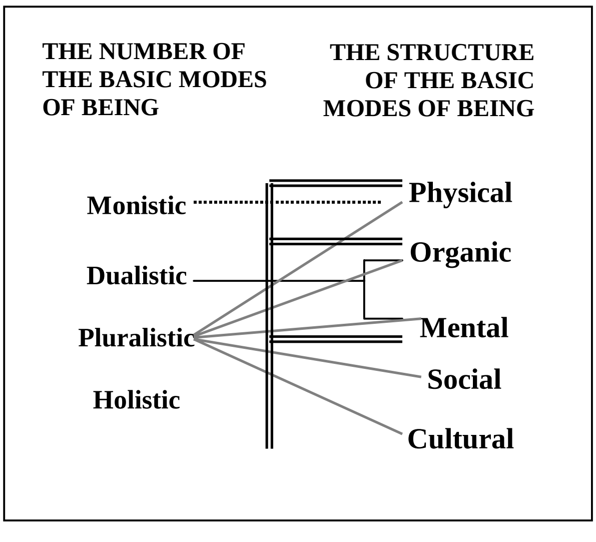
The concepts used in ontological analyses regarding the HB are usually not appropriate for empirical inquiries. Often these concepts are indefinite and impossible to operationalise or verify by the means of science (Ropo 1985, 4). For this reason, it is necessary to specify the human being in terms of 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 HB based on different disciplines as a contrast to philosophical anthropology which attempts to define the human being as a whole. However, the conception and the image of the HB 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 HB 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 HB may help to redefine the conception of the human being. Lehtovaara (1994, 53) also points out that this two-fold definition of the HB refers to the differences within the ways of acquiring knowledge (research methods) in philosophical and empirical studies. Hence, 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, the 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 HB 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 HB, contents of unconscious experiences, impacts of cultural inheritance as well as different beliefs, ideologies and values (Rauhala 1983, 13). Hence, the everyday conception of the HB 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 an aid of a construct that enables a broad approach to the conceptualization of humans. In addition, this construct should form a theoretically valid scope to ensure a well-defined focus in this study (Eisenhardt 1989, Ahonen 1994). In order to clarify the multiplicity of the human being and thus the possible numerous foci of the features that the IS designers' conceptions of the HB may hold, I am in the following describing the basic human modes of being which are included in a conceptual framework delineating the multifaceted nature of the human being.

4.1 A framework for outlining the conceptions 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 HB (e.g. Nash 1963, Laine 1994, Laine & 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 HB as a whole (Figure 2).



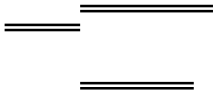


Figure 2. A conceptual framework for outlining the nature of the human being.

According to the first element, Rauhala (1983, 19) states that the most common way is to separate monistic, dualistic, pluralistic and monopluralistic or holistic models of the human being. Monistic conceptions are based on an idea that the HB 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 to 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 a same phenomenon. Different conceptions based on a two-aspectual interpretation of the HB are quite common.

In the pluralistic conceptions it is presupposed that the human being becomes true as many kinds of subsystems which have their own structure and thus also relative independency (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 multimedia environments or, development of trust in virtual teams. A limitation of the pluralistic conceptions is the difficulty to gather dissimilarity and state arguments for the human being as a whole. This limitation is attempted to solve within the monopluralistic conceptions which assume that the HB becomes true 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 each 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 HB 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, i.e. a machine. According to the organic (biological-chemical) system the HB 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. The HB as a mental-psychical system is a being with both consciousness and self-consciousness. This characteristic is essential only to humans, for example, Ahlman (1953, 7) states that "as far as we know, the human being is the only creature we know that is a problem to itself." A classical manner to delineate consciousness activities is to separate thought, emotions and will.

In addition, according to Wilenius (1978, 13) 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 HB 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. The human being defined as a cultural creature brings out the creative relationship between people and their material and mental environments. Ever since beginning to use simple tools and make fire the humankind has in a relatively short time created an immensely diverse mental and material culture. The cultural features of the HB are truthfulness, ethicalness, aestheticalness and religiousness (Wilenius 1978, 19-23).

When outlining the conception of the HB as different combinations of basic structure and 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 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 example, Immanuel Kant argued that people can control their will with their thought

(Wilenius 1987, 17). In the case that the nature of the human being is delineated in the context of information systems the HB 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. Hence, the basic human modes of being are understood as active elements through which the HB is relating to information systems. According to this active view, the different basic modes of being contribute each to some extent to a continuum of an active process within which the human being as a whole is active with the computer. From a pluralistic viewpoint this active process can be approached from the point of view of different subsystems. Human information processing, for instance, can be seen as a continuum consisted of brain functions, attention, perception and thought functions (Norman 1991). In a similar manner, an emotional experience may be seen as a continuum of neural, sensorimotor, affective and cognitive processes (Izard 1993). This brings forth two notable characteristics within human action. First, the hierarchicalness of the basic human modes of being is also active by nature: in human action the different modes interact with each other. Second, in human action there are both conscious or explicit and unconscious or tacit dimensions. This is because people are not conscious of all the aspects in their own behaviour, for example, neural processes are not conscious to humans.

From a more holistic point of view the nature of human action may be seen as Cook & Brown (1999) define it building on the pragmatist philosopher John Dewey’s concept “productive inquiry”. This description includes the tacit and explicit dimensions into human action which is understood in terms of knowledge creation involving to some extent all the basic human modes of being in interaction with each other underpinning knowledge creation. 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. 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. 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: one 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. Therefore, Cook & Brown (1999) ascertain, knowledge by itself cannot enable knowing. As a tool, knowledge disciplines knowing, but does not enable in any more than possession of a hammer enables its skilful use. Furthermore, knowing should not be confused with ‘tacit knowledge’, which is a tool for an 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 (or practice) 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.

According to Cook & 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 (cf. Simon 1991), 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 relation between the knowers and the world. In order to interact 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 pair of pliers gives particular form to how we interact with a bolt. Thus, knowing is to interact with and honor the world using knowledge as a tool. In a similar manner, the IS designers use their insight of the human characteristics in regard to humanisation of information systems. Also for this reason, information systems science should provide the IS professionals disciplined knowledge about the human being.

Cook & Brown (1999) define their understanding of the characteristics of "interaction with the world", that are at the center 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, e.g. information systems. That is, 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 can give rise to shape and fluidity (facilities) or incoherence and clumsiness (frustrations) in human activities. Dynamic affordance is not just a question of perception but about relationships between characteristics of the world and issues of inherent concern to people or the basic human modes of being. In other words, there is a sense of affordance that lies beyond the inherently static human senses, which deserves to be understood in its own right, i.e. dynamic affordance.

As Cook & Brown (1999) point out, dynamic affordance has both an intuitive sense and a very particular conceptual sense. Both senses can be seen in the bicycle riding example. Intuitively, 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 needed knowledge. Conceptually, dynamic affordance is lying 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. Without the dynamic affordance of that interaction there is no learning and no enactment of what is learned. This dynamic character is an essential element of the conceptual sense of dynamic affordance. Therefore, on the one hand, because interaction between rider and bicycle dynamically affords both the acquisition of knowledge and the use of knowledge once acquired, Cook & Brown (1999) see it as doing epistemic work that the knowledge alone cannot. On the other hand, dynamic affordance also puts emphasis on the features that emerge from the basic human modes of being within interaction of humans and the world. Consequently, understanding human action requires insight over the different basic human modes of being and their implications within dynamic affordance that occurs between humans and information systems as well as users and IS designers during the process of ISD. In addition, Cook & Brown (1999) ascertain that dynamic affordance and knowing play an essential role in how knowledge - explicit and tacit, individual and group - is generated, transferred, and used in organisations.

In general, the diversity of the conceptions of the HB as a whole emerges from the various combinations of the basic human modes of being. Some dissimilarities rise also from the different interpretations of the nature and relationships of the basic structures of the modes of being. In the following I am discussing the manner the human being has been understood within ISD.

4.2 The image of the human being within information systems development

The image of the human being is an inherent element in the theoretical models of information systems development, i.e. ISD methodologies. Avison & 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, Hirschheim, Klein & Lyytinen (1995,15) define that information systems development 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 phenomena as human beings, e.g. different organisations or parts of the new global information infrastructure like digital libraries or electronic commerce. Hirschheim et 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 a 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 philosophical assumptions that guides and constrains the enquiry. Assumptions concerning the nature of the HB is 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 & Fitzgerald 1994). As a consequence, the way the human being is seen in ISD is dependent of the IS designers' view of the human being and their operationalisation of the image of HB 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 HB which is expressed in the theoretical models of ISD need 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 of a certain point-of-view adopted by IS professionals, and also through training of IS experts.

Iivari (1991) has analyzed 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 predominantly published during the 1980's as manifestations of the paradigms analyzed. From the point of view of analyzing the image of the HB 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 & Cornford 1989). Therefore, it would seem logical that the textbooks comprised of ISD methodologies developed and published during that decade would include conceptualizations of the human being as the 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 & 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 be in contrast of the dominant ISD tradition and thus complementing 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 to their analysis Iivari & al. (1998, 172) state that they regard human beings ‘in their different roles of IS development and IS use’. In other words, the image of HB they looked for concerned the users but also the IS professionals as well as other people involved either in the development and/or use of information systems.

The conceptual structure in the framework for analysis defines the human being in relation to the distinction between determinism and voluntarism presented by Burrell & Morgan (1979). According to a deterministic view humans and their activities are completely determined by the situation or environment, whereas a voluntaristic view regards people completely autonomous and free-willed (Burrell & 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 to a profound analysis. However, the scope of the framework is narrow with respect to the different basic human modes of being: the deterministic-voluntaristic -dimension regards will as an 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 an conceptualization according to which human will is the key feature in exercising an effect on human performance in organizations. 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 organizations (Bolman & 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 HB 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. voluntarism turns the one-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 & al. (1998) resulted predominantly in different positions on the deterministic-voluntaristic -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 the speech act based approach, soft systems methodology, trade unionist approach and professional work practices approach the image of the human being was defined voluntaristic 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 information systems 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 the system. 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 HB 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 emphasizes 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 HB 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 of this kind of participation like 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 information systems 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 information systems. HIS assumes that the starting-point for developing information systems is the acts of the human being and not the technical system. Information systems are seen as tools for different human functions and thus do not have any other value than the one determined by their use. The human being is seen as responsible, active, thinking and skilled creature with an ability to possess internal motivation (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 expresses an existential conception of the human being which sees humans inseparable of 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 of 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 & Lindzey 1978, 318-325).

Based on the above-mentioned 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 & Klein 1989, Hirschheim & al. 1995). Yet, in some cases the image is seen as voluntaristic. Nurminen's ideal type Human-Scale Information System is the only model which assumes that characteristics typical to the HB are the starting point for developing IS. Nevertheless, the all the above-mentioned perspectives leave open what are the exact human characteristics that the self-steering activity and supposed voluntarist participation are supposed to bring about into the development situations both to be experienced or analyzed by the IS professionals and to shape the information systems, or how the beings-in-the-world are influenced by the IS. The promising attempt of Iivari (1991) and Iivari & al. (1998) to incorporate an empirical theory into their theoretical framework for adjustment of the analysis did unfortunately not make the situation any clearer. 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' view of the HB as a central factor in the humanisation of information systems.

5 Theoretical underpinnings and method

Because the object of research – IS designers' conception of the human being – 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 section 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 theoretically 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. 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 the IS designers' genuine opinions. By offering predefined answering options to the designers some assumptions of a particular theoretical or a priori view could be tested, but this procedure would not capture the spontaneous conceptions 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 solve the research question is consistent with the assumptions and procedures employed in qualitative research. What is needed is an approach that allows the exploration of conceptions. Phenomenography is an approach that provides this study a theoretical basis for studying IS designers' conceptions. In the following the basic tenets of this research approach are described.

5.1 Constructing conceptions by experiencing the world

Phenomenography is about individual meaning construction, which results as a conception. Thus, a conception refers to conceiving and understanding something. People form their conceptions while experiencing the world[1]. In doing so, people are neither constructing the world nor the world is 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 & 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, to form the foundation for the human construction of meanings and, on the other hand, to act as a mediator between an individual and the surrounding world (Uljens 1992, 85). For this reason, conceptions are acting as interpretative schemes because they contribute to the individual construction of meanings concerning the surrounding world. In other words, conceptions are regarded to act as a ground for action (Järvinen 1999, 47).

By defining humans and 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 under-

[1] Marton and Booth (1997, 86) state that experiencing something is equal by meaning to understanding, conceptualizing, and other similar verbs referring to human conceptions as a result of conceiving and understanding phenomena.

stood 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 & 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 the people conceptualise it (Järvinen 1999, 48). This is supported also by Uljens (1991), 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 with 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 & 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 factors, which signify the qualitative differences among conceptions. Conceptions are qualitatively different due to the way that the different aspects of an experience are merging with each other. Within this merging there are of 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 important. In other words, people's conceptions are qualitatively different with respect to both levels of understanding and value orientations. In what follows, the qualitative differences within conceptions are depicted.

5.2 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 & 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, is its internal horizon. The referential aspect signifies the meaning of the conception (Figure 3). These two aspects are dialectically intertwined and occur simultaneously within an experience. Thus, within a conception, structure presupposes meaning, and at the same time, meaning presupposes structure. 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.

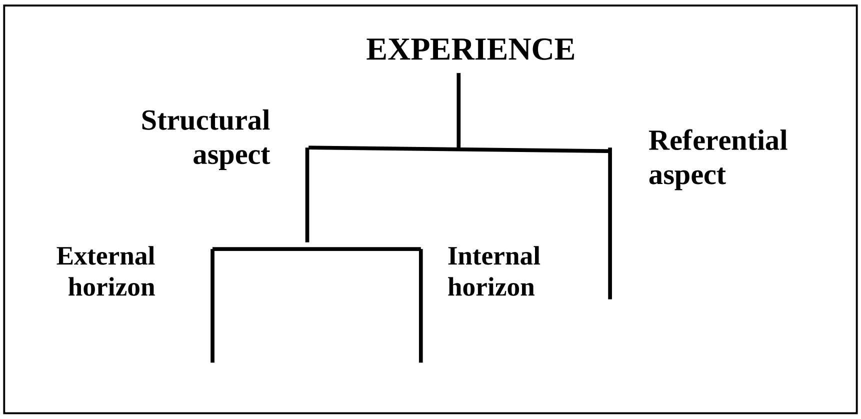


Figure 3. The analytical distinctions of an experience (Marton & Booth 1997, 88).

The qualitative differences among conceptions are due to the way the structural aspects and the referential aspect are merging 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 different conceptions with respect to the quality of understanding. Two extremes within the different ways of conceiving phenomena are often referred to as a surface approach and a deep approach (Marton & al. 1980; Marton & 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 not understood in way that is required from effective action. Respectively, when the focus of thought is on the whole meaning of a phenomenon instead of separate parts of it or even the surroundings of the phenomenon, the conception is in accordance with a deep approach. Then the meaning of a phenomenon is understood in a way that is required for competent action with respect to the phenomenon in question (cf. Sandberg 2000).

6 Expected results

The results of this study are expected to reveal the way Finnish information systems designers' conceptualize humans as active users of information systems. Due to the interpretive approach, the conceptions revealed may include some unexpected and thus new features which also may have theoretical implications for the image of the human being in ISD.

7 Limitations

The study concerns the IS designers' conceptions of humans as users of IS. Therefore, the focus is limited on the way that the IS-user relationship appears in the designers' minds. Thus studies focusing on the observation of actual work practices and designs would provide more insight to the view of how humans are taken into account in contemporary ISD.

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