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Rethinking Information Systems research methods with Heidegger's ontology

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Abstract
IS research is to some extent driven by practitioner concerns. Both practitioners and .Information Systems (IS) research has been dominated by the Cartesian worldview of duality. This has had the effect of narrowing the range of research questions addressed and focusing mainstream research on the application of scientific research methods. Heidegger's ontology gives us an alternative view of the reality of human life. His analysis of tools in use (which he labels equipment) is of particular interest for IS research. His concept of equipment can be directly applied to Information and Communications Technology (ICT) by both practitioners and researchers. The paper outlines some of the implications of this step for IS researchers.

Keywords: Heidegger, IS Research, Cartesian ontology, IT artefact, Equipment

1 Introduction
The IS research community was formed around the problems and questions raised by organizations' attempts to exploit the new Information and Communications Technology (ICT). It is concerned with both the 'hard' characteristics of the ICT application under study and the social context of the organization within which it is to be or is being deployed.

Ontological theories are rarely discussed in everyday life but they create the worldview that underpin our beliefs and direct our actions. The dominant ontology of the West, since Descartes, has been based on Cartesian dualism – the belief that reality can be understood by splitting the analysis into two parts - that of the human mind (thought, perception, spirit, mental concepts) and the material objects that we see in the world. This mindset forms the assumptions on which - managers and practitioners implement ICT applications within business organizations and the work of the mainstream IS research community rests. Riemer and Johnson (2014) argue that this has resulted in a number of significant unresolved questions in particular on the implementation of new ICT applications. Research has tended to over emphasise the 'IT artefact' at the expense of the context within which it has to work.

In his seminal book 'Being and Time' first published in 1927, Heidegger (2010) presented an ontology that gives us a radically different world view. In his view the traditional Cartesian worldview gives only a partial description of reality, ignoring the central human experience of everyday life that is common to all mankind. His analysis of tools in use (which he labels equipment) is of particular interest for IS research. His concept of equipment can be directly applied to ICT. In the view of Riemer and Johnson (p284, 2014) 'Heidegger's existential ontology is a fully articulated powerful framework capable of providing a non-dualist grounding for an IS discipline..'

This paper seeks to establish the impact that adopting a Heideggerian worldview might have on practitioners attitudes to ICT implementation and hence the effect on IS researchers choice of research methods. The next section assesses the effect that the Cartesian worldview has had on IS research. Section 3 gives a brief outline of those aspects of Heidegger's ontology that are most relevant to the use of ICT applications within organisations. Section 4 analyses some of the implications that adopting a Heideggerian worldview might have on IS research

2 The impact of Cartesian ontology on the IS Community
The two groups most intimately concerned to obtain business benefit from the deployment of ICT artefacts are the practitioners (consultants, business executives, government), who buy, install, implement and use the technology and IS Researchers, who assess each new application, research practitioner actions and the effects of ICT implementation projects with the aim of developing theories and guidelines for them (Ramiller et al, 2008).

The traditional Cartesian world view which starts with the fundamental dichotomy of subject/object (Foulds, 2013; Hubert Dreyfus on Husserl and Heidegger,1978; Riemer and Johnston,2014), almost seamlessly leads us to analysis through categorisation and description of objects and phenomena. Such a world view has encouraged the acceptance of an objective reality which we can come to know through perception, description and measurement. It has placed human reasoning and the power of the human mind to solve problems above most other activities. This has led to a fundamental belief in the ability of humankind to solve problems 'once and for all'. These ideas permeate the everyday life of both IS researchers and practitioners and executives in charge of managing new ICT applications. This section assesses the effect this worldview has had on both these groups.

2.1 Practitioners and the exploitation of ICT

For the last sixty years (post World War II) ever more sophisticated waves of information technology tools 'the IT artefact' (computing hardware, data storage facilities, systems software and most recently electronic communications) have created and then transformed the supplier industry. This industry has been characterized by the explosive rate of change in the technology, exponential growth in computing, electronic storage and electronic communications power, paralleled by a similar rate of reduction in costs (Moore, 1965, 2003). The industry went on to sell their products to all other industrial and commercial sectors. The level of investment in ICT over these decades has been extra –ordinarily high. ICT applications now cover a wide range of organizational activities – from personal tools (eg word processing) to organizational wide operations (supply chain) and communications channels (email). Each wave has opened up new possibilities with effects reaching ever deeper into the organization. Once in the hands of users many of these tools have proved flexible, yielding unexpected and unintended use but bringing unplanned organizational change and forging new connections between employees. The immediate future promises new developments in the technology that have just as great a potential to change our organizational life as previous waves (see for example Duncan et al, 2014; Bauer et al, 2014 McKinsey reports). Each new wave of applications appeared to promise significant business benefits and as a result business organizations and individuals have hastened to buy and install them.

The practitioner community inherits the 20th century view of business operations in which individuality was submerged within the workgroup and production line operations. Managers wanted conformity. Time and motion experts (Taylor, 2011) sought to establish the most efficient methods of manufacturing, training workers to be undifferentiated replaceable units. The enormous success of this approach in terms of wealth creation has left a legacy of belief in the efficacy of planning and the power of rational analysis. Executives have generally proceeded to invest in ICT based on detailed strategic, operational and IS project plans (Ciborra, 2006). An objective description of the IT artefact or IS includes the potential business benefits which it is assumed can be obtained by good project planning and management. The benefits depend on the type of business –a function of the IS and the business operation to which it will be applied. Managerial attitudes have tended to view the project completion to be at the point in time when system use began. Consultants and IS researchers have been ready to offer advice and guidelines for best practice on a wide range of issues including - making a business case identifying the business benefits to be garnered (Farbey et al, 1993; Parker et al, 1989; Renkema, 2000), creating detailed project and staffing plans (Remenyi, 1999), system development tools (ISD), managing installation and implementation and training the users (Remenyi and Brown, 2002; Marchand and Davenport, 2000) and creating strategic plans (Weill and Ross, 2009) . They have also been free with advice on potential major pitfalls and problems. Theory developed by consultants and IS researchers underpins many of these recommendations. A fundamental assumption by all participants is that adherence to these ideas will automatically lead to the successful implementation of the new system.

Despite the range and scope of this advice, ICT investment has produced mixed results for business organizations. While the business scene has undoubtedly been transformed and we now have operations and organizations that could not exist or be run without ICT, nonetheless the return on investment has been disappointing (Brynjolfsson, 1993; Strassman, 1990, Earl, 1992; The McKinsey Global Institute (MGI), 2002) generating managerial pessimism (Sauer and Cuthbertson, 2003). Moreover ICT projects continue to encounter major problems, including large scale ICT project failures (of which government initiatives are the most visible (Keil et al, 2000; Collins, 1998; Bacon and Hope, 2013), user criticism and opposition, unused systems (Markus, 1983; Markus and Keil, 1995) and poor implementation leading to lengthy delay in obtaining business benefits (Royal Free Hampstead NHS Trust.,2008; E-Health insider, 2008).

2.2 The impact of the Cartesian worldview on IS researchers

Mainstream IS researchers work with a similar worldview believing in their ability to use the scientific method (positivism) to develop theories that can model ICT artefacts and their implementation well enough to describe and predict the outcomes of implementing each new wave of applications. Researchers strive to develop guidelines on the major operations of design, adoption and implementation for managers to take to ensure the successful acquisition of business value. Classical positivism emphasises the reliance on measurable evidence to support theories. Research methods include passive observation, measurement and statistical analysis, survey, questionnaire, instrument experiments, case study and simulation (Mingers, 2003). This is the dominant stream of research as measured by the proportion of empirical academic papers that fell into this category - over 75% for the latter period of the 1990s (Mingers, 2003). Work in this stream is critically assessed by academics for both the practical value of the results and the rigour of the research method applied. Researcher objectivity is a key criteria. The research results convince through their adherence to accepted standards of validity, reliability and replicability. For mainstream researchers the most important outcome is the production of generalisable theories with predictive power. As Riemer and Johnson (2014) point out this line of research although it has produced some powerful results, does not offer much help on the various problems of implementation routinely encountered by organizations.

From the early 1990s, dissatisfaction with the restricted range of research questions that could be addressed by traditional research methods, led to an increasing interest in interpretivist or social constructivist methods (Orlikowski and Baroudi, 1991). These methods are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993). This approach sought to take account of the effects of ICT applications on the organizational culture into which it was being installed (Deal and Kennedy, 1982, 2000). The implication (implicit) with this approach was that the greater level of understanding would enable researchers to offer better guidelines on key practitioner problems – such as improving both selection and the management of new implementations. The research methods used include interviews, qualitative content analysis, ethnography, hermeneutics, grounded theory and participant observation (Mingers, 2003). These methods rely on the researcher judgements to a much greater extent than positivist methods.

Criticism of these methods by mainstream IS researchers based on the positivist world view has driven the development of an extensive literature offering guidelines for good practice (Walsham, 1993, 1995, 2006; Klein and Myers, 1999). Because the work is so dependent on individual judgements of the researcher at all stages the work is held to lack rigour. The research results have struggled to convince both practitioners and other researchers. There are concerns that the cases reported could be the result of a special situation and cannot be used to develop generalisable theories, that the data collected is biased as there are no clear rules for what and how to collect it, that interpretation of the data collected has more than one and probably several equally valid views leaving doubts as to the relevance and validity of the final report. Researchers in this stream have sought to deal with criticisms largely by seeking to establish rules and guidelines that adhere to the standards of positivism and hence to the Cartesian worldview.

Leonardi and Barley's (2010) overview of this stream of research offer a useful assessment of it's strengths and weaknesses. They categorise the research into five phases of implementation – from perception (adoption) to alignment (how organizations adapt to technology). The insights into how technology impacts organizations from this work are extensive and have established that 'changes that technologies occasion are intimately tied to social dynamics' (Leonardi and Barley, 2010, p30).The weaknesses stem from researchers acceptance of our culture's dualistic view of the world. By focusing almost exclusively on social process, this stream of research has tended to relegate the contribution of the unique functionality of the IT artefact under investigation to a minor role. By focusing on one phase of implementation the problems of integration over the project lifetime has been overlooked. Moreover despite the focus on social process little attempt has been made to take account of differing power relations within organizations. It could be argued that the most significant effect, of taking the Cartesian world view on this stream of research, has been the lack of attempts to take a holistic view of what is a complex interaction of social process with new technological tools (Ciborra, 2006).

3 Heidegger's ontology and ICT

This section gives a brief introduction to Heidegger's key ideas of Being. Riemer and Johnson's (2014) application of his concept of equipment to ICT applications is explained and the implications for organisational use of ICT outlined.

3.1 Heideggerian analysis

For Heidegger the traditional Cartesian ontology has a major gap in it's description of how we humans relate to the world. It fails to include the practical day to day lived experience of all humans – of Being in the world. The overwhelming issue for each of us is our involvement with the world (Heidegger, 2010; Foulds, 2013; Hubert Dreyfus on Husserl and Heidegger,1978; Barrett, 1978; Riemer and Johnson, 2014; Ciborra, 2006; Porra, 1999; Introna and Ilharco, 2004). According to Heidegger, each individual is catapulted into the world as it is and must deal with it from minute to minute throughout his or her life. We do so with great success - 'We are coping beings' (Hubert Dreyfus on Husserl and Heidegger, 1978). But for everyday living the individual person acts without conscious thought or mental awareness, dealing effectively with myriad routine situations. Heidegger's word for this is dasein. He uses this word to represent the immense complexity of individual experience of 'Being' in the world. Dasein is each individual's choices for action from the current range of possibilities. For example I can choose to be a teacher or an executive or a craftperson. These types of possibilities are constantly open to me - to continue in my current course or change, but each choice is at the expense of others. The choices are extra-ordinarily significant as they define me as a person. I am what I do and this is important as I, along with everyone else, care deeply about the choice. This choice takes place against the background of the world we know and live in – the skills, knowledge, technology, culture and potential activities available at this moment in time. Dasein does what everyone does. He or she has been socialised from birth and is eager to follow the norm. Each of us brings our history to the current situation and acts using this knowledge and expertise accumulated so far to achieve some activity. We have practical intentions and hence time has personal meaning for each of us. For Heidegger it is the whole person who matters. For him it is counter-productive to try and reduce an individual to the various possible categories into which they might fall such as gender, religion, soul, biology etc. This fails to capture the essence of personhood. By comparison this is exactly how the Sciences have approached the understanding of the world by a categorical analysis of objects of interest.

Heidegger's language can be difficult to grasp, as this last section shows and many commentators have noted (Barrett, 1978). He introduces terms that make use of existing words in new ways. Hubert Dreyfus on Husserl and Heidegger (1978) has hypothesised that this comes about because of the nature of the problem that he set himself. He sought to describe normal everyday activity which no-one else had found particularly interesting or unusual. He did indeed find people's ability to cope, extra-ordinary and hence needed a new vocabulary to describe it.

3.2 Viewing ICT applications as Heideggarian equipment

For the IS practitioner and IS researcher it is Heidegger's description of our use of objects that is of most relevance. For everyday activities we make use of a range of objects, which include for example physical tools such as hammers, software and theoretical concepts. Each of us encounters the objects in our environment which may or may not be relevant to our daily actions. Heidegger refers to these objects as equipment and distinguishes three levels of use-

- Ready-to-hand
- Unready- to- hand
- Present-at-hand

Ready-to-hand objects (equipment) are those appropriate for dasein's everyday activity. They are tools or resources that serve our individual needs. They have a purpose, but the purpose is specific to each individual's situation. For example I am using a word processor to write this paper. I am using it in-order-to deliver a high quality document in a timely fashion. The word processor is critically important to me in my daily activity. It is not necessarily important for others. A construction worker is far less likely to consider a word processer a ready-to-hand asset, but for him or her tools such as hammers will be of critical importance and hence fall into the ready-to-hand group of objects. Moreover ready-to-hand equipment is not only used in-order-to complete a specific task but also to contribute to some larger end, perhaps an institution or community endeavour. I am using the word processor in-order-to create a document that will join many others in forming the basis of an academic conference. Heddegger might describe my actions as creating the paper for-the-sake of the academic conference. This will change over time as the totality of objects in the world changes. If I had been writing this paper immediately post war then a typewriter would have been ready-to-hand for me as word

processers were not available at that time. Tools, objects have value only when I both recognise their potential functionality and have a use for it. Moreover for the tool to be of value within a group there must be a predetermined meaning for it and it's function held in common by all members of the group. Figure 1 illustrates this idea for one ICT tool – a tablet.
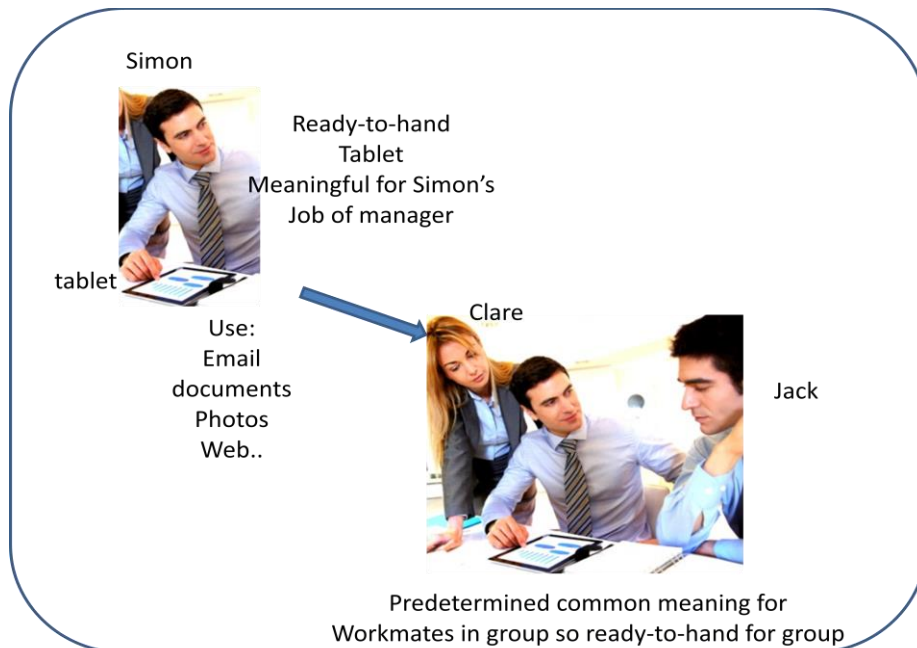

Figure 1: Meaningful use of tools – example of the tablet

For each individual social identity is intimately wrapped up in the equipment that they use in everyday life (and in particular that used for our work roles). Riemer and Johnson (2014) make the important point that equipment, practice and social identity are co-constituted. The relationship for example between my word processer (IT artefact now my equipment ready-to-hand), my use of it in writing papers (practice) and my social identity (stemming from the creation and presentation of the paper) are a mutual, holism. The relationship is not causal (figure 2).
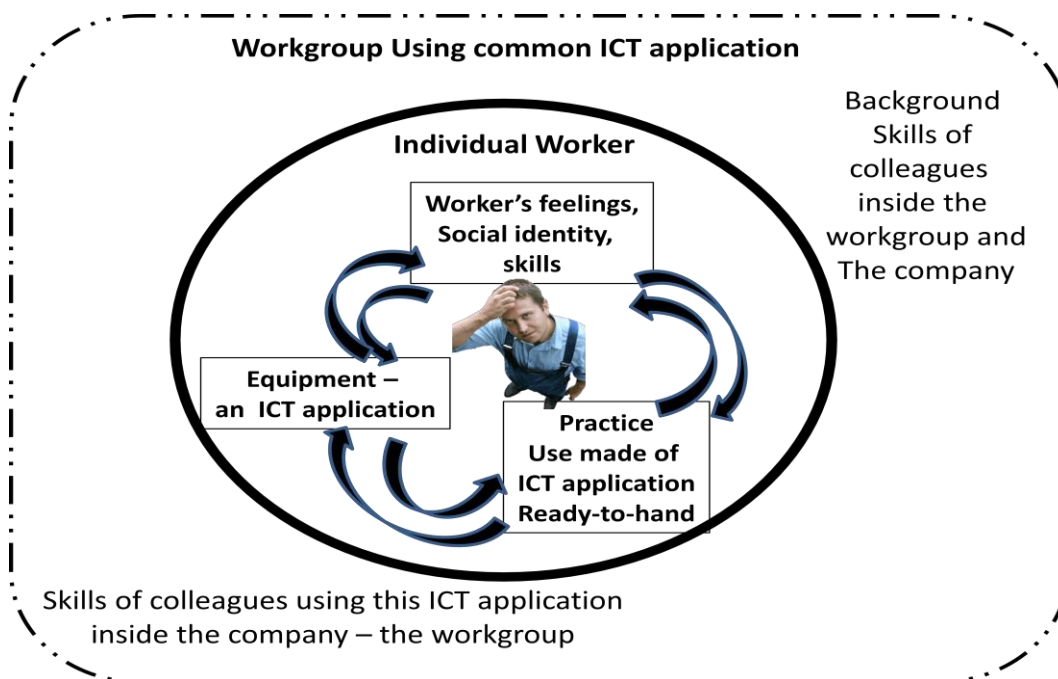

Figure 2: The individual using ICT tools within an organisation

Unready-to-hand is equipment that had been ready-to-hand which has suffered a breakdown. Present-at-hand equipment is in the world but of no immediate relevance to the individual (such as the word processer for a construction worker). This is the level at which traditional philosophy is focused. This is the point at which problems arise and individual humans can no longer cope automatically and need to become problem solvers. Present-at-hand equipment becomes an object for which a categorical description is appropriate. It can usefully be described as an objective thing with a view to understanding it's potential use and value. Figure 3 illustrates how ICT applications might appear within an organisation with a workgroup defined as a group of users that uses a particular ICT application equipment ready-to-hand (as a common resource or in collaboration) and other equipment available within or outside the company, that is still present-to-hand for this workgroup (ie not in use) but a potential source of more ready-to-hand equipment.
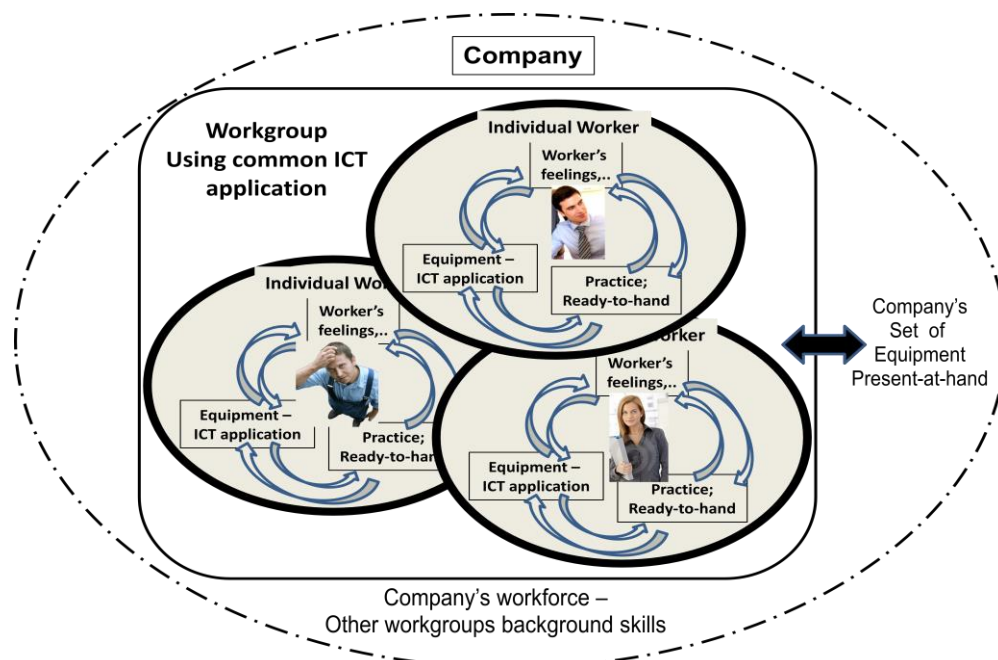

Figure 3: Organisational workgroup using ICT tools

In Heidegger's view it is not possible to explain perception through a rule based approach. 'Human understanding was a skill akin to knowing how one finds one's way about in the world' (Dreyfus and Dreyfus, page 4,1988). Skills are learnt through practical experience and draw on deeply buried knowledge. The skills of coping with everyday objects come from a lifetime of learning. We learn these skills as the need arises and only when and where they fit into a whole set of cultural practices, making use of the appropriate selection from the totality of equipment in the world. It takes time and effort to first acquire and then develop a skill to a high level of expertise. Dreyfus and Dreyfus (1988) capture this process with their five level skill acquisition model - novice, advanced beginner, competent performer, proficient performer and expert. Initially for the lower levels of skill, the performer relies on well understood routines to develop his or her skill. It is at the higher levels that the performer's own experience becomes important. Flyvberg (2001) notes that at the level of expert the performer is "intuitive, holistic, and synchronic… Experts are characterised by a flowing, effortless performance, unhindered by analytical deliberations". It is the design of the exercises that can take a performer through the lower levels to that of expert, which is the challenge. But it is this level that gives an organization the competitive edge, when achieved for all the company's equipment (and in particular ICT applications).

New Information systems and communications technologies have added considerably to the totality of equipment in the world. If we view the world through Heidegger's eyes these succeeding waves of technology arrive in the world of equipment as present-at-hand. It is the practitioner's aim to move the equipment from present-at-hand to ready-to-hand as appropriate.

3.3 The Organisation's use of ICT using the lens of Heidegger's ontology

For Riemer and Johnson (2014) the application of Heidegger's ontology brings equipment into centre stage reducing the IT artefact to one of many factors contributing to the process of ICT implementation.
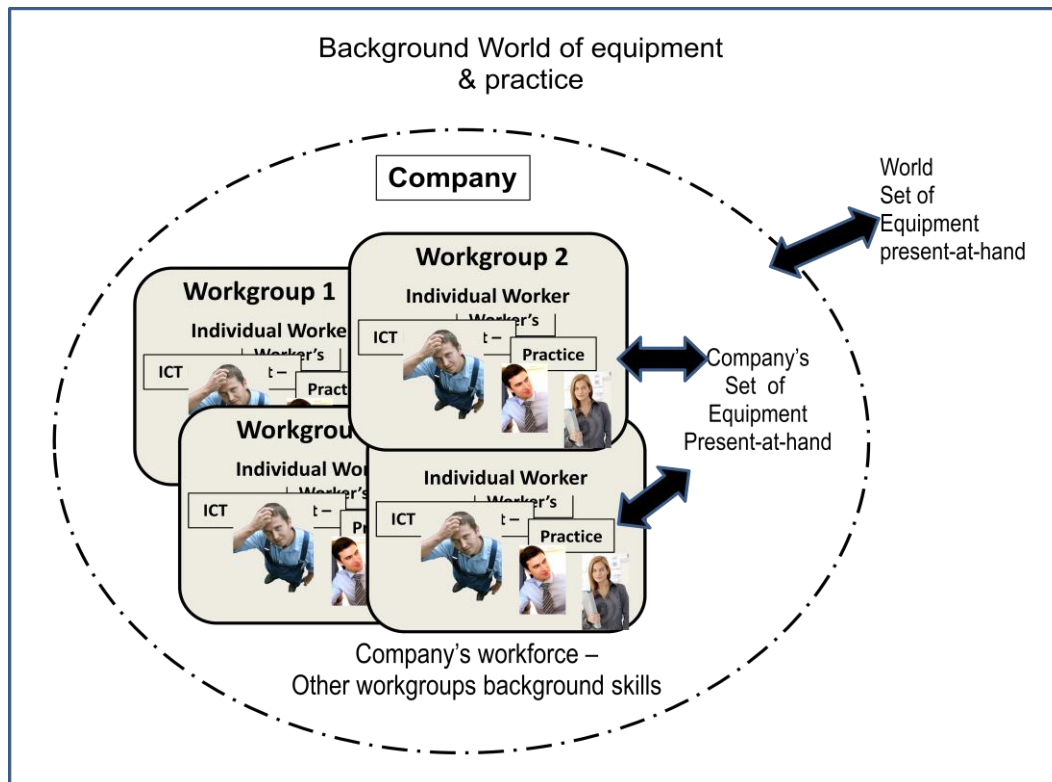

Figure 4 : Factors affecting an organization's position with respect to ICT

Figure 4 shows some of the factors involved in the development and deployment of new and existing ICT equipment as ready-to-hand equipment, for an organization applying Heidegger's ontology. The core unit for my analysis is the workgroup that uses a particular ICT application. An organization can be viewed as being made up of a number of overlapping workgroups each defined by it's use of one piece of ICT equipment. The use made of existing applications develops over time as the user group improves it's skills and understanding of how the tool can be used (possible practices), adapts (accepts or rejects) the social changes brought (social identity) and the application itself undergoes development. The workgroup's skills and knowledge of the company's operations and other ready-to-hand ICT applications and other ready-to-hand equipment of all types used within the company all make a contribution to this process. So the history of the company (in terms of social, operational and staff skill sets) is central to the level and quality of use achieved. Meanwhile other ICT applications are emerging into the world outside the company. These start as present-at-hand equipment for the company and may also be so new that they are present-to-hand for all organizations. The development path for each new application of interest to a company depends on both the skills and knowledge of it's own staff and the skills and knowledge in the world outside the company, in a similar way to the development path for existing company ICT. There is no point in time when implementation stops.

Experience and IS research suggests that few if any ICT applications are used to their full potential in most companies. Hence for each organization, we have three types of ICT equipment – present-to-hand (maybe of potential value), ready-at-hand but underused (with most users at advanced beginner or below skill level) and ready-to-hand used by experts (at which level innovative high value use of the application could be expected). Moreover skills development presents a more challenging activity for new ICT projects. At adoption/appropriation there would not be any existing experts from whom to learn – neither are there rules and procedures for the novice to work from. The first workgroups will need to develop these themselves. At any period of time each company has a unique profile and history so developing expert users for ICT applications will depend as much on understanding and using this history as on the intricacies of the application.

4 Applying Heidegger's framework to IS research

IS research is closely linked to practitioner concerns. Issues that are important to practitioners and executives drive the choice of research questions and hence research methods. What might practitioners perceive as important for exploiting new ICT applications under the Heidegger worldview?

This worldview makes clear how important it is to understand both the individual employee's worldview, values, skills and how these translate into common purposes and understandings for workgroups. It is these user workgroups that will deliver the effective and innovative use of ICT applications. Their identification with and caring for the programme and it's use of ICT is key to high quality operations. Hence involving them in all aspects of a change programme over it's lifetime (which includes new ICT applications) and supporting their ICT skills development becomes as important as the traditional activities of planning the programme and establishing the new ICT applications functionality reliability useability etc. Some issues that become more significant might include:
- Harnessing the individual ICT skills of all workgroup members effectively
- System Evaluation and ISD that fits user workgroups skills and needs
- Organising for continuous development- organisational self-reflection
- Effective Skills development of all staff, identification of skills required for new ICT applications

What effect might this have on IS researchers and their choice of research methods? Potential Research Questions could cover a wide ground including for example how companies succeed or fail at implementations, how companies enable innovative uses of existing ICT applications, how to develop workgroups of expert users, why use made of specific ICT applications varies between organizations and industries, the significance of organizational routines of self reflection etc. These questions could be approached using the interpretivist, constructivist empirical methods, with the emphasis on longitudinal case work using all types of data collection methods such as interviews, ethnography, individual personal reflections, participant observation(Leonardi and Barley, 2010). Researchers would want to immerse themselves in cases at both micro level (to obtain a rich understanding of the interaction of artefact and culture and workgroup practices) and macro level (to gain an understanding of the contribution of the organization as a whole). However Heidegger himself offered some guidelines for phenomenological research. Phenomenological research seeks to 'disclose life experience' (Ciborra, 2006). Introna and Ilharco, (2004) and Ciborra, (2006) have applied these ideas to IS research. Introna and Ilharco (2004) develop a Phenomenological description of the essence of screens, while Ciborra (2006) shows how far an exemplar constructivist empirical case by Suchman (1987) diverges from core phenomenological concepts of situatedness and then discusses Heidegger's own Phenomenological work on the experience of the early Christians. There are few practical examples in IS research and it is not yet clear what type of results would be produced by this method. The two examples by Introna and Ilharco, (2004) and Ciborra, (2006) point to intriguing possibilities.

5 Conclusion

Heidegger's ontology has a peculiar relevance for the explosion of information technology artefacts phenomenon. His description of equipment and how it is used in everyday life gives a more complete picture of the implementation and use of ICT applications within organizations, than the Cartesian worldview. IS research based on this view offers a more promising approach to understanding the problems of ICT implementation but only at the expense of adopting methods that will be expensive in terms of labour and time. Moreover to be effective it is important that both practitioners and researchers agree on this worldview.

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