Faculty of Arts and Sciences
FiF-thesis No. 95

Making Sense of the IT Artefact
– A Socio-Pragmatic Inquiry into IS Use Qualities

by

Jonas Sjöström

2008

Submitted to the Faculty of Arts and Science at Linköping University in partial fulfilment of the requirements for the degree of licentiate of philosophy.

Department of Management and Engineering
Linköping University, SE-581 83 Linköping
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Faculty of Philosophy
FIF-thesis No. 95

ISSN: 1401-4637

Printed by: LiU-Tryck, Linköping

Distributed by:
Linköpings universitet
Department of Management and Engineering
SE-581 83 Linköping
Tel: +46 13-281000, fax: +46 13-281101
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ABSTRACT

Information Technology (IT) plays an increasingly important role, both for individuals, business, and society as a whole. IT systems are artefacts (human made). They are designed for various purposes; for instance to support workflow, to compute, to communicate, to deliver services, to facilitate learning, or simply to entertain. Research within several academic disciplines has resulted in a variety of quality ideals which may guide designers and evaluators of IT artefacts in their context of use. However, the matter of how to understand the artefact and its qualities-in-use is often implicit in Information Systems research. This thesis proposes a way of conceptualizing the IT artefact based on theoretical a framework primarily built on semiotics (the study of signs) and socio-instrumental pragmatism (focusing IT as an instrument in social action). Further, the results include concepts for understanding IS use qualities in a socio-instrumental context. The results are formulated as practical theory, which means that the concepts at hand are readily applicable and useful in practical work with IT design and IT evaluation. The research process consists of a number of cycles, alternating between theoretically informed conceptual development and evaluations of IT artefacts in heterogeneous contexts of use. The research design is based on American pragmatism and inquiry as a theory of knowledge.

This work has been funded by the Swedish Governmental Agency for Innovation Systems (VINNOVA), the National Library of Sweden, and Jönköping International Business School.

Department of Management and Engineering
Linköping University, SE-581 83 Linköping
Foreword

Information systems development is a discipline within the faculty of arts and sciences at Linköping University. Information systems development is a discipline studying human work with developing and changing computer-based information systems in organizational settings. It includes theories, strategies, models, methods, co-working principles and tools concerning information systems development. Different development/change situations can be studied as planning, analysis, specification, design, implementation, deployment, evaluation, maintenance and redesign of information systems and its interplay with other forms of business development. The discipline also includes the study of prerequisites for and results from information systems development, as e.g. studies of usage and consequences of information systems.

This work, *Making Sense of the IT artefact - A socio-pragmatic inquiry into IS use qualities*, is written by Jonas Sjöström at Uppsala University (earlier at Jönköping International Business School and Linköping University). He is also a member of the research group VITS. He presents this work as his licentiate thesis in information systems development, Department of Management and Engineering, Linköping University.

Linköping, August 2008

Göran Goldkuhl
Professor
Doctoral Dissertations in Information Systems Development


18. Per Oscarson (2007) Actual and perceived information systems security
Licentiate Theses in Information Systems Development


15. Bengt EW Andersson (1999) Samverkande informationssystem mellan aktörer i offentliga åtaganden - en teori om aktörsarenor i samverkan om utbyte av information


23. Stefan Holgersson (2001) IT-system och filtrering av verksamhetskunskap – kvalitetsproblem vid analyser och beslutsfattande som bygger på uppgifter hämtade från polisens IT-system

24. Per Oscarson (2001) Informationssäkerhet i verksamheter - begrepp och modeller som stöd för förståelse av informationssäkerhet och dess hantering i verksamheter


29. Fredrik Ericsson (2003) Information Technology for Learning and Acquiring Work Knowledge among Production Workers


VII


Acknowledgements

The process of writing a thesis is by no means an isolated endeavor. I owe great thanks to many people who supported me in the completion of this work. First and foremost, my tutors Göran Goldkuhl and Pär J. Ågerfalk deserve my deepest and most sincere gratitude – both for being my colleagues and mentors in the research process, and for continuously feeding me (knowingly or unknowingly; in mysterious ways) with motivation to keep walking the path of academia. I also want to thank you for your patience with me during my periods of fuzzy productivity.

I also pay tribute to my colleagues at the informatics department at Jönköping International Business School – my employer during almost the entire research process. Many of you have been supportive and inspiring in a number of ways. This tribute is also valid for various participants in the VITS research network.

During the research process, I have cooperated with a number of fellow researchers and PhD students in various projects. Those projects have been the backbone of my learning process, and also important as a social arena. Therefore, a special thanks to Stefan Cronholm and Emma Eliasson, with whom I collaborated in the first period in my doctoral studies. Also, big thanks to members of the Swedish collaboration platform for municipalities (Sambruk), with special thanks to Janne Dicander, Gunilla Hallqvist, and Claes-Olof Ohlson.

Thanks to my mother for proof-reading, and to my father for helping me debug a corrupted document in the final hours of writing.

Most importantly, I thank my beloved family for their forgiveness about my unreasonable amount of late night work. Hugs & kisses to Hannah, Linnéa, and Helene.

Uppsala, August 2008

Jonas Sjöström
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Chapter 1

Introduction

This chapter is an introduction to this thesis. The background for the study is discussed in sections 1.1 and 1.2. The problem domain and the corresponding purpose and research questions are presented in section 1.3. Section 1.4 explicates the target groups for the study, and section 1.5 pictures the collaborative characteristics of the research process, and gives credits to the author’s research partners. Finally, in section 1.6, the disposition of the rest of the thesis is visualized and explained, and some reading advice is provided.

1.1 A new Era for Information Systems Research

Research in informatics has historically been primarily concerned with the development of information systems (IS) in an organizational context. Dahlbom (2003) concludes that a system theoretical perspective has dominated the discipline, and served its purpose in the sense that it allowed for theories on how to better manage processes, e.g. production and order processes, in organizations. Dahlbom argues that this was a natural perspective in the informatics field at the time, since information technology (IT) was a rather new phenomenon, which apparently could be an instrument to improve the productivity of an organization. The infological perspective, proposed by Langefors (1966) has been the point of departure for many IS researchers with a focus on constructing methods and theories that help practitioners understand complex systems (such as enterprises) by analytically breaking them down into manageable parts. The discussion above depicts the IT artefact primarily as a tool to help users solve tasks as part of some organizational context, and as a tool for managers to monitor and control such operations.

Rayport and Sviokla (1995) predicted that the focus on increased productivity would be followed by an entirely new set of offerings from companies. This is described as the third and final step for an enterprise, with regard to its adoption of information technology. They claimed that enterprises which adopted information technology internally, to support (step 1) and replace (step
2) their physical value chain, would realize the potential to create new services, e.g. providing their customers with real-time information about the production status, or allowing end customers to place orders using a computer. They referred to this as a virtual value chain and the creation of a marketspace of information-based services, as a complement to the physical marketplace. The IT artefact, in this context, is an instrument for communication, between an organization and its stakeholders.

In this view (ibid), the IT artefact is also an enabler of radically new ways of doing business and delivering services, rather than a tool to merely support and control traditional ways of doing things. Dahlbom’s (2003) discussions are in line with this, stating that the evolution of the Internet and the widespread use of personal computers (and other devices that brings people online) create a whole new area of interest for informatics research, where a system theoretical perspective plays a less focal role than previously. He suggests that a service perspective is better suited to inform theory development in IS, given the contemporary situation. This has been further elaborated by others (e.g. Hultgren, 2007; Hultgren & Eriksson, 2005), who draw upon social action theory to conceptualize web applications from a service perspective, arguing that social interaction is the most important phenomena to focus in such a conceptualization. As an example, one can argue that a supplier of a service or a product may leave the visitor with a bad social experience, hence damage the relation to this client (Edvardsson, 2005), and consequently endanger losing a potential or established client to some competitor.

Several scholars within the area of service management point out communication breakdowns as the main reason for unhappy clients (ibid). A number of IS researchers (e.g. Goldkuhl & Lytinen, 1982, Winograd & Flores, 1986, Auranäki et al, 1988, Dietz, 2001, Ågerfalk, 2003) have put forward the idea that communication and the resulting social relations such as commitments – are fruitful conceptual foundations within the IS field. The emergence of the World Wide Web has caused language/action researchers to further investigate the meaning of such commitment structures. Flores (1998) discusses such structures as the key to understanding the web as an instrument for creating and maintaining one’s identity. Identity cultivation is theorized as an incentive for individuals to actively participate in on-line discussions, e.g. reviewing books on a web site. Similar thoughts have been presented in the
INTRODUCTION

open source community, where concepts like ego gratification and career concerns are discussed as different forms of signaling incentives (Lerner and Tirole, 2002), encouraging people to contribute in situations where there is no apparent immediate compensation. In addition to this, the web 2.0 movement as described by O’Reilly (2005), claiming that users are eager to share their opinions and experiences, provokes me to put forward the claim that people today have a strong interest in the web as a vehicle to expose themselves socially in various identity-shaping activities.

To sum up, there exists a traditional task-solving perspective on the IS discipline, which is primarily oriented on users using IT to solve tasks in some context. A recent reaction towards this, which can be traced to several phenomena in research and practice, is apparently the interaction-oriented perspective, which seems to acknowledge IT as communicative, service-enabling, and identity shaping. Both perspectives provide valuable insights into the application of information technology, and may be more or less powerful to explain different phenomena in different contexts.

1.2 The Scattered Notion of Use Qualities

The two perspectives on information technology put forward above is an example of – and a consequence of – the fundamental properties of computers as general-purpose machines. The very concept of “software” is designed to allow for a computer to be used for multiple purposes. With this backdrop, one may reason about how to understand the notion of use quality in relation to information technology. Many perceptions of quality are currently being proposed by different researchers from different academic fields.

The following discussion starts out from the two perspectives discussed above (the task-oriented vs the interaction-oriented), and include various types of qualities that have been proposed within the frame of the two perspectives:

- Task-oriented qualities
- Experience-oriented qualities
- Web-oriented qualities
- Service-oriented qualities
- Social qualities
The qualities mentioned above will be briefly introduced here, as a means to properly present the research questions. The qualities will be discussed more in-depth throughout the thesis, especially in chapter 6.3.

Task-oriented qualities

There are a number of theories and methods for the design of interactive products (Preece et al, 2003), some of which are widely spread and considered to be useful analytic tools for designers. Preece et al (ibid) states that one aim of interaction design is to build usable interactive products. One of the definitions of usability that I find appealing, due to its simplicity, is that usability is the “user’s view of software quality” (Bevan et al, 1991 p 4). However, usability is commonly conceived in a more specific manner, e.g. in the ISO definition which formulates usability as the “[…] effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of goals in a particular environment.” (ISO 9241-11). Effectiveness refers to that users should be able to fulfill their goals through the use of the interactive product. Efficiency means that they should fulfill these goals with a minimum of effort. Satisfaction is a subjective measure, regarding whether the user is pleased with the product or not. Arguably, this traditional view on usability is most closely connected to a business process perspective. However, user-centered design methods such as contextual inquiry, prototyping, and scenarios, all share the feature that the users’ opinions about the evolving IT artefact is continuously feeding the design process, thus the application of such methods may render IT artefacts that serve purpose other than purely task-oriented ones. Usability research has generated a lot of prescriptive criteria for the design and evaluation of IT artefacts. Common examples of such principles are Nielsen’s (1993) 10 usability heuristics, Shneiderman’s (1998) 8 golden rules of interface design, and the dialogue principles presented in ISO 9241-10. Keinonen (1998) provides an analysis and abstraction of many of these commonly referred guidelines for usability design. Usability is generally not conceived of as the characteristics of an interactive product per se – it is a contextualized view of an interactive product, in relation

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1 According to Löwgren (2008), interaction design may be conceived in two ways: Either as an endeavor of bringing design philosophy into IS research, as proposed by Winograd et al (1996), or as an extension of the field of human-computer interaction. The latter perspective is evident in, for example, Norman (1988), Preece et al (2003), and Shneiderman (2007).
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to a specific group of users of the product, using it in a certain context (ISO 9241-10; Preece et al, 2003; Bevan, 2001). My claims regarding usability as being primarily task-oriented is supported by Löwgren (2002, p. 10) who states that “The field known as human-computer interaction [...] is mainly oriented towards improving the efficiency of computer-supported tasks”.

Experience-oriented qualities
The field of interaction design does encompass a broader view of use qualities than those focusing the performance of tasks within some organizational context. Preece et al (2003) discuss a set of user experience (UX) goals, e.g. that the user finds the product satisfying, entertaining, motivating, aesthetically appealing, or supportive of creativity. One of the main points of the UX discussion is that we need to define this type of design goals as a complement (or even alternative) to conventional usability goals (see above), depending on the type of IT artefact we are about to design. Löwgren (2006) proposes an extensive map of use qualities, including some connected to user experience, such as the use quality identity, which incorporates the perceived impact on self through ownership and use of some interactive product, e.g. the changed view of oneself as a consequence to learning and applying some piece of technology with a significant degree of empowering capabilities.

Web-oriented qualities
Presence on the web can be regarded as a continuous connection to ones customers. Hence, the nature of the web site and the way it works may have an impact on the visitors’ relation to the company. Interaction designers acknowledged this new context for interaction design, which in many ways differs from design of desktop applications in an organizational setting. An example of this is Nielsen’s (2000) web-oriented HOMERUN model, which provides a set of categories that may aid designers (or evaluators) to focus certain characteristics of a web site and the organization behind it. It advocates the following characteristics as preferable for web sites in their organizational context: High-Quality content, Often updated, Minimal download time, Ease of use, Relevant to users’ needs, Unique to the online medium, and Net-centric corporate culture.

Service-oriented qualities
Web site quality has also been approached from other disciplines. Santos (2003) approaches the topic from a service management perspective. She uses a
CHAPTER 1

grounded theory approach to theorize on different qualities of a web site and the organization behind it, proposing that web site qualities can be categorized into an incubative dimension (mainly ease-of-use issues) and an active dimension (mainly communication and social issues – the business action needed to keep the web site alive and respond to the customers’ requests). In relation to Santos’ work, theories within service management tend to primarily deal with the active dimension (e.g. Lewis & Entwistle, 2005). Furthermore, from a service perspective, a web site can be looked upon as one communication channel out of many, which makes web site design part of a larger context – one communication channel among others. Some scholars focus on the appropriateness of different communication channels, depending on the type of communication at hand (e.g. Johansson & Axelsson, 2005). The matter of a strategy for using different channels, to meet the variety of needs from clients, is also addressed in service design research.

Social qualities
There is also IS research directed towards understanding social aspects of IT use: it can be understood as performance of communicative actions – the establishment and maintenance of social relations (e.g. commitments) between actors using some IT application (Goldkuhl and Lyytinen, 1982; Winograd & Flores, 1986; Dietz, 2001; Ågerfalk, 2003). These types of qualities are based on the perspective that the IT artefact is a complex communication medium and a social agent. One of the more elaborated theories based on this perspective is Information Systems Actability Theory, or ISAT (Ågerfalk, 2003). ISAT was developed as an action-centric perspective on the use of IT in a social setting. Actability intersects with service management theory (which includes concepts like expectations, commitments, and communication breakdowns) and interaction design (including concepts to aid design and evaluation of user interfaces). Apart from these specific communities addressing social issues in relation to the design of information systems, there are other relevant examples of IS research primarily focusing the relation between technology and its social context, e.g. the work on sociability by Preece (1998; 2000) and work connected to Giddens’ structuration theory (e.g. Walsham, 2005; Orlikowski, 1992).
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1.3 Research Problem

Although the discussion above is quite superficial, a conclusion that may be drawn is that there are many different ways of perceiving the concept of use quality. One should keep in mind that only a small subset of interaction design concepts has been discussed. All of the presented use qualities are more or less interrelated; however these relations tend to remain implicit and may be confusing in a practical design or evaluation situation. In fact, Rogers (2004) state that one of the reasons for research results not being adopted is that there are too many (and diverging) theories out there. It is a major task to identify, and assess the usefulness of a theory in some design context, which makes it more convenient for practitioners to do business as usual. Practitioners typically find the existing way of working satisfactory. As a consequence they do not actively search for new methods for evaluation and design. Further, research results are often targeted towards other researchers, and may require an extensive understanding of the scientific terminology and the underpinning philosophy to be operationalized in practice. Rogers (ibid) points out that there is a need to create coherent and useful frameworks, and present them in an appropriate manner, in order for academic research to have an impact in practice. From this point of view, I argue that one problem is that a lot of research is hidden in academic discourse, rather than adopted by practice, although many of the theories are well grounded both in theory and in empirical studies, and could be valuable in practice to aid design and evaluation of IT systems.

The qualities discussed above seem to have in common that they, to a large extent, regard the quality of technology in relation to its use, and also discusses this as part of some broader social context. There seems, however, to be a gap between the different theories. As an example, interaction design, business process design and service design are related activities, but the connection between these activities is implicit, or completely untraceable in the discussion. This causes a disturbing theoretical void. A theoretical contribution which ties the theories together could possibly leverage communication between the various research communities these theories stem from. On a meta-level, one might raise the question of the use quality of these use quality concepts.

The discussions above signal that, primarily due to the inception of the World Wide Web in the 90's, the number of theories on qualities related to the use of
CHAPTER 1

IT has increased drastically, and it is an object of scrutiny in various academic disciplines. However, scholars from these foundations seem to base their work on unclear on non-existing assumptions about the nature of the IT artefact. Orlikowski and Iaccono (2001) argue that the IS field has emphasized the artefact’s context of use, its processing capabilities, and the dependent variable (e.g. the social setting which is changed through the development and implementation of IT). In emphasizing these things, they state that “The IT artefact itself tends to disappear from view, be taken for granted, or is presumed to be unproblematic once it is built and installed” (ibid p. 121). Therefore, this thesis aims at theorizing the artefact as such as well as examining various qualities related to its use:

The purpose of this thesis is to develop a communication-oriented conceptualization of IT artefacts, which allows for a theoretically sound and coherent formulation of use qualities for such artefacts.

As a consequence, the proposed perspective should also support a re-structuring of existing use qualities from the disciplines of interaction design and service management. A fundamental assumption is that such qualities need to be understood through an adoption of a multi-channel perspective to communication, i.e. understanding the web based ICT artefacts as one communication channel which needs to be understood as a part of a larger communication context.

The road to fulfilling the purpose can be clarified through the following set of researchable questions:

- How can the IT artefact be conceptualized to adhere to the dual perspectives presented in the IS field – the task-solving perspective, and the interaction-oriented perspective?

- How can existing IS use qualities be described, interrelated and well understood based on such a conceptualization?
INTRODUCTION

There is no prioritization regarding the importance of the two questions above. However, the first question obviously needs to be addressed in order to make it feasible to discuss the second.

1.4 Legitimacy

My research is aimed at being useful – the aim is to create practical theory\textsuperscript{2}. One goal is that practitioners will regard the results as useful instruments for design and evaluation of information technology, embedded in a social setting. Another goal is to make a contribution to the research community. Ideally, academic scholars will find this work a valuable contribution to the accumulated body of knowledge in IS research, especially within organizational change, IS development methodology and interaction design. The research focuses on the concept of the IT artefact, and attempts at providing a set of useful concepts which in turn may help other researchers to conceive the IT artefact and communicate their view of it. This is, for example, valuable to investigate the conceptual foundations of one’s work - what are we designing? A target group is researchers from various fields, e.g. information systems, service management, and interaction design, with the ambition of explicitly adopting a contextualized view of information technology in its social setting. The results are progenetive, i.e. useful for further theory development. Furthermore, the thesis provides some multi-facetted concepts of use qualities of information systems, which may be useful for both scholars and practitioners.

1.5 Research context

The work presented in this thesis is the result of joint efforts involving a number of people. This is manifested through a number of research publications, published between 2002 and 2008 (Table 1-1). The concepts presented in this thesis may be seen as part of the accumulated research on Socio-Instrumental Pragmatism (SIP), presented by Goldkuhl (2005) and Information Systems Actability Theory (ISAT), presented in a number of publications by various authors. ISAT is further discussed in chapter 2. This means that the thesis contributes to these theories, but the intention is also that

\textsuperscript{2} The concept of practical theory is further elaborated upon in section 3.3. It is based on a pragmatist epistemology, which is explored in the entire method chapter (chapter 3).
CHAPTER 1

the thesis can be understood and applied as such, without a sophisticated understanding of SIP and ISAT. I strive for avoiding requiring excessive studies from the reader in order for the presented concepts to be well understood and useful – the aim is a set of loosely coupled, but still coherent, practically useful theories. This is further discussed in chapter 3.

My work has been funded through projects. Two evaluations (see sections 4.1-4.2) IS Actability through evaluation and re-design, financed by the Swedish research council VINNOVA. The purpose of this project was to develop concrete guidelines for evaluation and redesign of information systems based on the actability concept. One of the empirical studies (see section 4.3) was funded by the National Library of Sweden.

These projects have been highly collaborative, which means that a lot of my publications have been co-authored by project colleagues (see Table 1-1). Partially, the contents of this thesis – being a monograph – have been presented previously through these publications. Large blocks of text overlap between the thesis and the articles, mainly in chapters 4 and 5.1 - 5.2. There has been a strategy to explicitly point out such parts of the thesis, especially when the publications are co-authored: It is clearly in the beginning of a section if it has previously been published, and a reference to the publication is shown. If there were several authors, you may also find statements like “we therefore conclude” in the text, to clearly point out that a particular statement is not a result of my individual work.

My research from 2006 to 2008 has been funded VINNOVAS’s project e-services for cooperative use\(^3\). The project is not part of the empirical sources for this thesis. However, the research performed in the project intersects thematically with the concepts in this thesis, and the funding has been valuable and necessary for me to complete this work, and it will be influential in my upcoming doctoral thesis.

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\(^3\) E-tjänster för Sambruk in Swedish.
## INTRODUCTION

<table>
<thead>
<tr>
<th>Table 1-1 Scholarly publications upon which the thesis is based</th>
</tr>
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</table>

11
CHAPTER 1

1.6 Disposition and Reading Advice

This thesis is a way of packaging the theoretical contributions to make them – and the process of creating them – understandable to both academics and practitioners. Table 1-2 is a brief annotation of the contents of the thesis.

Table 1-2 Disposition

<table>
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Academic publications of all kind tend to follow certain writing conventions; with the presupposition the readers are primarily people active within academia. Therefore, I think academics do not really need advice on how to read this thesis. My advice to practitioners is to start by reading chapter 1, followed by chapters 5-6. This way, one gets a grasp of the core message in this thesis (the results). The recommended reading order thereafter is chapter 4, which provides concrete examples which may further the understanding of the theoretical concepts. Chapters 2, 3, and 7 are primarily targeted towards researchers. However, I recommend that practitioners also take a glance at section 2.4 for an overview of the socio-pragmatic philosophy, and section 7.1-7.2 for a discussion on the practical implications of the presented results.
Chapter 2

From Signs to Socio-Instrumental Action

This chapter presents - and motivates the use of - the most essential theories in this thesis. Further, the role of IT artefacts in relation to these concepts is introduced. These theories are the basis for the research process and at the same time a fundament for the research product - the concepts that are the result of the thesis work. Hence, the ontological positioning in this chapter prepares the reader both for the epistemological discussions in the following research design chapter, and for the last chapters containing results and conclusions. In 2.1, the notion of *semiotics* is introduced, which provides a basic perspective on human communication. In 2.2, the perspective moves beyond a representational perspective into a socio-pragmatic perspective, with an elaboration on *why* we act in certain ways, and an exploration of the social relations which are established and cultivated through communication. Further, section 2.3 focuses the role of instruments in communication, with special attention paid to the IT artefact as such an instrument. Section 2.4 is a summarizing section, where a number of philosophical-ontological statements are presented, based on what has been said in sections 2.1 – 2.3.

2.1 On Signs and Communication

Andersen (2001) put forward the claim that semiotics - the study of signs - may provide useful insights to Human-Computer Interaction (HCI) research. Andersen mentions four potential contributions of the semiotics discipline: making HCI *more coherent*, exploiting *insights from older media*, defining the *characteristic properties of the computer medium*, and situating *HCI-systems in a broader context*. Given Andersen’s claims, semiotics is directly connected to the research questions with respect to all four claims at hand, even though this thesis does not limit the perspective on the IT artefact to a HCI context. This section is an introduction to some fundamentals of semiotics.
The work of Charles Saunders Peirce had a major impact on the discipline of semiotics. The Peircean definition of a sign is broad: "Something which stands to somebody for something in some respect or capacity" (Peirce 1985 p. 5). His semiotic triangle (Figure 2-1) describes the triadic relation between an interpretant, a representamen [sign], and an object.

According to this definition, the only thing that is not a sign is something that only represents itself. Such things are hard to find, though, since even a physical object, such as a car, may be seen as a representamen for its context - one could for instance see the car and draw conclusions about the owner based on its condition. That is; everything represents its own context to some extent, in the sense that a subject who perceives it will make an attempt to make sense of it, or an attempt to make sense of something else based on its interpretation of it. Peirce, commonly referred to as the “father” of semiotics, of course elaborated a lot further in his study of signs. His concepts of Firstness, secondness, and thirdness are concerned with how the human mind processes its impressions of the world. Peirce struggled a long time with how to coin these words. Firstness refers to the sensory impression, the very perception of a sign. Secondness is the twofold relation between a sign and some object which it represents. Thirdness, finally, is the very connection made in our mind between Firstness and Secondness. Thus, the meaning of our perception needs to be understood through all the categories: We perceive a sign (firstness), and relate it to some concept (secondness) through an internal process of relating them to each other (thirdness).

A reflection about Peirce’s theory, which may be somewhat hard to comprehend, is that similar thoughts have been presented by contemporary
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authors. As an example, Michael Polanyi formulated the same phenomena in a similar way: “We may say […] that the triad of tacit knowing consists in subsidiary things (B) bearing on a focus (C) by virtue of an integration performed by a person (A)” (Polanyi 1969, p 182). The subsidiary things correspond to Peirce’s firstness. The bearing on a focus corresponds to Peirce’s secondness, and the integration performed by the actor corresponds to Peirce’s thirdness. Polanyi (1966) coined the concept of tacit power, which is an overarching term to describe people’s ability to make sense of the surrounding world, and express themselves in a sensible way in any given situation. Polanyi is important to mention here, because he has contributed to popularizing a semiotic perspective on communication and knowledge, although he has also been misinterpreted on a quite large scale (Walsham, 2005).

Peirce further put forward the concept of semiosis – continuous interpretations being performed by the human mind, as an explanation of human thinking. Secondness, for example, in one interpretation act, may be firstness in the next act. Imagine that you are sitting on a train, and there is a picture of a fire extinguisher on the wall. This firstness will generate secondness – through thirdness you will realize that there is an actual fire extinguisher nearby. The presence of a fire extinguisher is a new sign – a first – which may cause you to think of a possible fire (secondness) through another, inferring thirdness.

This theory of semiosis indeed looks upon humans as subjects, constantly interpreting (thus making sense of) the surrounding world. The human mind is always under attack from a torrent of impressions from its sensory organs, which it seeks to filter, order and make sense of, in order to properly respond to its social and material environment. As such, Peirce’s concept of semiosis is also a theory of human communication. Figure 2-2, created by Walsham (2005) drawing on Polanyi, is one good example of how to start out from semiotics to conceptualize the basics of human communication.
A very important part of Peirce's message is that we need to acknowledge both intervening\(^4\) and interpreting\(^5\) as important actions in relation to the sign. The semiotic triangle can thus be understood both in the context of intervention and interpretation. When we express ourselves, there is an internal process of translating secondness (e.g. the way one currently feels) into a firstness (an expressible sign) through a thirdness (an act of translation from secondness to firstness).

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\(^4\) The term “intervening” is not used by Peirce. It will, however, be consequently used in this thesis. Intervening refers to "speaking": the act of creating representamen. A wider interpretation of intervention, which is not elaborated on in this thesis, also includes intervention in the physical world, e.g. cutting wood, carrying a log, or opening a window.

\(^5\) Interpreting is looked upon here as the internal process of perceiving a representamen as a sign and assigning meaning to it.
Bühler, who elaborated on a sign as a relation between a locutor (the creator of the sign), an addressee, and the object the sign refers to. Bühler (1934) discusses these three relations as three functions of language: The symptom, the signal, and the referring function (Figure 2-3). That is; while Peirce seems mainly to focus the cognitive processes related to interpretation and formulation of representations, Bühler places the representation of the sign in the foreground. He discusses the understanding of a sign in terms of language functions – relating it to both creators and interpreters at the same time. This view emphasizes signs as part of some social interaction situation. An interpretation of a sign is not only based on the sign as such, but also on the basis of who expressed the sign. This also has implications for the locutor: Depending on who is listening, we express ourselves differently. Signs can thus be viewed as parts of action relations: Joint actions of intervention-interpretation, between the actors.

Morris (1964), following in the traces of Peirce, has elaborated on the pragmatic relation of signs to the interpreter. Morris distinguishes between different pragmatic meanings of sign (designative, prescriptive, appraisive), all in relation to the interpreter and what he possibly may do based on the sign. These pragmatic meanings are based on the notion of the act as it is described by another American pragmatist, G H Mead (1938). Mead distinguishes between four phases of an act: impulse, perception, manipulation and consummation\(^6\). Although these distinctions are useful\(^7\), this is still a limited view on sign pragmatics since there is no reference given to the creator of the sign.

### 2.2 Socio-Instrumental Pragmatism

The semiotic reflection above is important, in the sense that it provides a basic view on some fundamentals of communication. However, it is a very shallow instrument to help us understand the social aspects of human action and

---

\(^6\) The designative function relates to the perceptual phase (observable properties); the prescriptive function relates to the manipulatory phase and the appraisive function relates to the consummatory phase.

\(^7\) Confer for example Cronholm & Goldkuh (2002) where these different categories have been used to clarify the different phases of a user interacting with a computer (in the Elementary Interaction Loop).
collaboration. We also need to address the issue why people communicate – the social grounds and social purposes of engaging in social interaction. Thus, the basic semiotic discussion needs to be complemented by other concepts to constitute a useful theoretical foundation to understand the phenomenon of people using information technology.

The theoretical framework of socio-instrumental pragmatism (SIP) as presented by Goldkuhl (2005) is an action-theoretic synthesis tailored to be used for IS research purposes. SIP primarily draws on American pragmatism (e.g. Peirce, 1931, Dewey, 1938; Mead, 1938 and James, 1907), symbolic interactionism (Blumer, 1969), Weber’s (1978) sociology, and speech act theory (Searle, 1969; Habermas, 1984). SIP itself is the result of a pragmatic approach to synthesizing theory, which in practice means that it is no attempt to integrate fully the theories it is informed by, but rather an eclectic approach to synthesizing aiming at a coherent framework, tailored for IS research. Selected parts of SIP are presented here (the ones that are relevant within this study). Confer Goldkuhl (2005) for a more thorough discussion about socio-instrumental pragmatism.

Figure 2-4 serves as a starting point for this discussion, through a model which reveals some of the most important concepts within SIP. The concepts in the figure are presented below. The relation to Bühler’s semiotics is clear: One actor intervenes in the social world through action, which renders a result. The result – some representation which can be perceived by others – is interpreted by some other actor(s), attempting to make sense of this representation. The representation may be a written or spoken word, but it could also be somebody walking out of a room or even someone doing nothing at all. Andersen (2001), in his call to further integrate semiotics into human-computer interaction research, states that humans are compulsive talkers and interpreters, constantly trying to make sense of the world.
Max Weber has profoundly discussed the term social action. Weber conceptualized social action in a minimalistic, yet powerful way: “Action will be called 'social' which in its meaning as intended by the actor or actors, takes account of the behavior of others and is thereby oriented in its course” (Weber, 1978 p 4). This means that he describes social action as action oriented towards other people’s previous, current or anticipated future behavior. “Others”, in this case, refers to individuals known to the actor or a number of unknown individuals. Weber’s notion of social action is that the performing actor takes other individuals into consideration, which affects the way he/she acts. The social aspect of action lies within the actor – this would mean that it cannot always be determined whether some performed action is social or not, without knowing what influenced the actor to perform the act in a certain way.

Weber further discusses four different orientations of social action. These are goal rationality (instrumental rationality), value rationality, affectual orientation and traditional orientation. These are not means for classifying actions, but a sociological tool that can be useful in discussing social action. Social action can be oriented different ways with regards to its goals and the sociological or psychological circumstances that affect the way the actor performs the action. Table 2-1 provides an overview of these orientations. Weber (1978) also points out that social action seldom can be said to belong to only one of the orientations above. An action can, for instance, be goal rational to some degree and value rational to some degree. Weber (ibid) also points out that these orientations can contradict each other.
Table 2-1 Orientations on social action, derived from Weber (1978)

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<th>Orientation</th>
<th>Goals</th>
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<tr>
<td>Goal rationality</td>
<td>Clear goals; Affecting the world in some intentional sense (desired effects outside the action itself).</td>
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<tr>
<td>Value rationality</td>
<td>The goal lies within the action itself, e.g. religious, ethical or esthetical actions.</td>
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<tr>
<td>Affectual orientation</td>
<td>These actions are emotional, which means that they do not necessarily have meaningful goals, at least not reflected goals.</td>
</tr>
<tr>
<td>Traditional</td>
<td>These actions are governed by habits, and traditions, which means that there are not necessarily conscious goals.</td>
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Goldkuhl (2005) further elaborate on Weber’s definition of social action by stating that action may have social grounds (“takes account of the behaviour of others”) and social purposes (“is thereby oriented in its course”). Given this way of conceiving social action, it is hard to find examples of action which is not socially oriented in its course.

A pre-assessment, which may be more or less reflected, is performed by the intervening actor. The pre-assessment is a phase where the actor shapes his action in the context of the social grounds and social purposes. After the intervention, there is a post-assessment made by the actor, striving to make sense of how the intervention has affected the material and social world. Goldkuhl thus distinguishes between three important phases in a social action setting: Pre-assessment, intervention, and post-assessment. Goldkuhl grounds this discussion theoretically by referring to Mead’s (1938) four stage model of human action, including impulse, perception, manipulation and consummation. In SIP, the first two stages have been integrated into one.

As a reflection, we must understand this model, focusing on single actions, in a larger context of intervention and interpretation. We should view single actions in the context of Peirce’s concept of semiosis, as explained in section 2.1. Every action is thus part of a never-ending series of interventions and interpretations, which continually changes our understanding of the world. We are all interveners and interpreters, and there is an ongoing change of roles and relations in any communication process.
It is important to state that the discussion above is an attempt to find useful concepts to discuss the very complex phenomenon of people acting in a social world. Every such conceptualization has its strengths and its limitations. SIP discusses instruments used when acting, which, when compared to other similar theories, increases its appropriateness for IS research (given the perspective that we may conceive IT artefacts as instruments). As argued by Wertsch (1998), instruments enable, direct and constrain action. Depending on which instrument we use at a given time, the action result or the acting itself will be different. Most instruments are artefacts (human made), which means that we have assigned certain properties to them in their design. Different instruments afford different actions from the people using them (Gibson, 1979).

IT artefacts – and some other types of artefacts with a high degree of automation (such as fuzzy-logic based washing machines) are capable of operating independently of human beings (e.g. Goldkuhl & Ågerfalk, 2005). After configuration and initiation, they carry out material or semiotic tasks without active continuous operation by humans. We may say that action that once used to be carried out fully by humans have been delegated to the instrument, through its capability to read its surrounding world through sensors, process this information based on rules, and process it through algorithms to a desired result. These artefacts may be conceptualized as agents, operating on behalf of human beings. They are still instruments for action, although they are more complex than tools which depend on active human operation to function properly (e.g. knives and forks). SIP clearly points out that we still need to think of action as performed by humans – the instruments, regardless of their degree of agency and autonomy, are still created by and operated by humans, and the responsibility for action is always to be found among human actors. As stated by Collins & Kutsch (1998), IT artefacts may perform action in a mimeomorphic manner, i.e. do things repeatedly given a set of instructions, while human action is polymorphic. A pre-requisite for polymorph (thus human) action is experience of the complex society in which action takes place, which makes it vastly more complex to predict human action, and to “design” human systems. Thus, we need to understand both the design of artefacts which support and replace human action, but also the soft human system which undergoes change when such an artefact is introduced to its. Thus, as thoroughly theorized by Checkland (1981), we need to properly understand and
acknowledge the difference between design of hard systems and change of soft systems.

When discussing social grounds and social purposes for action, it is important to adopt concepts which help us reason about these grounds and purposes, which are to be found in the social relations pre-dating any action. Blumer (1969, p 71) states that “the essence of society lies in an ongoing process of action - not in a posited structure of relations. Without action, any structure of relations between people is meaningless. To be understood, a society must be seen and grasped in terms of the action that comprises it”. This view of action in some social context is embraced by SIP – thus it is essential to actually study actions to properly understand any social environment. At the same time, SIP acknowledges the existing social relations as the seed for social grounds and social purposes for action. In line with Giddens’ theory of structuration (1984), the SIP perspective also acknowledges that any action causes changes to existing social structure and interpersonal relations. When acting, representamens are created, which are interpreted by others. Consequently, social relations are affected. These relations may, as an example, be promises causing expectations. The concept of social relations is clearly visible in SIP, primarily due to the influence from communicative action theory (Habermas, 1984 and speech acts (Searle, 1969), which will be discussed further in section 2.3.

SIP further emphasizes the importance of understanding the interrelated concepts of material treatment and communication. Drawing on Wittgenstein’s (1958) concept of language games, Goldkuhl (1996) introduces the broader concept of activity games. Goldkuhl & Ågerfalk (2002 p. 1) presents this concept: “Material acts and communicative acts together form patterns of action. They form not only a language game, but also an ‘activity game’ […], with relations between communication and material treatment. Large parts of this activity game are recurrent actions and are thus institutionalized in the organization and the practical consciousness of its participants”. The concept of activity games is thus anchored in institutionalization; a relation between action and structure discussed by, among others, Berger & Luckman (1966) and Giddens (1984).
2.3 Information Systems Actability Theory

Since the early 80’s, many IS scholars have shown an interest in a pragmatic perspective on IT systems. Scholars such as Flores & Ludlow (1980), Goldkuhl & Lyytinen (1982), Lyytinen (1985) and Winograd & Flores (1986) challenged the dominant semantic perspective at the time, and proposed an action-oriented turn in the IS discipline. Today, pragmatic-oriented IS research is still relatively small compared to other contemporary research fields (such as the semantic web). However, the interest for pragmatic and social issues related to IT systems can frequently be found both on IS conferences and in journals.

One of the theories descending from (and being part of) this pragmatic tradition is Information Systems Actability Theory (ISAT). ISAT is coherent with socio-instrumental pragmatism, and can be seen as a branch of SIP with a special focus on action-oriented design and evaluation of IT artefacts in social settings. A thorough account of the emergence of these two theories, and their interconnection, can be found in Goldkuhl & Röstlinger (2002). Actually, the first articulation of ISAT pre-dates the formulation of SIP, and the two theories have evolved in parallel. This also implies that it is problematic to draw a distinct line between these intertwined theories. In this section, a few basic ISAT principles will be discussed, which needs to be interpreted in the light of SIP as described in 2.2.

First, a part of the ISAT perspective, is a view of actability as a type of quality in the relation between an IT artefact (the instrument) and a user (the actor using it). Actability is defined as “[…] an information system’s ability to perform actions, and to permit, promote and facilitate the performance of actions by users, both through the system and based on information from the system, in some business context” (Goldkuhl & Ågerfalk, 2002 p 2). A few critical reflections need to be made about this definition. First, it is stated that information systems perform actions. I hesitate to adopt this formulation, since it increases the risk for confusion. I prefer Weber’s (1978) terminology, stating that humans perform actions. An IT artefact, the way I see it, may process data based on algorithms. This view is indeed adopted within ISAT. Goldkuhl & Ågerfalk (2002 p. 10) explain: “The system’s actions derive ultimately from the rules predefined to the system. We do no presuppose computers to have human properties of consciousness and ethical responsibility”. Thus, a definition of the IT artefact as a performer of action should be based on a more
precise terminology, which clearly separates the polimorphic action performed by humans and the mimeomorphic action performed by the IT artefact (as discussed in section 2.2). Another reflection about the definition concerns the business context. Given the amount of applications of IT, as discussed in the introduction chapter, it is more relevant to speak of actability in any social context. A final reflection concerns the use of the term information system – which is often used (e.g. Beynon-Davies, 2002) to encompass more than information technology. It is thus more appropriate to use the phrasing IT system or IT artefact, as part of this definition.

Second, one pragmatic aspect of IT artefacts is to understand more than the semantic (referential) aspect of a message. Within ISAT, speech act theory is proposed as a way of conceiving important action aspects of a message. Several scholars have advocated that we need to understand communication as action, since it affects the social world (e.g. Winograd & Flores, 1986; Goldkuhl & Lyytinen, 1982). ISAT adopts this view, and proposes that we need to understand messages from several points-of-view. Based on Searle's (1969) scheme, we may reason about a message as a result of an utterance act, a propositional act, an illocutionary act and a perlocutionary act. The utterance act is a syntactic view of a message; a production of a set of words. The propositional act is an act of referring to something in the material or social world. The illocutionary act is what we are doing in relation to some other actor(s); e.g. promising, commanding or declaring something. The perlocutionary act is an intentional cause of effect among the other actors. In ISAT, the perlocutionary act is questioned as part of the speech act, since the actual effect of what we do is not controlled by the intervening actor. It is rather an unpredictable result, based on the interpretations and following actions performed by other actors. The illocution, or action mode, is considered important in ISAT, since many design problems concerning this phenomenon have been identified in the empirical work underlying ISAT.

In IS actability a distinction is made between three usage situations of information systems (figure 2). There are interactive usage situations, where users interact with the IS. In this kind of situation, a user can perform a communicative action through and by support of the system. A user can perform some action (outside the IS) based on messages retrieved from the IS. This kind of action, related to IS, is called a consequential action. The IS itself
can also perform actions according to this view: these actions are called *automatic* actions. A computer is an advanced artefact and has the ability to perform certain information processing in an independent way, still on the basis of rules defined by human actors.

![Diagram of IS usage situations](image)

**Figure 2-5** Types of actions related to three IS usage situations
(from Goldkuhl & Ågerfalk 2002)

Messages play an important role in the actability concept. The pragmatic aspects of messages have been discussed (cf. Goldkuhl & Ågerfalk, 2002) as important within actability. Based on universal pragmatics (Habermas, 1984) and speech act theory (Searle, 1969), messages are considered to be products of speech acts, which contain not only a propositional content, but also an illocutionary force (this is referred to as ‘action mode’ within actability).

In Goldkuhl & Ågerfalk (2002) and Ågerfalk et al (2002) there are discussions concerning the relations between actability and the semiotic ladder of Stamper (2001). One important issue is that actability theory (following speech act theory) claims that there is an action aspect within the sign itself (the illocutionary force) and not only as effects arising from interpreting the sign. An actability claim is that pragmatic relationships are established through the sign between sender and recipient. For example, commanding or promising establishes different pragmatic relations between sender (the intervening actor) and recipient (the receiving actor). The sender of a message through an IS may not be the original communicator. He can be a ‘performer’, mediating a communication from the original communicator to the indented interpreters (recipients).

Actability has to date paid a lot of attention to Habermas’ (1984) theory of communicative action, and also to speech acts as defined by Searle (1969). One of the main reasons for the birth of IS actability was a reaction towards viewing
information systems specification as only a matter of semantic analysis. By paying attention to the illocutionary force of speech acts during information systems specification, and even conceptual modeling, pragmatic aspects of communication could be taken into consideration (Goldkuhl & Lyytinen, 1982; Goldkuhl & Ågerfalk, 2002). Ågerfalk (2003) proposes an extension of Langefors’ (1995) definition of elementary messages, by an incorporation of an action mode (illocution) component as an integrated part of a message. Ågerfalk refers to this extended basic definition as an ae-message (action elementary message).

One way of creating a useful instrument out of a theory such as actability is to formulate concrete ‘how to’-suggestions on IS design and/or evaluation. One part of the development of the actability concept is the formulation of a set of actability heuristics, or design ideals, which should guide an IS designer or evaluator to focus different actability properties of an IS (Table 2-2, next page). These design ideals could be compared to design ideals from the usability field, for instance Nielsen’s (1993) usability heuristics, which may be used as guidelines when designing or evaluating information systems. The design ideals within the actability are no replacement for Nielsen’s heuristics, but rather an alternative perspective on use qualities. They focus somewhat different phenomena, but in some senses they are much alike (Ågerfalk, 2004; Sjöström & Ågerfalk, 2003). The actability design ideals and their relation to other types of use quality are further discussed in section 6.3.
Table 2-2 Actability heuristics (Ågerfalk et al., 2002)

1. **Situational context awareness.** Performers should ultimately always know what they are doing and what they are supposed to do; only by looking at the interactive screen documents available.

2. **Good conditions for action in shown information.** Information shown to performers should be adequate (necessary and sufficient) so that actions can be intuitively based on it. This accounts for both information from developer-to-user (labels, captions, help texts, et cetera) and information involved in user-to-user communication.

3. **Good conditions for action in required information.** Information that the system requires from performers shall be meaningful and easily provided to the system. That is, the performer shall understand why the information is required and the information shall be convenient to provide.

4. **Easily accessible and adequate action memory.** Information about previously performed actions and other action prerequisites shall be easy to access.

5. **Action-legible IT-systems.** Expressive interactive user interface components (icons, labels, et cetera) should be used. The language used should be in correspondence with users’ professional language. Known and understandable consequences of possible actions. Propositional content, signifier of action mode and information about communicator should be visible and kept together. Separate messages should be kept separate (one thing at a time).

6. **Legible and relevant feedback.** Description and explanation of the system’s performed and scheduled future action(s) should be readily available. Effects of these actions should be shown. Alternative future user actions should be visible and choice of course of action to take should be informed by the system.

7. **Visible actors.** Information about performer, communicator and intended interpreter(s) should be easily accessible – both role and person.

8. **Restrictions and opportunities in navigation utilized.** Admit focus and work task changes. Sometimes sequence restrictions are necessary and desirable.

The ontological determination of actability as a quality was also discussed by Goldkuhl & Röstlinger (2002). They define actability as a *property of*
something; a property contributing to or enabling the actor to perform an action. The authors (ibid) include both executable and informative properties into the notion of actability, and they designate actability to be properties of external objects (signs or artefacts) or internal (subjective) constructs. The view of actability as a property is sprung from on the concept of affordances, as presented by Gibson (1979).

2.4 Philosophical and Ontological Manifesto

Sometimes, definitions of important concepts seem to be missing (or at least made very implicit) in IS research. Modern scholars are referred to in order to support some theoretical statement, but the authors do not fully examine the philosophy behind their work. Walsham (2005) provides one example of this; claiming that Michael Polanyi has been misunderstood by certain researchers, which in turn has led to some cascading misconceptualizations, due to the massive amount of researchers basing their arguments on the misinterpretations of the original work. Had these scholars satisficingly paid attention to the philosophy underpinning Polanyi’s work, these misconceptualizations would most likely have been avoided. This is a reason to put some effort into adopting a coherent philosophy on the IS field as part of any IS research endeavor.

Apparently, the characteristics of language use are considered vital in this study. It is my belief that we continuously need to question our perspective on language in our role as IS researchers. This chapter has presented the view I adopt on human communication and language. This section summarizes a set of philosophical and ontological statements, which reveal my perspective on the world, and which is the basis for this study:

- Humans are continuously trying to make sense of the world through interpretations of the signs surrounding them.
- These interpretations are made possible through the inherent “tacit power”, which is an accumulation of all our life experiences.
- Conversely, humans want to be “made sense of” by others. This is done through interventions in the world, which is manifested in the representations made through speaking, writing, walking away \textit{et cetera}.
“Representations” should be conceived in a broad sense, since the absence of action may also be subject to human interpretation.

There is a need to explicitly separate the performance of action from the results of action, and to separate the action results (which are in the performer’s control) from its social consequences (which are likely to diverge from the performer’s intentions due to human complexity).

Communication may be conceived of as action pairs, where one act of intervention results in a representation which is later interpreted by one or more other actors.

Information Technology has multiple roles in communication, both as media (carriers of representations) and as agents (processing and directing representations based on rules defined by human instrument builders).

Communication is not merely a semantic issue; it also has a pragmatic meaning, since it has an impact on the social relations in communities.

Human action has social grounds and social purposes. In order to properly understand how to design and evaluate Information Technology, we need to take into account these social aspects of IT use.

Another important starting point is the concept of information systems actability, re-visited after the discussion from section 2.3. My revised way of conceiving actability is defined as follows:

| Information Systems Actability refers to the properties of an IT artefact which define its ability to process information and mediate intentions on behalf of human actors, and to permit, promote and facilitate the performance of actions by users, both through the system and based on information from the system, in some social setting. |
Chapter 3

Research Design

This chapter comprises a discussion about the design of this study – the activities leading to the results, and a motivation for these activities. Section 4.1 is a straightforward description of what has been done. It is not uncommon that you are left with a number of questions after reading a method chapter in a thesis – therefore, I initially aim at answering the question “what have you done?” Theoretical discussions have deliberately been left out of this section, since such discussions sometimes tend to distort the core message. Section 4.2 motivates the selected approach by outlining a pragmatic research philosophy, in coherence with the ontological discussions in chapter 2. Section 4.3 elaborates on the notions of “good” theory and introduces concepts which will be used to self-assess the results in the thesis. Section 4.4 is a self-critical section, which point out known weaknesses of the chosen research approach, and how future research will be conducted to overcome the known weaknesses of this study.

3.1 Core Research Activities

This section shows the activities performed in the research process. The main principle for the research stems from a pragmatic perspective on knowledge development: We need to apply a concept in order to determine its usefulness\(^8\). Therefore, this work is empirically informed by studying the use of IT systems in their social context. That is; by evaluating these systems in context; we learn about the impact of IT artefacts on social interaction in different settings. This way; we gather empirical data which may be used to reason about the first research question (concerned with understanding the IT artefact’s role task-solving and social interaction). In addition, the evaluations render empirical

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\(^8\) This needs to be mentioned here, and is more thoroughly discussed in the next section.
data which can be used to reason about various use qualities of IT artefacts (corresponding to the second research question).

The evaluations are embedded in an overarching research process, as depicted in Figure 3-1. Appendix A explains how to interpret action diagrams.

**Figure 3-1 A pragmatic research process based on evaluations**

The evaluations are embedded in an overarching research process, as depicted in Figure 3-1. Appendix A explains how to interpret action diagrams.
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In total, four evaluations of IT systems have been made. Detailed information on each evaluation will be presented in chapter 4. The rest of this section presents the general characteristics of the bulk of evaluations.

It would be wrongful to state that this thesis is the result of one, original research design. Rather, the path to a complete thesis has been unpredictable in a number of ways. The publications referred to (see section 1.5) have been written at different times, focusing single points. The research design for each paper has been partially driven by opportunity (what has been interesting and available at that particular time). The funding for my research has been irregular and originated from different sources. This does not mean that the thesis is the result of random activities – all previous publications share some characteristics: A pragmatic approach to understanding the world, both in terms of ontological and epistemological matters. All the previous publications (Table 1-1) produced in this research process lead to concepts which in some way relate social action to (the use of) information technology. These two aspects (the social and the instrumental) characterize all the publications, and by working with this perspective over a period of time, the aim and research questions in this thesis have evolved. It is fair to state that these questions have been formulated at a late stage in the thesis writing process. These emerging research interests, as depicted in Figure 3-1, have grown more stable over time.

These interests have guided both the theoretically informed conceptual development and the selection of evaluation objects. Thus, each evaluation concerned some use of an IT artefact in its social context. In one case (see section 4.3), the particular evaluation was externally funded, thus there has been a clear assignment regulating the evaluation. Furthermore, each evaluation has been prepared through theoretical work, where external theories and some theoretically informed own concepts have been important to guide the evaluation process.

The evaluations, which have sometimes been conducted by researchers alone, sometimes in joint work with practitioners, have rendered evaluation results. These results consist of statements about the quality of the IT artefact at hand, given the context of the evaluation. During the evaluations, there has also been a continuous reflection, which is important from a research perspective.
Based on the evaluation results, the continuous reflections, and the theoretical framework in use, the own concepts have been analyzed and improved through the activity called empirically informed theoretical development. This means that in the end, the results are both theoretically and empirically grounded.

At these points in the research process, the results have been substantial enough to write research papers, which have been peer-reviewed and published. This has also resulted in feedback from fellow researchers, both from the review process as such and from the events where those publications are presented (e.g. conferences).

The characteristics of each evaluation are more thoroughly described in chapter 4.

### 3.2 Adopting Inquiry as a Theory of Knowledge

As presented in the previous section, the empirical work has been conducted as evaluations of IT systems in different settings. Based on these evaluations, a number of theoretical concepts have been developed: abstractions regarding the characteristics of the IT artefact in its social context. Some important conceptualizations have been made, such as the pragmatic duality of IT systems, highlighting the dual relationship between IT users as both users of technology and participants in human-to-human communication (Sjöström & Goldkuhl, 2004). Some theoretical concepts regarding the complexity of IT as a communication medium (through its agency properties) have been developed (Sjöström & Goldkuhl, 2002). As another example, Ågerfalk & Sjöström (2007; 2008) made a differentiation between communicative properties of web artefacts and IT artefacts in general, and some principles for understanding web artefacts were formulated. A detailed presentation of the developed concepts can be found in the result chapters (5 and 6).

An important perspective has been the view upon researchers as subjects, which connects well with the ontological-philosophical manifesto in section 0, which clearly has epistemological consequences. An important theoretical foundation to motivate this is Peirce’s (1931) theory on semiotics, i.e. human interpretation of – and intervention in – the world through signs. Peirce’s semiotics is not only a theory of human interpretation and intervention; it is
RESEARCH DESIGN

also one of the fundaments of the philosophical school of American pragmatism. This research is based on a pragmatic perspective on theory and theory development. The pragmatics of James’ (1907) states that it is the application of a concept which determines its value. This has epistemological consequences – in order to determine the “goodness”, or “trueness”, of a concept, we need to apply it in order to be able to evaluate its consequences. James argues that this is the first indication of the goodness of a concept; but there is also a need to anchor concepts in older truths. Based on this epistemological stance, it is indeed possible to make theoretical generalizations based on single or few observations – as long as the concepts are also anchored in established theories, in this case theories in the IS discipline, and theories from the domains of semiotics and social action. In line with James’ thoughts, the evaluations are not only assessments of the IT artefacts at hand; we also assess the theoretical concepts used to guide the evaluation. Thus, each evaluation in the research process has been informative in the development of new – or improvement of existing – theoretical concepts.

Even though Peirce’s semiotics provides great explanatory power regarding human communication, his work on inquiry is not fully sufficient in this research context. Peirce (1931) defines inquiry as the change of psychological state from doubt to belief. Dewey’s (1938) conception of inquiry is further elaborated than Peirce’s, and in some ways their views are not compatible at all. Even though they are often referred to as “American pragmatists”, their views of inquiry as a theory of knowledge differs significantly (Talisse, 2002). While Peirce’s inquiry concept – related to his psychological theory of semiosis – primarily focuses experience as interpretation, Dewey argues that how we experience is a result of doing. Peirce views inquiry as a process of discovery, while Dewey defines it in terms of reconstruction (Talisse, 2002).

Dewey points out that we actively change our world, and that the process of inquiry changes a situation from being indeterminate to being determinate. Thus, Dewey’s conception is more in line with a contemporary view of action research, aiming at changing both the local practice, and at the same time using that experience to develop various forms of instrumentalities (e.g. propositions and models) which may be operationalized and useful in other situations.

Dewey’s definition of a situation is that it is a contextual whole consisting of objects and events.
CHAPTER 3

“What is designated by the word ‘situation’ is not a single object or event or set of events. For we never experience nor form judgments about objects and events in isolation, but only in connection with a contextual whole. This latter is what is called a ‘situation’”

Dewey (1938 p. 66)

The IT artefact may be considered an object, and the use situation is characterized by a number of events and actions where the IT artefact is an instrument. This view of inquiry is in harmony with both usability research (focusing the use of interactive products), socio-instrumental pragmatism (focusing social action and its consequences on social relations), and the research questions as such, which aim at understanding IT in its action context.

Another important distinction between Peirce’s and Dewey’s perspective on inquiry is that Peirce’s view of reality does not correspond well with social science research. Peirce (1878) stated that “All the followers of science are animated by a cheerful hope that the processes of investigation, if only pushed far enough, will give one certain solution to each question to which they apply it”. Such a statement may make sense in the domains of chemistry, physics, mathematics, and other domains which are governed by forces of nature or formal axioms. However, in the field of information systems and other branches of social science, there are multiple paradigms which are sometimes governed by philosophical concerns rather than quantifiable and measurable phenomena. Peirce’s view, while striving for theory which thoroughly explains causalities in a natural science manner, is epistemologically problematic in relation to moral aspects of inquiry (Talisse, 2002). Dewey, on the other hand, also recognizes morally indeterminate situations – situations where social conditions are disordered, i.e. there is a lack of knowledge or a number of conflicts between people in a group. Moral inquiry is a process where these social conditions are changed in order to obtain a determinate situation. According to Talisse, “[…] one can say with some confidence that the main objective of Dewey’s entire philosophical career was to dissolve the supposed dichotomy of fact and value” (Talisse, 2002 p. 78).
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There is a need to comment the semiotics of Peirce and its connection to the researcher-as-subject issue. In this thesis, the term interpretation is heavily used. The notion of interpretative approach in this study does not fully correspond to interpretive IS research as commonly discussed in the IS field, e.g. by Walsham (1993; 1995) and other authors sharing that particular view of interpretive research. By adopting the term interpretive, I simply intend to position myself as a subject, striving to interpret and understand real-world phenomena and conceptualize these. By looking upon myself as a subject, I acknowledge that my results are highly dependent on myself. In order to overcome the weaknesses of self, it has therefore been important to expose the emerging results in various communities, thus generate feedback and food for thought on how to improve the concepts. Basically, academic exposure (e.g. conference papers and seminars) generates theoretically informed criticism and development ideas, thus the developed concepts have passed through the academic quality control system of peer-review a number of cycles. Conclusively, the evaluations provided qualitative empirical data, which has been interpreted and abstracted into theoretical concepts related to the research questions. These concepts have emerged through several cycles of refinement based on theory, empirical data, and peer-reviews leading to academic publications.

3.3 Norms for Good Theory

One important matter in every academic study is the quality of the results. In this section, I elaborate on my view of “goodness” of theory and the possibility to generalize the results. Based on Dewey’s (1938) notion of a situation as a contextual whole, it is possible to derive some desired characteristics of the result of this research. First, if inquiry is aimed at changing an indeterminate situation into a determinate one, we need to be able to understand and describe a current situation. Thus, there is a need for concepts which emphasize the role of the IT artefact in its context. Second, Dewey states that the truth of an idea is determined by its quality in guiding action towards its purpose. Thus, concepts which help us identify problems with the current situation are valuable, since they help us focus certain aspects of a phenomenon, thus aiding us in understanding what needs to be changed. Third, the same quote motivates prescriptive theories, i.e. design principles, telling us about ideals for IT design in context. Thus, I believe that Dewey’s inquiry as a theory of knowledge points out the direction for this research process. In believing this, there is still
a need to establish some quality criteria to guide the research, and evaluate the outcomes. Drawing on (among others) Dewey's pragmatism, Cronen (1995; 2001) elaborates on practical theory – theory which is used for and within an inquiry process by the inquirer in joint action with other participants in the process. Practical theory is clearly in line with the pragmatist thought that the application of a concept is the most relevant criterion of its value (James, 1907). Cronen (2001) discusses criteria for evaluation of practical theory, as presented in Table 3-1. This view of practical theory has been present in the research process, and also the basis for a structured discussion about the results of the research (section 7.2 is a Cronen-based assessment of the theoretical contributions presented in this thesis). A motivation for the practical theory approach is to promote the results of the thesis to be adopted by practitioners, thus relieve the problematic issues of theory use in practice (Rogers, 2004) which were discussed in section 1.3.

Cronen summarizes these criteria in four categories, by stating that they determine if a theory is useful for “(1) identifying a situation-in-view, (2) constructing judgments (systemic hypotheses) that (3) implicate actions leading to (4) the consequence of improving the situation” (ibid p. 29). These stages are a condensed version of Dewey’s (1938) description of the stages of inquiry.

Moving back to the second research question (“How can commonly discussed IS use qualities be described, related and well understood based on such a conceptualization [of the IT artefact]?”), it is clearly important in relation to the formulated research problem, but it may also be seen as a way of validating the first research question: By attempting to theorize further based on the conceptualizations made, the progenetive qualities of the conceptualizations are assessed, and implications for further research may be derived. This approach benefits the answer provided to both questions: The two questions trigger an iterative conceptualization process. The way the questions are posed is thus a way of facilitating a hermeneutic circle in the research process.

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9 The headline for each criterion has been added by me to make the criteria accurately referable from the final chapter.
Table 3-1 Evaluation criteria for practical theory (After Cronen, 2001)

<table>
<thead>
<tr>
<th>General characteristics as a practical theory</th>
<th>The instrumentalities of a practical theory should guide those activities of inquiry that develop, organize, test, and reconstruct: 1) Percepts of the situation-in-view, 2) Provisional Hypotheses about how particular percepts are related, 3) systemic hypotheses (judgments), 4) actions taken in the inquiry process, and 5) consequences implicated by actions taken beyond the original situation in view</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guide for theory application</td>
<td>A practical theory should provide sufficient guidance for the use of its instrumentalities. Definitions, descriptions, models, and case examples all contribute to guiding its use. Meeting this criterion is not a matter limited to providing formal definitions with the form of analytic propositions.</td>
</tr>
<tr>
<td>Generation of alternative hypothesis</td>
<td>A practical theory should facilitate the creation of alternative systemic hypotheses. The details of experience typically amenable to more than one coherent explanation. A single explanation blinds the inquiry process to alternatives and stymies an investigator when a particular line of inquiry is unfruitful.</td>
</tr>
<tr>
<td>Adaptability to specific situations</td>
<td>A practical theory should allow for further development of old methods and creation of new ones. As a practical theory is employed in a new and different kind of situation, methods may have to be developed or adapted in response.</td>
</tr>
<tr>
<td>Richness of instrumentalities</td>
<td>A practical theory should grow in the richness of its instrumentalities. Logical positivist theories depend on propositional form. The terms in a proposition are elaborated only by breaking them down into smaller component parts. In practical theory, by contrast, we look for richer, more useful ways to explore what is involved in, say, a &quot;consummatory moment&quot; or a client's &quot;story&quot;. Our understanding of such instrumentalities should develop as we use the theory.</td>
</tr>
<tr>
<td>Support for observations and explanations</td>
<td>A practical theory should lead to greater sophistication for all parties involved including the professional inquirer. Its use should make one a more sensitive observer of details in action, better at asking useful questions, more capable of seeing the ways action are patterned, and more adept at forming systemic hypotheses and entertaining alternatives.</td>
</tr>
<tr>
<td>Support for participation</td>
<td>A practical theory should provide instrumentalities for including the person using it as a part of the inquiry process. Practical theories reject both a subjective and an objective understanding of inquiry. Thus they need to be able to take account of the practitioner as participant when that is useful.</td>
</tr>
</tbody>
</table>

3.4 Case Selection: Overview and Rationale

This section is an overview of the characteristics of the four evaluations, including a motivation of the selection of cases. Table 3-2 introduces the four situations that have been evaluated.
CHAPTER 3

Table 3-2 Overview of evaluation situations

<table>
<thead>
<tr>
<th>Evaluation Situation</th>
<th>IT artefact(s)</th>
<th>Intervening actors and media</th>
<th>Interpreting actors and media</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: Coordination of shared resources in a university environment</td>
<td>Scheduling System, Intranet, TV Screens</td>
<td>Teachers and administrators update schedules using a desktop application.</td>
<td>Teachers, administrators, and students interpret schedules using intranet, web site and TV screens located at the university</td>
</tr>
<tr>
<td>#2: Developing education service contracts to stakeholders in a university environment</td>
<td>Syllabus Database (Intranet)</td>
<td>Teachers and administrators update syllabi using a desktop application.</td>
<td>Teachers, administrators, and students interpret syllabi using intranet. Teachers and administrators can also acces the syllabi using desktop applications.</td>
</tr>
<tr>
<td>#3: Navigating complex information repositories in a library</td>
<td>Search application (3rd party artefacts)</td>
<td>3rd party systems and library staff maintain the publication index which is the basis for searching.</td>
<td>Students, teachers and library staff search for publications using the library's intranet.</td>
</tr>
<tr>
<td>#4: Essential and accidental communication in a web shop &amp; community</td>
<td>Web Shop (3rd party artefacts)</td>
<td>The interventions and interpretations taking place in this situation are too complex to summarize here. They are presented in detail in section 4.4.</td>
<td></td>
</tr>
</tbody>
</table>

The four evaluations target a diversity of IT artefacts in different social settings. The emerging theoretical concepts have emerged or proven useful in different ways in the four evaluations. The detailed contribution of each evaluation will be presented in the following sections; one section corresponds to each evaluation. However, at this point there is a need to clarify some more details on each evaluation and reflect upon the connection between the four evaluation situations and the inquiry process, as discussed by Cronen (see above). Evaluations #1, #2, and #4 were performed by researchers only, and they have not rendered any actual intervention in the world. Evaluation #3 meets all of Dewey’s stages of inquiry, from situation-in-view to the consequences of improving the situation. However, in line with Dewey’s
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thoughts on inquiry, a contextual approach to evaluation has been adopted in all evaluations, and the IT artefact has been studied from a broad perspective, taking into account the “contextual whole” (people working with the artefacts), and the social context in which they are performing purposeful action. Evaluation #3 was a full inquiry, involving the staff from the library and the library’s clients (students and staff). Table 3-3 depicts the empirical data in the four studies, and short statements characterizing the evaluations.

<table>
<thead>
<tr>
<th>#</th>
<th>Empirical Data</th>
<th>Character of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IT artefact and logged reflections of problematic situations related to the use of the system.</td>
<td>Heuristic evaluation of a scheduling system, combined with author's experience from using the system in the teacher role.</td>
</tr>
<tr>
<td>2</td>
<td>IT artefact, system documentation, and staff e-mails</td>
<td>Analysis of business communication problems in relation to the design of the user interface of the syllabus database.</td>
</tr>
<tr>
<td>3</td>
<td>IT artefact, interviews with users, think-aloud observations of users working with system, inquiry of business issues.</td>
<td>Triple-perspective study of a search application in its context: Library point of view, Student point of view, and University staff point of view.</td>
</tr>
<tr>
<td>4</td>
<td>IT artefact, user-to-user communication through IT artefact, HTTP request logs</td>
<td>Evaluation of communication and identity cultivation in an online web community/shop.</td>
</tr>
</tbody>
</table>

The four evaluations show the use of IT in different social contexts, thus provides a variation of the empirical data as a basis for conceptualizations. They represent different types of task (scheduling, formulating and disseminating education service contracts, searching information, and engaging in an online community to learn more about books). They also represent different social environments: The first two IT artefacts are intra-organizational, the third one is inter-organizational, and the fourth one is web based and open to public visitors, but also an example of inter-organizational collaboration. The evaluations also differ in methodology: The means for assessing each situation has varied, since the backgrounds of the evaluations are different, and driven by a continuously emerging research interest, and sometimes also influenced by external assignments. The access to empirical
data has also differed between the evaluations. The following subsections will include more elaborated discussions about the character of each case.

To provide some structure to the presentation of the evaluations, they will also be based on the concepts presented by Cronholm & Goldkuhl (2003), who present six ideal types in IT evaluation. They differ between what is evaluated and how it is evaluated. The question to what is evaluated is either an IT system as such or an IT system in use. The question to how it is evaluated is based on the three categories criteria-based evaluation, goal-based evaluation and goal-free evaluation. By combining these two categories, they end up with a matrix with six ideal types of IT evaluation, presented in Table 3-4.

<table>
<thead>
<tr>
<th></th>
<th>IT system as such</th>
<th>IT system in use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal-free</td>
<td>Type 1</td>
<td>Type 4</td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal-based</td>
<td>Type 2</td>
<td>Type 5</td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criteria-based</td>
<td>Type 3</td>
<td>Type 6</td>
</tr>
<tr>
<td>evaluation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Their proposed ideal types have not been applied in advance to design the evaluations in this thesis, rather as an instrument to retroactively characterize the evaluations, consequently positioning them towards one another. The mapping of the evaluations to these ideal types show the diversity of the evaluations: They represent all ideal types in Cronholm and Goldkuhl’s model.

### 3.5 Known Methodological Weaknesses

This section is a documentation of some known weaknesses in the research approach.

First, the evaluation of the scheduling system is not based on a well documented use context. The discussions are partially informed by the author’s personal experiences from using the system, which may lower the credibility of the evaluation results. While being a doctoral student, I have also worked as a teacher at Jönköping International Business School, thus gained experiences
from the scheduling system. In the evaluation process, the decision was made to incorporate those personal experiences rather than interviewing other users. The rationale behind this decision was that the time to perform the evaluation was limited. Still, I believe it added value to the evaluation to include these personal experiences, although it may be conceived as a less credible form of empirical data in a research context.

Second, one may question the theoretical framework which underpins this thesis, or at least state that it should have been complemented with contemporary IS research to a larger extent. I fundamentally agree with this (potential) criticism, but I also argue that this work is part of a larger, accumulated research process, which can be recognized in pragmatist IS research communities such as the Language Action Perspective community (which emerged into the Pragmatic Web community) and the Organizational Semiotics community. These communities are a small but rather consistent force in the IS field, and publications stemming from these philosophical underpinnings are occasionally published in higher ranked journals and conferences. These publications, however, are typically the results of a focused editorial work, targeting a specific journal or conference track. That is; this type of work has a value in the greater IS society. However, within the thesis there is a need to provide a focus on the underpinning philosophies in use (e.g. semiotics and social action theories), which leads me to conclude that a stronger connection to the IS field in general is more suitable in upcoming publications, and also in the doctoral thesis, where there is more room for theorizing.

Third, one may question the choice of evaluation situations. A response to that is that the research process needs to be partially driven by opportunities. Still, the four evaluations made encompass a number of different IS use situations, as discussed in the previous section, which indicates that the empirical data as a whole constitute a fertile ground for theory development, even though it is not the result of following a grand plan formulated in the very beginning of the research process.
This chapter serves as a presentation of the four evaluations. Each evaluation is presented through an introduction and characterization based on Cronholm and Goldkuhl’s (2003) evaluation model (see section 0), and described in detail through four views: 1) Theory base and theoretical concerns, 2) Primary Data, 3) Evaluation results, and 4) Contribution to theory development. The theory base and theoretical concerns view explains how the evaluation was theoretically informed, and motivates why the theoretical perspective at hand was relevant to adopt in the evaluation. The primary data view contains a discussion about how data was gathered to inform the evaluation. The evaluation results view shows some issues about the situations that were evaluated. Finally, the contribution to theory development view shows some reflections about how the particular evaluation has contributed to the development of theory in the research process.
CHAPTER 4

4.1 The Scheduling System
This section describes the evaluation of a scheduling system – i.e. an IT artefact used for coordination of shared resources (such as rooms, computers, and video projectors) in a university environment. This evaluation and the abstractions made from it have previously been published by Sjöström & Goldkuhl (2002; 2004).

Figure 4-1 Process description for the scheduling system evaluation
Figure 4-1 shows the evaluation process. The evaluation results are presented in section 4.1.3, and the contributions to theory development are discussed in section 4.1.4.

It is fair to categorize this evaluation as a criteria-based evaluation of the IT system in use. It was intended to perform an evaluation of the IT artefact as such, based on actability heuristics. However, I had personal experience from
the IT artefact and from the workpractice. These experiences were included in the evaluation process. The criteria used are discussed in section 4.1.1. The primary data – the discussion of the IT system as such and the personal experiences of the IT system and workpractice – are further discussed in 4.1.2.

4.1.1 Theory base and theoretical concerns
In this evaluation, the primary tool for evaluation was the set of evaluation heuristics defined within ISAT (Table 2-2). Information Systems Actability Theory was introduced in chapter 2.3, but will be further elaborated here to properly introduce this evaluation. ISAT explains different actors’ work with IT systems as performance of actions towards other actors in some social context. The actions performed by humans using the IS are considered social, since they are directed towards human beings – explicitly or implicitly. An actable IS should therefore ideally support a human to perform actions in a desired manner in some social context.

IS actability has been discussed at several levels: both as interactions between humans and machines, and as people performing actions using the IT artefact as an instrument in different usage situations. The given information content of screen and paper documents can be analyzed from the user’s point of view, to determine whether the information supports the performance of action in a satisfactory way. This raises questions about the illocutionary force of a message - what is done by the sender in relation to the recipient through communicating (Searle, 1969). According to speech act theory (Searle, 1969), the propositional content – what is being talked about - is only considered to be one dimension of a message.

While ISAT as such is a reaction towards the focus on semantics, this evaluation was a reaction towards the strong focus on speech act theory in ISAT at that time\textsuperscript{10}, which arguably did not pay enough attention to the receiving actor who interprets a message. This evaluation aimed at understanding the human-to-human communication level, where further questions are raised, since this is the level where an actor actually receives and interprets a message, whereby social interaction takes place between actors –

\textsuperscript{10} The evaluation was performed in 2002.
social relations emerge and are cultivated. By taking into account the interpretation, the social (or organizational) effects of a speech act through the information system could be analyzed. Previous ISAT publications mainly focused the interaction and action levels – the human to human communication level has not yet been thoroughly discussed. This is challenging, since most social action theories, the theoretical foundations for ISAT, were developed without consideration to mediators as complex as information systems. Since the human-to-human communication level of action is most clearly related to social action theories, it should be further researched – we believe it is the main link between the IT system and the business processes in organizations. Thus, a theoretical concern in this study was to enable refinements of ISAT on the human-to-human communication level.

Much of the discussions concerning IS actability has been based on the division into three types of use situations (see Figure 2-5). Following this model, there seems to be a risk that evaluation of IS usage can be reduced to these usage situations. The focus on these parts can move the focus away from the human-human communication. This division leads to a strong focus on the parts (which are closer to human-computer interaction) and not on the wholeness (the interaction between humans and the resulting establishment of social relations). This can partially be seen in the actability heuristics in Table 2-2. The heuristics are to a large extent formulated with a focus on usage of information systems as an action instrument. Human-to-human communication aspects can be found in some of the heuristics (e.g. in heuristic 2, 5 and 7). Many of the heuristics seem to have a more narrow focus, being oriented towards one of one of the three types of usage situations, especially the interactive usage situation (see heuristics 1, 3, 5, 6, 8). The heuristics are mainly focused on analysis of screen documents, but they are not supposed to be used without knowledge about the users’ work situations and the action the users wish to perform. An actability analysis should guide the evaluator to study and reconstruct the human-human communication. When screen documents are analyzed separately, the interventionist’s view and the interpreter’s view will be kept apart. In this evaluation, we suggested that sets of screen documents related to the same communicative act should be seen as a coherent whole, thus evaluated in relation to each other. This will give the possibility to see aspects of communication which otherwise can be disregarded in an actability analysis, according to the original heuristics (1-8).
While aiming at understanding different screen documents in relation to one another, there is still a need to adopt some theory to assess these documents. In this evaluation, Weber’s (1978) definition of social action was situationally adapted to get guidance on how to more specifically assess communication action. Obviously, there are social considerations taken in a scheduling activity. Weber’s concepts were used to derive some questions which were in turn used in the evaluation:

1. What does the actor want to achieve (what are his goals and values)?

2. Why does he want to achieve it? Why is it meaningful for the actor to achieve these goals and express these values?

3. To what extent does the scheduling system help him to achieve his goals and express his values?

Weber’s view on social action helps us focus these issues, thus attempt at finding some answer to the questions.

The theoretical discussions above explain that two different perspectives were used to evaluate the scheduling system in its social context. The first perspective was an evaluation of the screen documents in the scheduling system, based on the ISAT heuristics. The second perspective was based on the theory that we need to understand screen documents in relation to one another, to properly assess communication and social action. In order to assess social action, the three questions derived from Weber’s social action theory was posed to perform the assessment.

4.1.2 Primary data

There were two sources of data: The IT artefact as such, and my own experiences from using it.

4.1.2.1 Characterization of the IT artefact

The scheduling system is used at a university to schedule lectures and other types of teaching session. It is also possible to schedule extra equipment, such as computers and video projectors. Two views have been in focus in this
CHAPTER 4

evaluation: The screen document for overview and searching, and the screen document for scheduling a new teaching session.

The screen document for overview / searching
Figure 4-2 is an overview of the present in schedule the system. All the current bookings (future bookings including today) are displayed.

![Image of the interactive screen document for overview and searching]

Figure 4-2 The interactive screen document for overview and searching
Each booking is a result of a previous action from some actor in the organization. When a teacher is about to schedule, he/she must interpret the current state of business by looking at this screen and by performing an interpretive act. Furthermore, the teacher has to navigate in the system (e.g. by searching in the schedule). These actions are navigational, in the sense that interactions take place, with the purpose of changing the current view of the system.
The screen document for scheduling

When the teacher has got an overview of the current bookings, he/she can create a new booking.

Figure 4-3 The interactive screen document for scheduling

Figure 4-3 shows the interactive screen document used to create new bookings. A set of interactions is needed in order to schedule the booking. This actual scheduling action is directed toward two groups of actors: Students and other teachers. The illocution is different for these two groups. The purpose of communicating the message to the students is that the teacher wants them to show up at the lecture. The purpose of communicating it to other teachers is that the teacher wants to prevent them from booking that same room at the same time.

4.1.2.2 Personal experiences of the scheduling system

The evaluation of the scheduling system was affected by my personal experiences of using the system. At the time of the evaluation, I had worked as a teacher at the University for a few years. It was impossible to overlook these
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experiences when performing a heuristic evaluation of the system. Thus, I decided to incorporate these into the evaluation process. This means that the scenario (next section) presented in the evaluation results is based on real events. In other words, I am the real world instance of the character “Adam” mentioned in the scenario below.

4.1.3 Evaluation results

In order to put the evaluations in context, a scenario is used. The scenario, called “The Last Minute Change”, has actually taken place and was experienced as very troublesome by the teacher (who coincidentally is also the author of this thesis). Several other teachers have expressed last minute changes as troublesome in collegial discussions.

“Adam is a university teacher who - due to sudden illness - wants to perform a last minute change to the schedule. The system supports the re-scheduling, however there are several things left to do to ensure that his students receive this information. This is especially important to Adam, since many of the students commute to the university. Adam wants to make sure that the students receive this information as soon as possible – otherwise they might travel a far distance to the university in vain. This affects the students in several ways. The school’s image might change, their image of Adam might change and they might even loose their motivation to complete the course. Only Adam knows the exact reasons why it’s important to him to inform all the students. He takes several time consuming measures to notice them outside the IT system, since it does not support performance of these actions.”

The main character is referred to as Adam, to provide referability to the discussions. The evaluation results will be presented in two parts. The first part is based on the assessment questions derived from Weber’s social action concept. The second part is based on the ISAT evaluation heuristics.

4.1.3.1 Evaluation informed by Weber’s social action concept

In this evaluation, the last minute change was discussed from both the intervening actor’s (the teacher’s) and the interpreting actors’ (the students’) points of view. One way of illustrating how Adam performs the re-scheduling would be to use some visual aid. In this case we use action diagrams (Goldkuhl, 1992), which gives the possibility to describe action logic in
business processes. Figure 4-4 describes Adam’s action when performing a last minute change.

![Diagram of teacher's actions in the last minute change scenario]

The ideal situation from Adam’s perspective is that the students should gain knowledge of the change in the schedule in due time, i.e. quickly enough to avoid unnecessary inconvenience. The students have the option of receiving the message about the re-scheduling through different media: The Internet, the school’s intranet or by watching TV-screens in different places at the school. The Internet site and the intranet site can be reached both from home and from school, and they look very much alike. Figure 4-5 illustrates how the student can check the schedule from the intranet, which is the most common way of accessing the schedule among the students.
These diagrams illustrate which actions the actors have to perform. Together, they tell us something about the action relationship that’s formed between the actors.

What the teacher wants to achieve (the first question) can be derived from the scenario. He has made a last minute change in the schedule, and he wants to communicate this to his students. It is also important for him to be sure that they actually receive his message – he needs confirmation that his message has actually been communicated. An interesting reflection at this stage is that different teachers performing this action probably would have different goals. One extreme could be that just changing the schedule satisfies a teacher, thinking that it’s up to the students to check for changes periodically. The other extreme would be that the teacher isn’t satisfied until every single student for sure has received and understood the message in due time. We argue that the goal varies with the individual; some shade of grey between the black and
white extremes presented above. Sometimes the individual might be aware of his goals and sometimes they might be unconscious.

The question why he wants to achieve these goals is not easy to answer, however inspiration from Weber can help us to determine the orientation of this social action. Adam’s wish to communicate the last minute change might have different reasons. If he wants to score high on the course evaluation, or if his goal is to maintain his favorable reputation among the students in general, his action would be characterized as goal rational. But if his only incentive to communicate his message were that he actually felt sympathy with the students that would have to commute to the university for nothing, his action would be value rational (it becomes an ethical issue). We could have a long discussion on this matter; how to describe Adam’s action using other ‘classes’ of Weber’s; the point is there can be many reflected or less reflected reasons and values that affect Adam when performing this action.

The third, and final, question is whether the IT system helps Adam to reach his goals - and express his values - when performing the last minute change in the schedule. In the case study, Adam can change the schedule in the system. But in order for him to fulfill his goals when performing this social action, he had to perform a number of additional tasks manually. A question that is interesting here is if the scheduling system at all should support Adam to achieve his goals completely – one could argue that it is not the intention that the system should solve such problems. We believe that the argument is valid to some extent, but it could also be an organizational problem that a teacher has to spend a lot of time on tasks that could have been supported by the IT system. This problem (from the teacher’s point of view) also generates a question about the organization’s goals with respect to service quality towards their customers.

The discussion above was mainly oriented towards the individual Adam; his goals and values. We may also attempt at discussing the organizational goals. What is the corporate policy when it comes to last minute changes? There may be no explicit norms and values concerning these matters. In the IT system there is no advanced functionality supporting dissemination of last minute changes. This can be considered to be one sign that this issue is not reflected or treated on an organizational level. It is left to individual teachers to handle such matters in their own ways. What is interesting here is that the concern about
students from one single teacher (Adam), which should be seen as individual value rational actions, can be transformed to goal rational organizational action if the IT system is redesigned to include such functionality supporting quick dissemination. Think of the situation that Adam is very discontent about not being able to inform his students in ensured ways about last minutes changes. If Adam is bringing this concern to an open discourse with colleagues and managers, then this might lead to a change in the corporate policy followed by changes in the IT system. If the IT system now gives support to such actions (dissemination of last minute changes) this will be part of the organization’s goal rationality (agreed upon by different actors within the university).

4.1.3.2 Evaluation informed by ISAT heuristics

During the evaluation of the scheduling system, we used the ISAT heuristics as a tool to set focus on different actability aspects of the system. The heuristics helped us identify a set of problems in the current design of the scheduling system. Table 4-1 (below) shows the results of the heuristic evaluation. Note that heuristics 9-11 were not in the list when the evaluation started, they emerged during the evaluation as they were needed to categorise some identified issues.

<table>
<thead>
<tr>
<th></th>
<th>Table 4-1 Evaluation results based on actability heuristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Situational context awareness.</strong> There are several screen documents in the system where it is hard to understand which actions you can perform. Labels and headlines are unclear.</td>
</tr>
<tr>
<td>2.</td>
<td><strong>Good conditions for action in shown information.</strong> A lot of knowledge about the organization is needed in order to perform a scheduling act, e.g. information about parallel courses and the number of students taking different courses. The IT system does not give this kind of support, which results in high cognitive load.</td>
</tr>
<tr>
<td>3.</td>
<td><strong>Good conditions for action in required information.</strong> Some of the information the user provides to the system has an unknown meaning. For instance when the type of scheduled activity is chosen – there are options like 'preliminary', 'exam', 'locked' and others, but the meaning of these types is unclear (even with some experience from the workpractice). Further, at some points, the user has to provide information that probably could be automatically derived from the existing information in the system (e.g. connections between programs and courses).</td>
</tr>
</tbody>
</table>
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4. **Easily accessible and adequate action memory.** All previously scheduled activities can be found in the overview screen document. Simple filtering (e.g. finding all scheduled activities for a specified teacher or class) is unproblematic once learned, but it is not fully intuitively afforded in the user interface.

5. **Action legible IT systems.** A big problem is that different course codes are used in different contexts. The scheduling system uses one set of course codes, and the system where the students’ results are registered uses another set of course code. This is problematic for the teachers, who have to keep track of both versions of each course code during administration. Another thing that could confuse the user initially is that equipment (such as portable computers and projectors) is classified as rooms within the system. In order to book extra equipment, you would have to choose to book extra rooms.

6. **Legible and relevant feedback.** Error messages are hard to understand due to the use of technology-oriented language. Sometimes there is no direct feedback – when an activity has been scheduled, there is no visible feedback whatsoever that this has happened. The user has to scroll through the bookings afterwards (or add a filter expression) to make sure that the activity has been successfully scheduled.

7. **Visible actors.** There are visible actors in many parts of the system, at least to some extent. For instance, you can see who last changed a booking (who did it and when it was done). Since this is a scheduling system, actors like student groups and teachers are visible for the teachers when scheduling an activity. The teacher can thus see the intended recipients (interpreters) of the message.

8. **Restrictions and opportunities in navigation utilized.** Some screen documents in the scheduling system are modal, which means that no other screen document can be accessed without closing the current one. There is no obvious reason for this design, and it’s hard to tell if this makes the system more or less actable. More thorough user studies are needed to draw conclusions about the consequences of the modal design.

9. **Accurate timing.** Time is an important aspect in the ‘last minute change’ example. During this study, we noticed that there was no heuristic that regards the time aspect, which led to the development of this new heuristic. The scheduling system does not give any indication to the teacher if the ‘message’ (that a lecture has been cancelled) has reached the intended interpreters (the students) in due time.
10. **Interpretation initiative.** This heuristic was also developed during the evaluation. The conclusion in this case was that the scheduling system could have been more actable if the information about the ‘last minute change’ had been pushed to the students (e.g. via e-mail, or via SMS). As it is now, the student must take interpretation initiative to check the schedule.

11. **Distribution of actions.** The third new heuristic concerns the distribution of actions – what should be done manually, and what should be supported by the system? In the evaluation of the scheduling system, there were several ‘needs’ that the teacher felt that, which led to a number of manual actions, that could have been supported by the system.

### 4.1.4 Contributions to theory development

This evaluation was a pilot study for this research. It was conducted as a heuristic evaluation, based on criteria 1-8 in the ISAT heuristics (Table 2-2). However, as I had personal experience from the scheduling system, I was aware of certain issues with the use of the system, which were not satisfactorily identified when evaluating the situation based on the ISAT heuristics. The issues at hand were apparently closely related to communication between humans and the social grounds and purposes governing this communication. Therefore, as a complementary theoretical source, Max Weber’s social action concept was adopted and situationally adapted as an evaluation tool, in order to see how the use of the system and the issues at hand could be explained from that angle. The two assessment strategies rendered different evaluation results, which pointed out a need for a broader understanding of human-to-human communication within ISAT. This led to some conceptual development: Addition of three new ISAT heuristics, and three new concepts, which may be used to identify and explain problems in other situations where IT artefacts are used as a medium for communication action:

- Complexity of IT-mediated communication
- Communicative view of user interfaces
- The Pragmatic Duality of user interfaces

The resulting concepts are further discussed in the results section (5.1). Further, some reflections were made concerning the context of evaluation. By applying an actability perspective, based on the original actability heuristics, we set focus on certain aspects of the ‘last minute change’. The analysis was mainly
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an analysis of screen documents and interactive use situations. Such an analysis points out a number of properties of the system that affect the user’s performance of action when using the system. Some of these properties are related to human-to-human communication, but the heuristics as such only aid us in getting a scattered picture of the communication that takes place. The heuristic analysis has been performed from the interventionist’s (the teacher’s) point of view. We believe that the heuristics encourage an evaluation of screen documents, rather than an evaluation of the establishment of action relationships between actors. A conclusion is that heuristic evaluation needs to be performed bearing in mind the overall communication goals in the social setting.

4.2 The Syllabus Database

This section presents the second evaluation, focusing IT-support for syllabi management in a Swedish university. A syllabus may be understood as a contract between the university and its students, specifying the goals, content, examination forms, literature, etc, of a particular course\(^{11}\). Changes in a syllabus, and development of new syllabi, are important activities involving many stakeholders. This evaluation has been used as the empirical base for publications made by Sjöström & Ågerfalk (2004; 2005).

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\(^{11}\) Note that the term ‘course’ refers to the distinct parts that together form a degree programme. In other universities, this is sometimes referred to as, for example, ‘module’ or ‘subject’.
Figure 4-6 Process description for the syllabus database evaluation

As shown in Figure 4-6, the empirical data consists of the syllabus system as such, the context of this system in terms of the organization’s description of their use of syllabi, and a selection of e-mails related to the use of the system and to syllabi management issues. Following Cronholm and Goldkuhl’s (2003) classification scheme, this evaluation is a criteria-based evaluation of an IT system in use.

The theoretical base and theoretical concerns, including the assessment criteria used in the evaluation work, are discussed in section 4.2.1. Section 4.2.2 presents the empirical data that was analyzed in the evaluation. Section 4.2.3 summarizes the evaluation results, and section 4.2.4 discusses the theoretical contributions that were developed based on this evaluation.
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4.2.1 Theory base and theoretical concerns
This evaluation is part of the continued conceptualization of IT artefacts as instruments for communication action. The purpose of the evaluation was to further investigate the usefulness of the communicative perspective on user interfaces (section 5.1) and assess its practical usefulness for evaluation purposes.

One starting point for generating evaluation criteria was the four aspects of communication in the communicative perspective on user interfaces. These four types include 1) affordances (communicated from the designer to the users), 2) business communication to the user from other users (what I read), 3) business communication from the user to other users (what I say), and 4) navigation in the system (no communication takes place in this case).

The table is a set of ISAT heuristics which are clearly focused on socio-pragmatic aspects of IT artefacts. As discussed in section 4.1.1, many of the ISAT heuristics do not focus such aspects. Confer Sjöström (2003) for a more detailed motivation of this particular synthesis.

Apart from the existing ISAT heuristics, the criteria are derived from Weber’s (1978) social action theory and the communication maxims of Grice (1975). Weber (1978) has been discussed previously in this thesis in different ways, and one of the implications of Weber’s theory is that the manner in which a person acts in a social context is influenced by how others will interpret their action. Grice (1975) formulated a set of communication maxims, which capture parts of this influence in terms of the expectations one has on other people’s utterances.

The set of criteria in Table 4-2 is by no means exhaustive, but is sufficient for facilitating a discussion about action-related characteristics of IT systems. There are also some overlaps in the table. The reason for this is that we want to emphasize that some design advice are motivated in different ways; for example, keeping actors visible. It is also important to clarify that these criteria are not normative. Sometimes, for instance, there may be a point in not showing the actors’ identities. The criteria should be looked upon as a set of instrument to help us focus communicative characteristics of the IT system, thus making well motivated decisions regarding these issues.
Table 4-2 Socio-pragmatic aspects of messages (after Sjöström, 2003)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Actors</td>
<td>Make the users understand the social context by making the actors visible in the IT system. This way, the users will be aware of the origin of messages, and whom they are sending messages to.</td>
</tr>
<tr>
<td>Timing</td>
<td>Allow the users to understand when other actors will interpret their messages. This can be done by making it transparent when messages reach their intended interpreters, and if messages are pushed to them or pulled by them.</td>
</tr>
<tr>
<td>Message Context</td>
<td>Promote qualitative utterances by making information about previous actions available in the action memory and 2) making the actors visible in the IT system in order to make clarifications possible and promote users to trust the information.</td>
</tr>
<tr>
<td>Info Quantity</td>
<td>Promote a suitable quantity of information handling by 1) displaying and requesting an adequate amount of information in screen documents and 2) making the actors visible in order to allow users to retrieve more information if needed.</td>
</tr>
<tr>
<td>Action Affordance</td>
<td>Make sure that all required actions (business actions and navigation actions) are afforded and readily available by the IT system.</td>
</tr>
</tbody>
</table>

Table 4-2 aids us in directing attention towards social phenomena when analyzing a user interface, both from an interpretation and an intervention perspective: We may speak of two actions towards a sign: (a) the interpretation of messages and (b) the formulation/sending of messages. These are two different aspects of user-to-user communication taking place using the IT artefact as a medium.

The set of design advice in Table 4-2 provides specific questions concerning different properties in the user interface related to user-to-user communication.

By combining (1) and (2) we arrive at a set of questions that facilitates the analysis of user interface features (see Table 4-3).
Table 4-3 Questions for analyzing communicative aspects of a user interface

<table>
<thead>
<tr>
<th>Question</th>
<th>Criterion</th>
<th>Part of UI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Who created each message?</td>
<td>[Visible Actors]</td>
<td>[Interpretation]</td>
</tr>
<tr>
<td>2. When were the messages created?</td>
<td>[Timing]</td>
<td>[Interpretation]</td>
</tr>
<tr>
<td>3. Are there other messages related to the interpretation of an existing message?</td>
<td>[Message Context]</td>
<td>[Interpretation]</td>
</tr>
<tr>
<td>4. Do I receive unnecessary information?</td>
<td>[Info Quantity]</td>
<td>[Interpretation]</td>
</tr>
<tr>
<td>5. Are the recipients of the information visible?</td>
<td>[Visible Actors]</td>
<td>[Formulation/ Sending]</td>
</tr>
<tr>
<td>6. When will the message reach its recipients?</td>
<td>[Timing]</td>
<td>[Formulation/ Sending]</td>
</tr>
<tr>
<td>7. Are there other messages related to the formulation of a new message?</td>
<td>[Message Context]</td>
<td>[Formulation/ Sending]</td>
</tr>
<tr>
<td>8. Do I have to supply unnecessary information?</td>
<td>[Info Quantity]</td>
<td>[Formulation/ Sending]</td>
</tr>
<tr>
<td>9. Can I create this message that I need to communicate?</td>
<td>[Action Affordance]</td>
<td>[Action Repertoire]</td>
</tr>
<tr>
<td>10. Can I move to another part of the system as required?</td>
<td>[Action Affordance]</td>
<td>[UI Navigation]</td>
</tr>
</tbody>
</table>

According to the presented view of user interfaces, the functionality afforded by an IT system is the result of a designer’s work; i.e. a result of communication from designer to user. Therefore, the criterion ‘action affordance’ is not discussed in relation to interpretation and formulation/sending, but in relation to action repertoire and user interface navigation alone.

The questions posed above were used in this evaluation. Thus, the communicative perspective was used in this case as a *progenetive* theory, to generate a new theoretical device to investigate an IT artefact in its use context.

### 4.2.2 Primary Data

In this particular evaluation, three different data sources were available as described in Table 4-4. These empirical sources served as a basis for discussing
the communicative features of the user interface of the syllabus system. The discussion is structured according to the set of derived evaluation questions.

Table 4-4 - Empirical sources and corresponding domains of interest

<table>
<thead>
<tr>
<th>Domain of interest</th>
<th>Empirical source</th>
</tr>
</thead>
<tbody>
<tr>
<td>The role of syllabi in the organization</td>
<td>Excerpts from staff handbook</td>
</tr>
<tr>
<td>Characterization of the IT artefact</td>
<td>Access to the syllabus system</td>
</tr>
<tr>
<td>Business communication</td>
<td>Selected e-mails, concerning the work with the syllabus system</td>
</tr>
</tbody>
</table>

A further investigation of user experience would be interesting, but was beyond the scope of this study due to limits in time. We would argue that the e-mail examples clearly indicate problematic issues and are sufficient to substantiate the points made in the evaluation.

4.2.2.1 The Role of Syllabi in the Organization

Figure 4-7 (below), a guide for teachers that can be found in the staff handbook on the university’s intranet\(^\text{12}\), is an illustration (depicted in Figure 4) intended to position the syllabi within its business context. This illustration provides an overview of the pre-requisites, activities, systems, and catalogues related to the syllabus. It also shows the ‘inputs’ to a syllabus, and what each syllabus is used for.

Figure 4 has been refurbished in two ways (compared to the original version). The ‘intranet’ nodes originally contained the name of the intranet, and the letters A–J have been augmented to the figure in order to facilitate referencing to its parts. The figure indicates that syllabi are vital parts of the organizational communication. Some parts of the figure (in relation to the user interface) are worth reflecting upon (these figures are also described in the teacher guide):

- A. Syllabi are linked with the bookshop and the library.
- B. Confirmed courses are the basis for student registration

\(^{12}\) The intranet is a separate system. The guide for teachers is a downloadable PDF document, accessible through the intranet.
C. The university’s intranet contains course information that is imported from the syllabus system
D. The syllabus system is linked to the class scheduling system
E. The syllabus is used in the production of the ECTS catalogue, which is sent to partner universities to inform exchange students about courses given in English
F. The short versions of the course description are used to produce descriptions of optional courses and elective courses
G. The short versions of the course description are used to produce the descriptions of courses that are not part of a programme
H. Course descriptions are also published on the website www.studera.nu, which is a national Swedish service for students to find information about programmes and courses at all Swedish universities.
I. The syllabi are used to map each course to a programme. This is also linked to Ladok – the Swedish national system for registration of credit points from Swedish universities. When a syllabus is changed and re-confirmed, a new Ladok ID is generated for each link between the course and its programme(s).
J. The syllabi are used by the administrative staff to design the examination plan, which is a schedule of written exams
Figure 4-7 - The teacher’s guide illustration of the syllabi context
4.2.2.2 Characterization of the IT artefact

This section illustrates and describes the user interface of the syllabus system. The screenshot in Figure 4-8 shows the part of the system focused in this study: the screen document where users can find and edit syllabi. This screenshot illustrates the syllabus system’s user interface and parts of the content of a syllabus.

The course described in this screen document has a set of attributes, such as name, ID, number of credits, level (A–D, where A is basic level and D is masters level), field code (e.g. informatics or business administration), area of science (e.g. social science or technology), and course language. Furthermore, the description of a course includes course objectives, course contents,
examination type, literature, a short description of the course in Swedish and English, *et cetera* (there are more text fields in the window which appears when scrolling down – the scrollbars have been cut off from the right side of the picture in order to save some space). Each course has a course co-ordinator, who is responsible for the administration and planning of the course, and an examiner, who is responsible for the overall quality of the course. The syllabus is in one out of two different states: confirmed or edited but not confirmed. The syllabus may also be audited to secure the quality of the language. In order to edit the contents of a syllabus, it has to be unlocked. After finishing editing, the syllabus is supposed to be locked again.

### 4.2.2.3 Business Communication

This selection of e-mails represents a few different communication situations that are related to the development of syllabi. The real names used in the e-mails have been replaced with fictional ones. English text has been retained, including spelling errors.

---

**From:** Joe the Administrator  
**To:** Ben the course-coordinator  
**Date:** 2003-05-28 15:19:36  
**Subject:** Syllabus for course X

Hi Ben!

There is a copy of the syllabus for course X [in the syllabus system], but I can't find any changes from the syllabus that was determined 2001-06-11. Are you editing the syllabus or should we remove the copy?

Greetings

Joe

---

**Figure 4-9 E-mail 1 – From an administrator to a course coordinator**

The e-mail message from an administrator, depicted in Figure 4-9, is a question to a course coordinator regarding why a syllabus has been copied. The course coordinator has created a copy – a measure that could have been taken for

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13 Text originally in Swedish has been translated to English by the authors.  
14 In order to edit a confirmed syllabus, you have to make a copy. The revised copy then has to be confirmed by the undergraduate council.
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several reasons, e.g. that the course coordinator plans to make some changes in
the near future or that the creation of the copy was unintended.

<table>
<thead>
<tr>
<th>From:</th>
<th>Karen the Administrator</th>
</tr>
</thead>
<tbody>
<tr>
<td>To:</td>
<td>All staff members</td>
</tr>
<tr>
<td>Date:</td>
<td>2003-11-18 09:29:49</td>
</tr>
<tr>
<td>Subject:</td>
<td>Course syllabi - important information</td>
</tr>
</tbody>
</table>

To Course Coordinators

For every course syllabus there must be a short description in the database
("kursplanedatabasen") [the syllabus system]. The course syllabi for spring
2004 will be confirmed (and locked) tomorrow the 19th of November. Please
make sure today that you have included a description in the syllabus. Please
also check that you have given a date under "Granskad datum" [audited on].

Regards
Yoda, responsible for undergraduate programmes

Figure 4-10 E-mail 2 – From administrator to the entire staff,

In Figure 4-10, we see a high priority e-mail stating that course-coordinators
should make sure that the courses they are responsible for are described shortly
(Short description is an input field in the user interface). Note that the deadline
for this update is the day after the mail is sent. The e-mail depicted in Figure
4-11 is another reminder, this time from marketing staff to course co-ordinators
(it is sent to all staff members, though). It is revealed that earlier messages have
been sent to remind the course co-ordinators to update the short descriptions of
the courses. The term course plan is used instead of the term syllabus in this
case. Information about several deadlines is revealed in the message.
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Figure 4-11 E-mail 3 – From the marketing manager to the entire staff.

4.2.3 Evaluation results

The questions proposed in Table 4-3 were used to evaluate the syllabus system. Each question was addressed based on the three parts of the empirical study: the documentation, the user interface, and the e-mail communication. One assumption was that university employees are familiar with the semantics of the syllabus information. Therefore, the semantic meaning of individual input fields was not discussed in this analysis.

Many of the answers to the questions posed in the analysis signal that users of the system are in a situation where they cannot validate the consequences of
their actions or the expectations others have on them in the process of working with syllabi. This creates a need for a discursive conversation outside of the IT system in order for actors to obtain clarifications or remind their co-workers about their obligations. These reminders are typically communicated using e-mail. Sometimes mailing lists are used, which sends the messages not only to the intended interpreters, but also to other actors who are not really related to the issue at hand. As referred to above, five types of problem were identified: the temporal problem, the action transparency problem, the documentation problem, the mixed message problem, and the communicator problem. These problems have been formulated as generalized abstractions as described in Table 4-5.

### Table 4-5 Five types of IT-related communication problem

<p>| | |</p>
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<thead>
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<tbody>
<tr>
<td>1.</td>
<td><strong>The Temporal Problem</strong>. This problem class concerns timing in</td>
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<td></td>
<td>the organization. E-mails are sent out by administrators,</td>
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<td></td>
<td>reminding course co-ordinators what has to be done. These</td>
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<td></td>
<td>reminders are sometimes sent out with a short notice. A re-</td>
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<td></td>
<td>design advice would be to allow administrators to communicate</td>
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<td></td>
<td>important dates through the system. Deadlines for course-</td>
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<td></td>
<td>coordinators’ editing of syllabi, dates for language checks</td>
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<td></td>
<td>and for syllabus confirmation dates should be visible in the</td>
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<td></td>
<td>system. These types of reminders could even be implemented in</td>
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<td>the system itself and sent automatically to remind course</td>
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<td>co-ordinators to check the syllabi at given times before the</td>
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<td></td>
<td>deadline. This way the communication would be directed towards</td>
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<td></td>
<td>(and only towards) the intended interpreters. This would also</td>
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<td></td>
<td>help course co-ordinators understand what they are supposed</td>
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<td></td>
<td>to do it.</td>
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<td>2.</td>
<td><strong>The Action Transparency Problem</strong>. This problem concerns the</td>
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<td>fact that the effects of action are sometimes unclear to the</td>
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<td>user. To overcome this problem it would be necessary to make</td>
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<td></td>
<td>sure that each action performed through the system is clearly</td>
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<td></td>
<td>presented to the actor, with respect to what is being done,</td>
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<td></td>
<td>and to whom it is being done. This may be hard to include</td>
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<td></td>
<td>fully in the design of the system, but at least vital parts</td>
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<td></td>
<td>of the documentation (Figure 4-7 - The teacher’s guide</td>
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<td></td>
<td>illustration of the syllabi context) could be communicated</td>
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<td></td>
<td>to the user through the syllabus system’s user interface. It</td>
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<td></td>
<td>would also be possible, for instance, to make it possible</td>
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<td></td>
<td>for course co-ordinators to decide whether books should be</td>
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<td></td>
<td>ordered or not.</td>
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<td>3.</td>
<td><strong>The Documentation Problem</strong>. We argue that the need for a</td>
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<td></td>
<td>major illustration of the syllabus system’s relation to the</td>
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<td></td>
<td>business context is a sign of a problematic user interface</td>
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<td></td>
<td>design – the documentation problem. The illustration helps</td>
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<td>users to understand that a syllabus is an important document,</td>
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<td>involved in a large</td>
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communication process. The user interface and the documentation help us picture parts of the use of syllabi. However, it is not fully transparent what the process really looks like. Parts of this could be communicated to users through on-line help, instead of (or as a complement to) being communicated through the staff handbook.

4. **The Mixed Message Problem.** An important and problematic issue is that only one screen document (view) is used, even though there are several different actors involved, who have different roles in the process of developing, confirming, and acting on basis of syllabi. The implication of this ‘mixed message design’ is that the one and only screen document affords the functionality needed in all actions and for all users, which makes it hard for users to understand their obligations and action possibilities when they are using the system. Users are forced to communicate and to make sense of several unrelated messages in one screen document. A re-design advice would be to create multiple screen documents that are tailored for different actors. One view for course co-ordinators, one view for language checkers, and one view for administrators. This would make it easier to design each screen document to suit the needs of the group of actors who is to work with it, and it will be possible to remove (or de-activate) parts of the screen document that currently confuse users.

5. **The Communicator Problem.** Sometimes, it was unclear who communicated what to whom and with what intentions. A feasible re-design suggestion would be to allow course-coordinators to communicate informally with other actors (e.g. by using a text field). This text field would give the course-coordinator the possibility to comment what is done, for example: ‘This copy of the syllabus is still under construction and should not be confirmed yet!’ This would make the status of each syllabus more understandable to administrators and the language check department. This would probably reduce confusion among the different actors working with syllabi, and hence reduce the need for clarifications through e-mail communication. The actual use of this text field (which would emerge over time) could also be valuable input to designers in future re-design activities. An alternative re-design measure is to perform a business process analysis and re-design the syllabus system, in order to better formalize the workflow aspects in the IT artefact.

The following subsections presents the analysis more in detail based on the evaluation questions, and the problem types above are further discussed and explained through empirical illustrations.
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4.2.3.1 Who Created Each Message?
It is not possible to see who created each message by examining the user interface; the pieces of information in the screen document are of unknown origin. However, the text fields indicate that actors with different roles process different parts of the syllabus. Someone has to design it initially, someone has to check the language (particularly important when courses are given in English), and someone has finally to approve the syllabus. It is transparent who audited the course, and who performed the language check (at least there is support for communicating this information).

The documentation does not explicitly identify the individuals or roles responsible for editing and creating a syllabus. However, it is indicated that inputs needed to make a syllabus comprises the budgeting process, the supply of courses, and the study places in programme courses and single subject courses. Still, the actual meaning of these inputs remains unclear.

The first e-mail (Figure 4-9) is directed towards an individual (Ben the course coordinator) which seems to imply that Joe the Administrator presumes that Ben created the copy of the syllabus. The second and the third e-mails are also directed towards course coordinators. This indicates that several people who interpret the syllabi interpret the course coordinators as the origin of syllabi.

The analysis above indicates that it can be problematic for course coordinators to understand who edited a syllabus, but the people who use the syllabus for different purposes (i.e. the ones to confirm them, and the marketing people) seem strongly to believe that the course coordinators are the originators of the messages. It is worth pointing out that the e-mail communication is directed towards others than the intended recipients; one interesting follow-up on this is that IT system design (at least in this case) causes a need for communication also outside the system, sometimes to people who are not involved in or concerned with the current issue. This can be referred to as the communicator problem.

4.2.3.2 When Were the Messages Created?
It is possible to find out (approximately) when the most recent changes were made. By searching for earlier versions of this syllabus, we can deduce that this version has been created after the previously approved version (since this
version is a copy of the syllabus that has not yet been approved). So far we know that someone made changes to a syllabus, sometime after the previous version was approved. Some aspects of time are thus made transparent in the system: the course coordinators are supposed to communicate that they have audited a syllabus by entering their name and signature. There is also an input field where the confirmation date of the course is revealed.

The documentation does not present any time aspects of the use of syllabi. The workflow of the organization, including important dates, is not part of that model.

The first e-mail (Figure 4-9) reveals that Joe the administrator has compared the confirmed syllabus and the copy of the syllabus in order to draw the conclusion that they are identical. Joe cannot determine if the copy was made yesterday or last year, so he needs to contact the course coordinator in order to get a clarification.

A reflection at this point is that the time aspect is sometimes considered important, while at other times it is not. The e-mail indicates that undisclosed time aspects (and the fact the Joe the administrator is not aware of the course coordinator’s intentions) might give rise to extra labor – in this case, the comparison of two documents, and additional communication in the organization. This can be referred to as the temporal problem.

4.2.3.3 Are There Other Messages Related to the Interpretation of an Existing One?

Different versions of the syllabus can be retrieved in the system. Except that, there seem to be no more messages of interest accessible from the user interface.

The entire documentation can be looked upon as a message that is related to all syllabi. This document is not actually a part of the system, but it indicates a need for complementary information when working with course plans.

When a course coordinator receives an e-mail, such as the ones presented above, it is likely that this causes them to open the syllabus system to see if
something is supposed to be done. In that sense, the e-mails are indeed related to the messages in the IT system.

On an abstract level, the e-mails imply that the syllabus system does not support the process of working with syllabi – it only supports the semantics related to them. Studying the communication that arises as a consequence of IT system use seems to be one way of understanding the communication characteristics of the IT system. It could hence be one valuable input for system re-design and maintenance. Once again, we see an instance of the temporal problem.

The same type of reasoning is applicable on the documentation part. Since the documentation can be considered as related to system use, it should be easily accessible from within the system. This can be referred to as the documentation problem.

4.2.3.4 Do I Receive Unnecessary Information?

The three input fields ‘Language checked’, ‘Audited date’ and ‘Audited by’ constitute one example of this in the current user interface. These three text fields are directed towards different actors. The language check is supposed to be performed (and entered into the system) by a language expert, and the auditing information is supposed to be handled by course coordinators. It is possible, though, to interpret the text fields in the wrong way, as they all seem to be related to the language check.

The documentation tells us that several actors are updating the syllabus, and several actors are affected by these changes. These actors are working with the same screen document in the user interface. Thus, the amount of information displayed on the screen is generic; no matter which action you are supposed to perform (e.g. copy or edit the syllabus, confirm it or perform a language check, or perform some actions based on the contents of the syllabus) you are confronted with the same view of the business messages. This can be referred to as the mixed message problem.

The second e-mail (Figure 4-10) is possibly partly a consequence of the receipt of unnecessary information – not in the system, but related to the nature of the system. All staff members receive messages that are really meant for course
coordinators (indeed, some of them are course coordinators, but certainly not all of them).

4.2.3.5 Are the Recipients of the Information Visible?

There is no way to find out with whom you are communicating by looking at the user interface alone. There are some indications that others will view a message, such as language experts and some authority that will confirm (or deny) changes made in the syllabus. Still, it is unclear who will actually make use of the information I put into the system, and what I am accountable for in respect to these people’s future actions.

The documentation indicates that the screen document will be the subject to other people’s actions, but it is still presented at an abstract level (you cannot see the roles or individuals that will be affected by your actions). Some recipients can be derived from the user interface and the documentation.

The bookshop and the library receive information about syllabi. This indicates that books are ordered when a syllabus is approved. The user interface does not reveal this. It seems fair to specify the person who decides on whether the assignment of literature should affect the ordering of books or not (there might, for instance, be freely available online versions). The course coordinators are neither able to understand that books may be ordered based on their changes in a syllabus, nor are they able to communicate to other actors that books are not supposed to be ordered\textsuperscript{15}.

The syllabus will be visible on the intranet, but it is unclear exactly whom it is directed towards. Will it be published immediately, or after it has been confirmed? Since this is some kind of workflow situation, where the syllabi can have different states, there is a relation between time aspects and possible recipients of the actions. This is concealed in the system.

The first e-mail (Figure 4-9) is an example of ‘accidental’ or ‘unintentional’ communication, since a course coordinator has created a copy of the syllabus

\textsuperscript{15} According to one user of the system, this has actually happened. The teacher planned to use the free PDF-file version of the book; still the books were ordered by the bookstore without the teacher’s knowledge.

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without knowing what consequences it would have for someone else. This is an example where the nature of the artefact causes people to communicate something without being aware of it; causing confusion and a need for clarifications. This can be referred to as the action transparency problem. 

4.2.3.6 When Will the Message Reach its Recipients?
Neither the documentation nor the user interface reveals any information about when messages will be interpreted by other actors in the organization. Since the e-mails are related to issues that have not been dealt with in due time (e-mails 2 and 3) and issues that need clarification, they do not provide any answer to this question. The lack of understanding of when others will interpret a message makes it unclear for the users of the system to evaluate the business effects that may occur when they make changes to a syllabus. This temporal aspect of business communication seems important to acknowledge when designing workflow-supporting systems (such as the syllabus system). The empirical data does not point this out explicitly, since the problems that are indicated in the e-mails seem to be more related to problems of understanding if and how someone will receive messages created, rather than when they will be received. This is another instance of the temporal problem.

4.2.3.7 Are There Other Messages Related to the Formulation of a New Message?
Whether or not there are other messages related to the formulation of a new message proves to be hard to answer without greater knowledge of how actual users work with the system. One clear answer to this question is that messages viewed on the screen (constituting the syllabus that is being managed at the moment) are required when formulating new messages (e.g. confirming the syllabus or editing its content).

The documentation also seems to be related to the formulation of syllabi, since knowledge of the use of the syllabi in the organization probably affects the way they are formulated. If, for instance, the material were to be for internal use only, the formulations would probably be different.

E-mails number 2 and 3 (Figure 4-10 and Figure 4-11) are likely to trigger course coordinators to start working with the syllabi. In this sense, the e-mail messages are related to the work of the system. E-mail 1 (Figure 5) might also
trigger a course coordinator to start formulating a message in the syllabus system. It seems important to compare the answer to this question with the answer to the question concerning other messages related to the interpretation of messages. In a system like this, where we are working with one screen document only, messages required for interpretation are the same as the messages we are formulating (at a type level, that is). This makes the answers to the two questions similar. In situations like this, the rational choice might be to try to answer both questions at the same time.

Arguably, this is related to at two latter problems – the temporal problem and the mixed message problem.

4.2.3.8 Do I Have to Supply Unnecessary Information?
There are input fields that are meant to be used by different actors, all in one screen document. This could confuse the actors working with the system, since they may be led to believe that they should input something that is actually supposed to be done by someone else. This, together with the reception of unnecessary information, indicates that there should be more screen documents in this system, each one adapted to the needs of a specific actor role. This is another instance of the single view problem.

The documentation describes the syllabi’s complexity, which may be interpreted (by the individual actors working with the system) as if they are supposed to write everything. The obligations of each role are not well defined. What is the course coordinator supposed to do, what is the examiner supposed to do, what are the marketing people supposed to do, et cetera?

One sign of this problem, as seen in e-mail 3 (Figure 4-11), is that the course coordinators are reminded to write short descriptions of the courses, in two languages. Note specifically the remark about short versions already supplied, which need to be even shorter.

4.2.3.9 Can I Create This Message That I Need to Communicate?
We cannot say what the users need to communicate only by studying the user interface, and the documentation does not help us much either. It does indicate that a lot of communication is needed, since a syllabus is interpreted in different ways (and for different purposes) by different actors. When the course
coordinator creates a copy of a syllabus, there seems to be a need to provide an explanation (e.g. “this syllabus will be updated by me shortly – do not use it until it has been audited by me”). There is thus a need to communicate informally using the IT system. This is also related to the communicator problem.

For the users, there might be a problem to understand exactly what they are supposed to do and when they are supposed to do it. We consider these two issues as strong candidates to be included in the battery of questions we use for analysis. At this point, the obligations of the users are not transparent in the system. The system supports of the semantic contents of syllabi, and to some extent there is a workflow support (auditing and confirmation of course plans). However, a lot of the workflow is managed outside of the system, resulting in communication sometimes directed towards other people than the relevant recipients (e.g. “all staff members” instead of the course coordinators who have not performed actions which they are obliged to perform).

4.2.3.10 Can I Move to Another Part of the System as Required?

In the analyzed user interface, there is only a minimal amount of navigation possible: You can navigate the contents of the screen document by using the ‘go to’, the ‘show’ and the ‘search’ (the binoculars) components of the interface. Our analysis so far has discussed the problems of having one screen document only, since each syllabus is actually developed in a workflow where several actors are involved in formulating, auditing, language checking and confirming each syllabus. Furthermore, when the syllabi have been developed and confirmed, they are used for a number of different purposes. This indicates that the syllabus system might support the users’ work better if it consisted of a set of screen documents, supporting the workflow and the actions that the different actors are obliged to perform. That is, there is a need for more screen documents, hence a need for enhanced navigation in the system. Once again, this is an instance of the mixed message problem.

4.2.4 Contributions to theory development

In this evaluation process we have derived a set of theoretically justified questions for user interface evaluation. These questions, derived from the communicative perspective on user interfaces, social action theory and communication pragmatics, have proven useful in identifying problems with
the user interface of a syllabus system. The recognition and analysis of these problems are based on the notions of communication and social action. This way of understanding (and evaluating) user interfaces emphasizes problems related to organizational action, which the IT system is supposed to support. This is not a substitute for traditional human-computer interaction approaches to user interface evaluation. Rather, it is a complement which can support evaluators (and/or designers) in keeping the bigger picture in mind: human beings are social by nature, and human behavior is strongly linked to the social setting (e.g. organization assignments) in which they act. Information technology is designed by humans, for humans, and in many cases for a specific purpose (such as coordinating syllabi work at a university), which is emphasized in the proposed evaluation model. This way, the suggested approach complements traditional usability evaluation criteria by clarifying what is actually to be meant by “task match”. It is worth noting that some of the problems identified, and the corresponding re-design suggestions, would likely have been pointed out also by traditional usability evaluation approaches (e.g. the suggestion to improve the on-line help). However, our design advice concerns including help about the work activity and the users’ relationships with other actors in the organization, which is typically not focused in traditional usability design guidelines.

The evaluation shows that the users’ lack of understanding of the business process is one source of the problems, as illustrated in the e-mails. Consequently, one could argue that the IT system as such is not the problem; that the problem is that the actors in the organization just need education. However, a different system design, which would reveal more of the communication context, is likely to reduce the risk of user misunderstandings, and is also likely to increase users’ understanding of how the organization works as a whole.

Although the communicative perspective on user interfaces has been helpful to assess the IT system’s role within its social and organizational context, we do not claim to have proven the usefulness or strength of this model of analysis – we have only shown an example of the use of the model. Although the model was useful in this case, an important task for the future is to test its relevance and usefulness in more comprehensive empirical studies. Future work will also focus on the relation between established usability concepts and user centered
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design principles on the one hand and the suggested communicative perspective on user interfaces on the other.

In short, the evaluation has been useful for theory development in four ways: i) As part of the evaluation, we formulated a set of theoretically sound set of evaluation questions, bringing together ISAT heuristics and the previously proposed communicative perspective on user interfaces. These evaluation questions have guided us in a way which revealed a number of problems with the current user interface design. ii) In the evaluation, the communicative view on user interfaces was operationalized, and its analytical power was tested in an additional evaluation situation. iii) Related to (i), we also tested the progenitive power of the communicative perspective on user interfaces, by applying it to derive new theory. iv) Five types of communication-oriented problem have been identified which are likely to occur in other situations.
4.3 The Search Application

This evaluation focused the qualities of the search application Metalib/SFX at a Swedish university library. Researchers at Jönköping University in collaboration with the Jönköping University Library formulated an evaluation plan and sent an application for funding to the National Library of Sweden. The evaluation has led to any peer-reviewed publications, but it has been documented in an evaluation report at the National Library of Sweden (see Sjöström et al, 2007).

The National Library of Sweden granted funds for performing an evaluation of Metalib/SFX, which at that time was in use in 43 libraries in Sweden. The evaluation assignment thus formally came from the National Library of Sweden. The evaluation was performed at the local academic library in Jönköping, and the detailed characteristics of the assignment were specified in a dialogue between the researchers and the local library. The result of the dialogue was the formulation of the following four questions, which are in line with – and more specific formulations of – the original assignment:

1. What does the search application mean for the library’s clients? Is the clients’ information demand satisfied\(^{16}\)?

2. What does the search application mean for the library as a workpractice?

3. What will an evaluation from an ISAT perspective and a usability perspective reveal about the quality of the search application?

4. What are the implications of questions 1-3 for user training and future development of the application?

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\(^{16}\) The part of the question based on the concept of information demand was formulated by a fellow doctoral student based on their research interest; therefore it will not be explicitly addressed in this thesis. However, the concept of information demand intersects with both usability and actability issues, which means that the first evaluation question will still be part of the thesis.
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Figure 4-12 Evaluation process for the academic library system
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This evaluation differs from the other three, in the sense that it was based on an external assignment. Table 4-6 further clarifies the evaluation process shown in Figure 4-12 by presenting the connection between evaluation questions, theoretical and empirical sources, and strategy for data analysis.

Table 4-6 Data collection and analysis in the evaluation of the search application

<table>
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<tr>
<th>#</th>
<th>Question</th>
<th>Strategy for analysis</th>
<th>Sources</th>
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<tr>
<td>1</td>
<td>What does Metalib/SFX mean for the library’s clients? Is the clients demand for information satisfied?</td>
<td>A deductive process, client-oriented evaluation of the search application based on information demand theory and a quality in use for all approach.</td>
<td>Empirical sources&lt;br&gt;Client interviews, observations of use of the artefact&lt;br&gt;Theoretical sources&lt;br&gt;Information demand theory and quality in use for all</td>
</tr>
<tr>
<td>2</td>
<td>What does Metalib/SFX mean for the library as a workpractice?</td>
<td>An inductive process, inquiry into the library’s processes and its interactions with its clients, and the characteristics of these changes.</td>
<td>Empirical sources&lt;br&gt;Library workshops&lt;br&gt;Theoretical sources&lt;br&gt;Change analysis concepts, communicative view on user interfaces</td>
</tr>
<tr>
<td>3</td>
<td>What will an evaluation from an ISAT perspective and a usability perspective reveal about the quality of the application?</td>
<td>An inductive process, where empirical data is abstracted into categories and problematic issues with respect to the use of the search application.</td>
<td>Empirical sources&lt;br&gt;Library workshops, client interviews, observations of use of the artefact&lt;br&gt;Theoretical sources&lt;br&gt;Usability and actability</td>
</tr>
<tr>
<td>4</td>
<td>What are the implications of questions 1-3 for user training and future development of the application?</td>
<td>An abductive process, analysis informed by the results from the first three evaluation questions. Theoretical categories (from usability and actability) were used to structure the analysis and generate change suggestions.</td>
<td>Empirical sources&lt;br&gt;All empirical data&lt;br&gt;Theoretical sources&lt;br&gt;Information demand&lt;br&gt;Usability and actability&lt;br&gt;Other sources&lt;br&gt;#1 - #3 above.</td>
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It should be noted that the description above is a simplified way of representing the actual analysis. It does outline the evaluation process in a representative manner, but in practice the work was iterative, and the work with the different evaluation questions informed the work with the other ones. A more thorough presentation of the theoretical and empirical sources can be found in the following subsections.

The other evaluations have been classified according to Goldkuhl & Cronholm’s (2003) scheme. This evaluation, however, is not as easily categorized using their framework. The evaluation assignment implies a broad approach to evaluation, based on both theoretically informed quality criteria (e.g. usability) and measures stemming from a workpractice analysis of the library and its clients. On the one hand, this evaluation may be considered goal-based, since some goals such as increased efficiency and improved service were known as overarching library goals. On the other hand, the evaluation was also goal-free. The term goal-free typically causes objections, since it indicates that there are no goals. However, the term is misleading. It means that we do not have any clearly formulated goals when the evaluation starts. In a goal-free evaluation, the goals emerge as part of the evaluation work. A planned part of the evaluation was to better understand the goals and desires of the library and its clients. Finally, the evaluation was also criteria-based. The assignment governing the evaluation stated that it should reveal the usability and the actability of the search application. Consequently, those theories (including some of the quality ideals found within them) were used to plan the evaluation. The evaluation was clearly focused on the IT artefact in use.

This chapter continues as follows: Section 4.3.1 is a further elaboration on the theories involved in the evaluation. Section 4.3.2 presents some aspects of the empirical sources, i.e. the library work practice, its clients, and the search application. Evaluation results are presented in 4.3.3, and section 4.3.4 discusses some theoretical results based on the experiences from this evaluation.

4.3.1 Theory base and theoretical concerns
This evaluation did not start out with any well-defined theoretical concerns. The strategy was rather to evaluate the search application in its context, and
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collect and extensively document empirical data throughout the evaluation process. In doing so, there is an opening to make theoretical reflections retrospectively, by making post-evaluation analyses of the empirical data. However, the evaluation approach which was shaped by the research interests of the participating doctoral students. Thus, there was a framing of theoretical concerns, based on the concepts of evaluation through practical inquiry, usability, information demand and actability.

The theory in use was directly based on the evaluation questions as depicted in Table 4-6. A number of theoretical sources were mentioned in the table. These will be described a bit more in detail here. Important aspects of the evaluation work will be presented, and motivated theoretically. This way, the theories and their application in the evaluation process will be presented.

The concept of information demand (Lundqvist & Sandkuhl, 2004; Lundqvist, 2005) is in the core of the first evaluation question. Information demand is a concept which (among other things) is useful when developing user stereotypes, in order to make it possible to adapt a user interface for different classes of users. A user’s current context (the task at hand) can also be used to tailor the user interface, and remove unnecessary and confusing elements. Stereotyping or user profiling is common in design and systems development, and the concept of persona (Laurel, 1991) can be related to this by defining it as a made-up character, representing a user stereotype. A brief example, taken from this evaluation context, is that the need for information and search support differs significantly between an engineering student and a business administration researcher. In this sense, it does not differ from established usability approaches (e.g. Bevan, 2001), in which an understanding of user tasks is an important part of design and evaluation. Further, profiles based on information demand analysis should not be used to limit the possible actions and behaviors of the user.

Bevan’s (2001) concept of quality in use for all influenced the evaluation work in several ways. The evaluation was centered on users of the search application (although they were conceived in a broader way; as clients of the library). The evaluation process aimed at including clients of different types. The choice of clients in the study was based both on the client’s role (student, teacher, or researcher) and their domain of interest (engineering, philosophy et cetera). All
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clients were novice to this particular application, although their experience in using computers and web pages varied heavily. As a whole, the process was user-centered – the strategy was to assess the search application from a multiple-stakeholder angle to obtain a rich understanding of its qualities in action. The evaluation results were the primary input for re-design of the search application and development of tutorials.

There was a need to ask relevant questions about the clients’ impressions of using the search application. In order to make the collected data well-structured, we decided to make a semi-structured interview to follow up each observation. These interviews were made immediately after the observations. One important decision to be made in the evaluation process was which questions to ask. In order to find these questions, there was a need to start out from some set of theoretically informed quality ideals. The project schedule was tight, which made us accept a satisficing (Simon, 1969) rather than fully informed set of questions to include in the interview. The first theoretical source to inform us was a usability evaluation questionnaire named QUIS, Questionnaire for User Interaction Satisfaction (Norman et al, 2006). A number of questions from the QUIS framework were selected. This was done by narrowing it into only such areas of design which were applicable and relevant in this situation. The QUIS framework contains evaluation questions for many facets of the user interface (screen factors, terminology and system feedback, learning factors, system capabilities, technical manuals, on-line tutorials, multimedia, teleconferencing, and software installation). QUIS as such is clearly based on established usability evaluation concepts such as Nielsen’s (1993) heuristics and Shneiderman’s (1986) golden rules. The adoption of QUIS in this evaluation is thus a way of indirectly taking into account a fair amount of established criteria for usability in the evaluation work. The second theoretical source to inform us was the ISAT evaluation heuristics (as presented in section 2.3, complemented by the heuristics derived from the evaluation described in section 4.1). By combining these, we ended up with a number of questions which were relevant and applicable in the situation at hand. Furthermore, the interview templates were revised after the first two observation sessions, which were “pilot observations” with the goal of improving the latter observation sessions.
The study of the library aimed at understanding the new search applications impact on the internal processes, and the impact on interactions with the clients. Parts from the change analysis method CA/SIMM (e.g. Goldkuhl & Röstlinger, 2005) were applied to perform this part of the evaluation. Based on a goal from the library’s side – to deliver a high service level towards the clients – there was a need to incorporate some service-oriented theory in the evaluation process. One aspect of quality in service delivery is to avoid communication breakdowns with clients – in order to do so, they need to anticipate the clients’ communicative needs and try to establish processes which meet those needs. Furthermore, given the emerging communicative perspective in this research process, the search application as such was considered new communication medium, which will affect the clients’ impression of the library’s services. Basically, the library expressed three overarching goals with the search application: (i) A higher internal efficiency, (ii) improved communication with their clients, and (iii) an improved level of self-service, allowing the clients to solve their needs. Thus, the communicative perspective on the IT artefact was a steadily present instrument in the evaluation process. It was applied as a means of conceiving the world, rather than a theoretical instrument with a specific function.

4.3.2 Primary data

This section summarizes the empirical data gathered in the evaluation process, as described in Table 4-7.

<table>
<thead>
<tr>
<th>Domain of interest</th>
<th>Primary empirical sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>The user interface</td>
<td>Access to the search application</td>
</tr>
<tr>
<td>Client perspective on the search application</td>
<td>Interviews with users</td>
</tr>
<tr>
<td></td>
<td>Observations of system use</td>
</tr>
<tr>
<td>Library perspective on the search application</td>
<td>Workshops with library staff</td>
</tr>
</tbody>
</table>

The role of these empirical sources in the evaluation process was introduced in the previous section. The following sections describe the sources more in detail.
4.3.2.1 The User Interface

As evaluators, we had full access to the search application, and knowledge about it was an integral part in preparing and performing the evaluation work. The most relevant parts of the user interface are described here.

![Figure 4-13 The Quicksearch view of the MetaLib/SFX search application](image)

The quicksearch of the user interface (Figure 4-13, above) of the search application is designed in line with a typical Internet search engine. The idea of the design is to allow users to easily submit keywords (or Boolean expressions) to perform a search. During the library workshops, the staff stated that a goal with the search application was to be as simple as Google, while still rendering high quality search results based on credible sources. The search application allows the users to select which group of databases to include in the search using the radio buttons below the query input field (e.g. Articles, English and Articles, Swedish). By selecting one of those, the user limits the search to the databases associated to this choice.
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Figure 4-14 Ongoing Search view in the Metalib/SFX search application

When a query expression has been formulated, the application starts searching for hits\(^\text{17}\). These are presented in an ongoing search view in the search application (Figure 4-14, above). This view shows the number of hits from the underlying databases, e.g. Oxford Journals and ScienceDirect.

\(^{17}\) The search is powered by the Metalib index server, which in turn has access to a number of databases.
At any time during the search, the user can click the link to see the retrieved hits. This causes the search process to pause, and the Quicksearch Results view (Figure 4-15) is shown to the user. It should be noted that the search process is interrupted when the user clicks the “view retrieved hits” link.

At this point, the user can change the view of the search results (brief list, extended list, or full view). There is also an option to “retrieve more” – if this link is clicked, the search process will continue where it was interrupted, and deepen the search. When this is done, publications with a higher rank (higher relevance according to the search algorithm) may show up in the list. It is also possible to narrow the search using the links in the right column, by topic, dates and authors.
The user interface also contains a metasearch part, which allows the user to further tailor the search, e.g. choose exactly which databases to include in the query. The users in this evaluation mainly worked with the quicksearch, with a few minor exceptions; hence the metasearch user interface is not presented here.

4.3.2.2 Client perspective on the search application

The client-oriented study was conducted in a three-step manner. First, an interview was made in order to determine the client’s needs and expectations on the library. During this session, a number of search tasks were defined personally for each user to facilitate the next step. The interviews were recorded (audio only) and later transcribed. Second, the user was observed while using the search application to solve the tasks. A thinking-aloud strategy was used, to find out about the users thoughts, and to make sure that the use session showed progress when major obstacles were encountered. The user was asked in advance to continuously comment what was being done during the observation. Four “levels” of intervention from the observer were set into play: 1) A question of the type “what are you thinking about right now”. 2) The observer hinted to the user to look into the help section to solve the current task 3) The observer hinted at how to solve the problem, without explicitly saying how to do it and 4) The observer said exactly what needed to be done to solve the task at hand. This was a way of trying to avoid intervention as much as possible, allowing the user to attempt to solve all tasks without interference, still making sure that there was some progress in the observation session. The observations were recorded both as video (screen events were captured) and audio (everything being said was recorded). The final step in the client-oriented study was a post-observation interview, where the client was asked a number of questions regarding their impressions of using the search application. The complete template used for the interview can be found in appendix B. In total, 14 clients were studied, and the average session lasted approximately one hour. The main part of the time was used for the observation of system use.
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4.3.2.3 Library perspective on the search application

The evaluation included two workshops with library staff, aiming at discussing and documenting the library staff’s understanding of the impact of the new search application on the organization. Interaction diagrams\(^{18}\) (Goldkuhl, 2007) was the theoretical concept primarily used to investigate the library perspective was interaction diagrams. Such diagrams are part of the change method CA/SIMM (Goldkuhl & Röstlinger, 2005), which in turn is part of the framework of socio-instrumental pragmatism. While belonging to the same ontological framework, interaction diagrams are coherent with the communicative view on user interfaces. Briefly explained, an interaction diagram is a way of identifying actors (e.g. organizations and organizational units) and the way they interact. An example from the evaluation is shown in Figure 4-16. During the workshops, future (post-implementation) business interactions were modeled, and parts which were expected to be affected by the search application were discussed in depth. The business goals were discussed and documented. A number of issues (new activities, problems, and strengths) were elaborated upon, based on the change analysis method CA/SIMM (ibid).

For the evaluators, these two workshops greatly increased the understanding of the situation-in-view, in the sense that it contextualized the search application, and also added the goals and concerns of important stakeholder groups. The workshop participants represented all functions in the library. The workshops focused how the library’s processes would be affected; still it was a methodological decision to include representatives from the organization’s functions, to be able to understand the business processes across functional borders.

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\(^{18}\) Not to be confused with UML interaction diagrams.
Figure 4-16 Interaction diagram showing library-client interactions

The workshop discussions were documented as interaction diagrams, and in plain text. These documents were validated at the beginning of the second workshop, and then in later discussions with a smaller selection of library staff. The library staff also continuously reviewed the emerging evaluation report, and provided feedback to the evaluators when some part of the documentation was unclear or incoherent with the workshop discussions.

It is also worth pointing out that the library staff will also be using the search application, thus the inclusion of them into the evaluation is in line with the quality in use for all approach (Bevan, 2001) – the workshops also included discussions about the staff’s impression of the application. Some members of
the staff had been introduced to the application, and expressed their opinions about it.

4.3.3 Evaluation result

The evaluation rendered a number of problems related to the current design of the user interface, and some unresolved issues concerning the impact on the organization. A number of suggestions for re-design and tutorial development were formulated. Figure 4-17, a “populated” version of Cronholm and Goldkuhl’s (2006) model, summarizes and categorizes the evaluation results.

![Figure 4-17 Overview of MetaLib/SFX evaluation results](image)

The results are briefly mentioned here, and will be further discussed in the following subsections. The purpose of the figure is to provide an overview of main conclusions drawn in the evaluation work. It is also an illustration of the relation between user interface design issues and the fulfillment of business goals. The conclusions regarding interaction quality is primarily based on the client study, while communication quality and process quality mainly stems from the library workshops.
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It is probable that clients who experience interaction problems do not share the library’s view about the increased level of service that is by the library. An important conclusion is therefore that the interaction quality problems need to be addressed in order to achieve the increased quality on the other levels. The evaluation led to a set of suggestions on how to re-design the user interface, and suggestions how to design tutorials for the application (a less preferred, but more feasible solution). This line of reasoning is not completely backed up by evidence, but the evaluators identified a risk that the current design does not contribute to the library’s business goals of increased internal efficiency and improved level of service. However, it should be pointed out again that the clients who participated in the study were novice users and that the identified interaction problems may become less problematic over time, as the clients experience from using the search application increases.

4.3.3.1 Library perspective

The workshops with library staff revealed a positive attitude towards Metalib/SFX, basically due to the increase in efficiency in administrating journal subscriptions, especially package subscriptions and keeping track of open access journals. It will also be easier for the library to keep track of available books in their library, and in other libraries. The search application also facilitates remote loans from other libraries through a web based loan application form, which is believed to make clients more aware of the option to loan from other libraries, and reduce the library’s and clients’ effort in performing such loans.

The library staff states that it is a great improvement to have an up-to-date view of available journals and books. Basically, instead of updating subscriptions on their own, these updates will be made at a higher level by specialized staff at Libris and ex-Libris. The staff also stated that the search application will be an everyday tool for them, to find answers to requests for clients. The intention is to replace the existing application (JULIA) on the public computers in the library, in order to offer more powerful search opportunities for the clients.

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19 Libris and ExLibris are collaboration organizations for libraries. ExLibris concerns collaboration on the international level, while Libris handles collaboration issues within Sweden.
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From a communicative perspective, we may explain these changes in the following way: The library will improve their ability to communicate available books and journals to their clients, and to offer access (e.g. full text PDFs) to these publications. This communication is improved both through the active use of the search application by the staff, which empowers them to better answer the clients' questions, and by making the search application directly available to the clients on the Internet to facilitate self-service to search and download full text publications. From the library perspective, it is also considered important to offer a single point of entry to its clients, to reduce the clients' need for extensive knowledge about different data bases and query languages. We may thus conceive the search application as an agent; which performs searches in the underlying databases on behalf of the user.

However, the library also acknowledges that the implementation of these changes will generate a need for new types of support, and new types of questions from the clients. One important issue which was addressed by several users in the user study was that it is hard to evaluate the quality of the information that was found. It was expressed as a need to better learn how to evaluate different sources of information, such as academic journals, books, and conference proceedings. There seems to be a risk that students perform a search, find a satisficing number of publications for their essay, and base their argument on those publications without critically assessing if these were the most relevant publications to use. The library needs to prevent this type of behavior, where the frame of reference is heavily framed by technology, and continue their work on how to properly navigate information sources to find what is needed to pursue credible discussions which meet the requirements of academia.

4.3.3.2 Client perspective

The user interviews and observations were analyzed, and six categories were inductively generated based on the statements from the users (Figure 4-18). Three of those (make selection, interpret search results, and get full text) are search process oriented - directly connected to different phases of the search process. The three others (general impressions, reasons to contact the library, and explicit re-design suggestions) are general concerns, which may concern any or all phases.
These issues are strongly related to a number of design principles which are known within academia. The rest of this section shows a selected part of the issues found in the use observations, and some theoretical motivation connected to these issues.

Several scholars (e.g. Cronholm & Goldkuhl, 2006; Nielsen, 1993) state that users of a system need to understand the terminology (vocabulary) in use in the system. Also, following the communicative view of user interfaces (see section 5.1), and based on the work on semiotic engineering (e.g. de Souza et al, 2001) we need to acknowledge system design as a communication from designers to users; hence the designer needs to do things in a way which is possible to make sense of by the users. In this evaluation, many users had none or too little knowledge about academic databases to properly understand the search results. As an example, one user stated that the databases might as well be named A, B, C et cetera, since the database names didn’t mean anything to her anyway. Several other users also expressed a lack of knowledge concerning the underlying data bases. Users also stated that other terms in use in the system, such as “meta search”, were not easily understood. The library’s internal language has spilled over on the terminology in the design of the IT artefact, which makes it hard to understand for the users.
The users of an IT system should easily understand what is afforded by the system (Gibson, 1979). In ISAT, it is prescribed that a system’s action repertoire needs to be transparent, which means that the user should understand what can be done and how it is done when using a system (e.g. Ågerfalk, 2003; Cronholm & Goldkuhl, 2006). The most important conclusion regarding affordances in the library context is that the user interface requires knowledge about Boolean search expressions to be really useful. Most users in this study did not have sufficient knowledge about Boolean operators such as AND and OR to write efficient, composite search expressions. There is also an infrastructure problem which creates confusion when Boolean search expressions are applied – some of the underlying databases accept such queries, others do not. The result is that the relevance/rank in the search results is based on different criteria, depending on which underlying database the publication is stored in. It should be noted that there exists some user interface components to refine a search, e.g. filtering it for a certain year. This reduces the need to write complex queries. Still, some users suggested more support to come up with relevant search results, e.g. allowing the users to formulate new queries to refine the hits within the previous search.

There is much theory on how to design the navigation within an IT system. It is sometimes stated that the user should have the option to freely move between different parts of the user interface, and always understand where they are at (Cronholm & Goldkuhl, 2006). A high degree of flexibility and efficiency of use is recommended by Nielsen (1993), which means that it should be clear to novice users how to use the system, while advanced users also needs to be able to work efficiently (e.g. using shortcuts to certain functions).

Furthermore, the user should always understand what is going on (Nielsen 1993): When a user does something, there should be feedback about ongoing and/or completed system activities. This feedback should be clear and provided within reasonable time. The search application caused some confusion due to the possibility to interrupt an ongoing search, and see the results so far. Many users did not understand that the search was still going on. The implication of this is that they believe that they found the most relevant publications given their query, which I consider to be very problematic. The users believe they did something, but in practice they did not.
ISAT (e.g. Ågerfalk, 2003; Cronholm & Goldkuhl, 2006) prescribes that a system sometimes needs to be designed so that the user has knowledge about previously performed actions. This is important when the user needs to do follow-ups on performed actions, and sometimes to improve the accountability of what has been done. In the library case, a user within the health sciences expressed a need for a search history – this may be important to present as part of your research method in a thesis.

The use of the IT system should empower the users in acting, both while using the system and after using the system (Ågerfalk, 2003; Cronholm & Goldkuhl, 2006). This is also in line with the usability concept of task match as presented by among others Nielsen (2003). A very interesting observation made in the user studies was that the users had severe troubles to download full text (PDF) documents, which may be seen as the users’ ultimate goal when using the system. The user interface is different, depending on where the full text document is stored. A common situation is that the webpage of a journal is shown in a new browser window. The user then has to navigate within the journal’s web page to find the PDF file. There are a number of other situations which causes different views for the user, which leads to a lot of confusion, and often the users failed to actually download documents. This may also be explained by the usability heuristic consistency, stating that concepts and design elements should mean the exact same thing in different parts of the user interface (Nielsen, 1993; Cronholm & Goldkuhl, 2006). The design should also be in line, as much as possible, with common conventions and de facto standards, to avoid confusing the user (Nielsen, 1993).

An important characteristic IT systems, especially those that are web based, is that the response times do not distract or annoy the users (Nielsen, 2000). During a number of use observations, the system was very slow, which annoyed the users.

Preece et al (2003) discuss user experience qualities: a number of use qualities related to the users emotions when using a system. This may be conceived as a more thorough way of discussing the usability goal satisfaction (ISO 9241-11). Examples of emotions caused by system use may be frustration, joy, motivation, et cetera. Ideally, the use of the system renders positive emotions rather than negative ones. The search application was considered boring and
inflexible most users. This may be explained by the fact that they were novice users of the system, and they weren’t fluent enough in using it to fulfil their needs for information. On the other hand, there may be a risk that users avoid using (thus learning) the system if the first impression is that it is boring and hard to use.

4.3.4 Contribution to theory development

This evaluation concerns an IT artefact with a quite high degree of agency built into it. Using the terminology in this thesis, we may say that the users of the search application need to understand what the agent is doing on their behalf, in order to properly assess the results presented by the agent. In this particular case, there is a risk that responsibilities of the quality of action are blurred, as a consequence of this agency. This shows a tension between the human action awareness (what is being said; and by whom) and the agency properties of the search application. This is an example of a design tension between agency properties of an artefact, and its properties as a communication medium. This way of understanding the IT artefact’s qualities as both a medium and an agent provides a lot of explanatory power when investigating the role of IT artefacts in a social context.

Further, the application of interaction diagrams in combination with the communicative view has been useful to identify changes in communication patterns in the workpractice. This has not been highlighted in the two previous evaluations. First, the library is no longer updating their databases with up-to-date information about available publications. Available publications are now communicated directly from Libris and ExLibris level to 43 libraries, and consequentially also directly through the libraries’ clients through the MetaLib/SFX as a communication medium.

Further, the library strives for a larger degree of self-service among their clients. They attempt at providing an IT artefact which can help the clients find what they are looking for, i.e. the responsibility of finding publications based on the clients’ expressions of their needs is delegated to the artefact. The implementation of the IT artefact is likely to change communication patterns (and the library’s readiness to respond to new requests) from their clients. Thus, a very important conclusion following from the proposed view on IT artefacts is that the design of IT needs to be accompanied by a reflection on the
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impact on other communication channels, and the how the interplay between those channels should be designed. At large, the evaluation is an example of how the IT artefact affects social settings: Both the internal library workpractice, and the clients’ practices. It also shows how the IT artefact has an impact on the interplay across these organizational boundaries. We may speak of this as the interplay between various communication channels; or “channel interplay”.

Interestingly, the qualities of the user interface may be crucial in achieving the intended positive effects for the library: A design which meets the needs and the language of the clients, and which is easily understood by them, may very well lead to a number of positive effects from the library’s point-of-view. Conversely, a bad design may be counterproductive, and increase the clients’ need to communicate with the library, without actually providing a better total level of service. This indicates the need to reason about the relation of different use qualities, and how they can be conceived in relation to each other.

Further, there is a need to reflect about the theoretical basis for this evaluation. How could a truly ‘good’ design be achieved? The theoretical framework which has been used here is based on some theoretical sources, such as usability and actability. However, we may need to look beyond those theories. As an evaluator, one cannot resist speculating in other design trends while performing an evaluation. We must, for instance, take into account the potential of social software to produce more relevant search results in this type of applications. A simple example is the possibilities opened up by harnessing the user’s behavior and data. An example of how this may be used in IT design is shown in the evaluation of the web shop/community (section 4.4). The current design of the search application is based on a top-down structure, where the catalogue of publications is handled at a higher organizational level, and shared between libraries. Conclusively, By adding the “web 2.0” (O’Reilly, 2005) ingredient to this type of application, a door to new functionality and search support is opened, which may lead to a new era for the role of local libraries in the academic world. From a communicative perspective, this may be explained as horizontal communication: “Web 2.0” is based on that the users’ actions are logged in different ways, which creates representations which may be used to build new types of services. Such artefacts mediate representations between users; which may be seen as horizontal communication. The evaluation of the
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search application was focused on *vertical* communication, i.e. the sharing of representations from ExLibris and Libris to the local libraries and their clients.

### 4.4 The Web Community/Shop

This evaluation aimed at deriving a conceptualization of the IT artefact from a communication action perspective, given the characteristics of Web applications in general, and Web 2.0 in particular. Such a conceptualization should be a useful analytical instrument in future evaluation and design efforts and can also serve as a tool for further elaboration on the role of the IT artefact in Web communication and community building. This can be seen as one response to Orlikowski and Iacono’s (2001) call for theorizing the IT artefact, and particularly its role within the Web context. The evaluation process is shown in Figure 4-19.

![Figure 4-19 Evaluation process overview for the web shop/community](image)

The communicative perspective on user interfaces was used as basis for the evaluation and the subsequent theory development. This evaluation has led to two publications (Ågerfalk & Sjöström, 2007; 2008).
4.4.1 Theory base and theoretical concerns

The way we use the Web has changed dramatically since its inception in the mid 1990’s. As users have changed from passive consumers of information to active contributors, much of the content on the Web today is the result of individuals’ knowledge sharing and exchange of ideas. O’Reilly (2005) conceptualized this emerging information infrastructure and referred to it as Web 2.0; a term now widely used when describing the business models, tools and technologies that facilitate and leverage such global interaction and communication on the Internet. He suggests that network effects arising from user contributions are key to market dominance in the Web 2.0 era and that in order to be successful; companies must learn to trust users as co-developers. This insight is a key factor also in the success of the open source software movement, which has proved that communities of volunteer developers are even capable of threatening the dominance of some of the world’s leading software companies. Conforming to the old “if you can’t beat them, join them” mantra, many commercial organizations are also entering the open source arena in an effort to build active communities around their products (Fitzgerald, 2006). A fundamental question in relation to the success of these emerging “gift cultures” (Bergquist and Ljungberg, 2001) is what motivates people to contribute time and knowledge without any apparent payback, at least not in the immediate monetary sense. Lerner and Tirole (2002) argue that the two major motivations are career concerns and ego gratification, which they collectively refer to as the signaling incentive.

By contributing to a Web community, such as an open source project, people gain reputation and status within that community, which thus appears to be the main driving force. Interestingly, well before the coining of the term Web 2.0, Flores (1998) analyzed the emerging networked society and came to the conclusion that Web systems are primarily identity creating systems. Drawing on Heidegger’s identity concept, he suggests that identity requires “both an intense Kierkegaardian total commitment to some cause or person that discloses a new world for an individual and a Hegelian working out of that commitment so that others recognize that new world as making more sense than their former world, so that they see the individual who brought it about as a leader and that new world as their world.” (Flores, 1998 p. 364) According to Flores, this is central to both personal and corporate identity on the Web. A successful company has to show commitment and build strong corporate
identity to attract people (i.e. visitors) and an individual has to commit fully to a community in order to build a strong personal identity, motivated by the signaling incentive. Hence, while personal identity is important to oneself, it is also important to others in order for them to recognize ones contributions. In a similar vein, personal identity is important to corporations in order to recognize their users and customers and to tailor their own Web presence, thus building their own identity. However, while identity and recognition is important on the Web, the flipside of the identity coin is that of privacy. Consider, for example, the following: Last year, a team within AOL released search data of more than 650,000 users. Although actual user names were replaced with random numbers, all the search terms of single users were possible to track and by using these search terms it was possible to track down an individual (Barbaro & Zeller, 2006). Apparently, No. 4417749 conducted hundreds of searches over a three-month period and eventually the data trail led to Thelma Arnold, a 62-year-old widow in Lilburn, GA, who confirmed the searches were indeed hers (Barbaro and Zeller, 2006). Shortly after this report, AOL removed the search data from its site and apologized for its release, but the detailed records continue to circulate online. The story does not tell whether or not Ms. Arnold benefited from her strengthened identity in this particular community. However, the example clearly illustrates that some of the traces we leave on the Web are less intentional and probably less ego gratifying.

According to Flores (1998), the speech act theoretical insight that institutions are constituted by their commitment structures is essential to understanding identity creation on the Web. We can, for example, use these structures “to determine whether we are witnessing new institutions or just different versions of old ones” (Flores, 1998 p. 357). Hence, actors’ intentions and the way these are used to coordinate interaction with other actors are essential for identifying institutions, such as corporations, communities and individuals’ on-line presence. However, a focus on intentions alone seems to limit our analysis of social interaction through information technology (IT) to what the actor is aware of and purposively chooses to do. This is also mirrored by Weber’s account of social action, which identifies such action with behavior to which the actor attaches meaning (Weber, 1978). Arguably, it is hard to attach meaning to something of which one is unaware. In an ideal speech situation – the casual face-to-face setting (Clark, 1996) – two communicating parties rely on many subtle cues besides the spoken word. Body language and other “give
offs” are central in our day-to-day interpretation of social life, and these are often unintentional. Goffman (1959, p. 2) writes, “The expressiveness of the individual appears to involve two radically different kinds of sign activity: the expression that he gives, and the expression that he gives off”. According to Goffman, what we give are the things we communicate through verbal signs, such as spoken language. The things we give off, on the other hand, are the often non-verbal signs that help to situate and verify the things we say. Goffman (ibid) defines interaction as “the reciprocal influence of individuals upon one another’s actions when in one another’s immediate physical presence.” An interesting aspect of communication through IT artefacts, such as through the Web, is that this casual face-to-face setting changes into a more structured computer mediated one. In this new setting, participants are typically not in one another’s immediate physical presence; they may in fact neither see nor hear each other, and may recognize each other’s action at considerable delay (Ågerfalk, 2004). In this context, there appears to be another form of “give off”, the kind that made it possible to track down Ms. Arnold in Lilburn, GA.

The traces she left while using the search engine helped to situate and verify her identity to the extent that even though the AOL employees’ intention was to anonymize the users, she was still very much identifiable. It thus seems that Dietz’ (2001, 2003) distinction between essential (realization independent) issues and their realization becomes central to understanding communication action on the Web. While the essential aspect of Ms. Arnold’s actions was to find information, her incidental traces, or “technology embedded give offs”, were essential for other stakeholders in the Endeavour of establishing her identity.

### 4.4.2 Primary data

In line with the discussion on give v. give off above, the distinction between what users purposively intends to do and the sometimes unintentional traces they leave behind, indicates a need to distinguish between different types of contextual information related to the performance of actions at Web pages. It has generally acknowledged that data is a valuable asset in the Web 2.0 philosophy (O’Reilly, 2005) and that there are different types of data available: what users intentionally communicate to others and the traces of action that are gathered by the Web infrastructure as such (primarily through the content of
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HTTP requests and responses). Therefore, to understand Web communication we need to analyze both essential and incidental communication. In our study, essential communication action was manifested as screen documents and incidental communication action was collected and logged using a browser extension\(^\text{20}\). For this study, we chose the well-known web site Amazon.com since it embraces many characteristics of Web 2.0.

The essential action data is information which is revealed in the user interface when performing action, documented in the evaluation as screen shots from the web site. Figure 4-20 shows two aspects of essential action: an anonymous reviewer (“a reader”) and his statement about a book. It is also shown in the example that nobody assessed this review as being helpful.

<table>
<thead>
<tr>
<th>0 of 7 people found the following review helpful:</th>
</tr>
</thead>
<tbody>
<tr>
<td>✭✭✭✭✭</td>
</tr>
<tr>
<td>Reviewer: A reader</td>
</tr>
<tr>
<td>No points, no correctness, no validation, no value!</td>
</tr>
<tr>
<td>What the hell is this book for? Is it just a manifestation that free software is bad?</td>
</tr>
</tbody>
</table>

Comment | Was this review helpful to you? |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No (Report this)</td>
</tr>
</tbody>
</table>

Figure 4-20 - An unknown user comments on a book on Amazon.com

The incidental action was studied by looking at the HTTP requests sent from our web browser to web servers. The mechanism by which HTML (Hypertext Markup Language) pages are retrieved from a Web server for display by a browser is the HTTP (Hypertext Transfer Protocol) request command (W3C, 2007). An HTTP request contains a certain amount of information sent when a user accesses a page on a web server. We expect that users of a Web application are aware of the parts of a message that are visible on the screen. If a user, for instance, writes a book review, they are probably aware that the entered information is communicated to someone through the browser, over the Internet, to a Web server. In addition to this visible part of the message, there are some “hidden” pieces of information added to the HTTP request, as defined

\(^{20}\) The browser in use was Mozilla Firefox and the extension is called Live HTTP headers.
in the HTTP standard (W3C, 2007). This information is part of the communication context, and reveals some information about the user and the technology in use. An example HTTP request can be found in appendix C.

The request contains technical information such as the user’s operating system (and version), the language in use, and the browser used and its version. Furthermore, the message contains the user’s IP address\(^{21}\), which can be used to identify the current user, at least indirectly. Using the Domain Name System, it is possible to map an IP address to a country, region, or even to a company and sometimes to an individual user. In addition, the HTTP request contains so-called “cookies”. These are small pieces of information that are stored on the user’s hard drive. Whenever a Web page in a certain domain is accessed through the browser, the browser sends the cookies associated with that domain to the web server. The web server then returns new (or changed) cookies, which the browser stores and sends again in the next request. Cookies are a common mechanism for maintaining state in longer transactions or for personalizing a context for a user (Krishnamurthy & Wills, 2006). Finally, the request contains information about “referring page” – if a user follows a hyperlink from site A to site B, site B is told that the visitor came from site A.

### 4.4.3 Evaluation results

This section contains the evaluation results, divided into essential actions and incidental actions at Amazon.com.

#### 4.4.3.1 Essential Action at Amazon.com

The perhaps most obvious essential action at Amazon.com is the purchasing of products, e.g. books. An interesting aspect of Amazon.com, however, is that it facilitates users’ sharing of experiences and opinions about the various books on offer. In the following we will focus on this community-oriented activity. Specifically, we will focus on the visible results of user actions as represented by the Amazon.com website.

---

\(^{21}\) Technically, the IP address is not part of the HTTP request but is communicated through the underlying TCP/IP protocol stack. Hence, all HTTP requests can be traced to a certain IP number.
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Figure 4-20 illustrates a review of a book, communicated by an anonymous user (“A reader”). Seven people have valued this review and unanimously stated that the review wasn’t that helpful to them (perhaps as a result of its lack of argumentation).

Figure 4-21 shows another review, provided by an individual who has chosen to identify himself as Mark Tarrani. It is even possible to follow the hyperlinked name and find additional information about this individual, including a personal photo. This person has apparently written many other reviews (hence the “Top 100 Reviewer” badge). 29 out of 30 people report they have been helped by the review, which thus signals that this reviewer is appreciated by the community. (It is perhaps not too far-fetched to assume that “A reader” was the one person out of the 30 who did not find Mike Tarrani’s review very helpful.)

29 of 30 people found the following review helpful:

🌟🌟🌟🌟 Balanced and business-focused, March 26, 2002
Reviewer: Mike Tarrani “www.tarrani.com” (Deltona, FL USA) - See all my reviews

This may be the perfect book about open source software because it places open source within the context of business value and does not promote it as the great panacea that characterize the message of far too many books on the subject.

Figure 4-21 - An identified user comments on a book on Amazon.com

4.4.3.2 Incidental Action at Amazon.com

Consequently, we revealed quite a lot about ourselves when searching for a book on Amazon.com. We told them, not only that we were interested in the particular book, but that we were using English versions of Windows NT 5.1 and the web browser Firefox 1.5.0.11. We also told them that the search string “Fitzgerald Open Source” was entered from Amazon.com, and that we had visited the site before (a cookie was sent). Furthermore, we revealed our IP address, which in turn gives away that we were located at Jönköping University in Sweden at the time of the query.
Interestingly, when requesting the start page “http://www.amazon.com” a large number of HTTP requests are performed in the background (see Table 4-8). These requests would typically go unnoticed without the special analysis software. The anticipated requests (the page itself and the include files it needs to display properly) are marked with grey. The other requests will be discussed below.

Table 4-8 Performed HTTP Requests when entering http://www.amazon.com

<table>
<thead>
<tr>
<th>#</th>
<th>Host</th>
<th>Explanation</th>
<th>Purpose</th>
<th>Performer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sb.google.com</td>
<td>The request is forwarded to Google’s safe browsing service.</td>
<td>Verify host safety</td>
<td>Google toolbar on behalf of user</td>
</tr>
<tr>
<td>2</td>
<td><a href="http://www.amazon.com">www.amazon.com</a></td>
<td>The request to get a web page is sent to the Amazon web server.</td>
<td>Request action from server</td>
<td>User action through browser</td>
</tr>
<tr>
<td>3</td>
<td>[...]s-amazon.com</td>
<td>Request for images are sent to another Amazon web server.</td>
<td>Request images from server</td>
<td>User action through browser</td>
</tr>
<tr>
<td>4</td>
<td>sb.google.com</td>
<td>Multiple requests are sent to Google’s safe browsing service.</td>
<td>Verify host safety</td>
<td>Google toolbar on behalf of user</td>
</tr>
<tr>
<td>5</td>
<td>[...]bleclick.net</td>
<td>A request is sent to some advertisement host.</td>
<td>Espionage</td>
<td>Web application on behalf of Amazon</td>
</tr>
<tr>
<td>6</td>
<td>[...]vertising.com</td>
<td>A request is sent to some advertisement host.</td>
<td>Espionage</td>
<td>Web application on behalf of Amazon</td>
</tr>
<tr>
<td>7</td>
<td>[...]eries.google.com</td>
<td>A request is sent to Google’s page ranking service.</td>
<td>Contribute to page ranking</td>
<td>Google toolbar on behalf of user</td>
</tr>
<tr>
<td>8</td>
<td>m1.2mdn.net</td>
<td>A request is sent to some advertisement host.</td>
<td>Espionage</td>
<td>Web application on behalf of Amazon</td>
</tr>
</tbody>
</table>
Requests #1, #4, and #7 are addressed to two different Google services: Safe Browsing and Page Ranking. These requests are sent by the Google Toolbar, a popular plug-in to the web browser. When installing this plug-in, the user is asked whether they want to activate these services or not. It is probably safe to assume, however, that many Internet users are, just as the authors were, unaware of the whereabouts of this plug-in. Effectively this means that every time a page is requested with this configuration, such requests are fully or partially forwarded to Google (possibly without the user knowing).

Requests #2 and #3 are the “essential” requests: The requests sent to retrieve the actual web page and its included files (e.g. images, style sheets, and JavaScript include files).

Requests #5, #6, and #8 are sent to various (commercial) advertising services. The purpose of these appears to be to keep track of users’ browsing across different Web sites. Krishnamurthy and Wills (2006, p. 4) explain, “Cookies are also used by tracking servers to more accurately identify a user as the user navigates between different Web sites. If pages from these Web sites cause objects to be retrieved from the same tracking server and this server has a cookie associated with it then the server receives this cookie on each retrieval.” Martin et al (2003) refer to such series of HTTP requests as “clickstreams”, which can be used to, for example, maintain unique visitor counts, understand web usage patterns, assess the diffusion of advertisements, delivery of personalized offers, and general tailoring of web site content. Series of HTTP requests can thus be monitored through tracking cookies, which are stored, and used for various commercial purposes. It should be noted that there is information available about the use of cookies, both from Amazon and their partners in the advertising business. Also, the Google toolbar provides a reference to a privacy statement detailing what information is collected and what it is used for.

Apart from the recipients of the requests, it is also likely that there are additional logs of the requests, i.e. by the organization responsible for providing access to the Internet.
4.4.4 Contributions to theory development

This evaluation has led to some valuable insights about how the web can be understood from a communicative perspective. The concept of identity has been used as a complement to understanding the ongoing communication—both communication which is evident to the users and the underlying communication which takes place in the background.

Some abstractions have been made based on the evaluation. First, navigation on the web always leaves traces. This means that navigation and communication are inseparable based on the semiotic foundation in this thesis. This is based on the semiotic foundation that we leave representations which others may interpret. Second, we may look upon web based IT artefacts as emergent artefacts, which evolves through actions by a number of stakeholders with different and sometimes conflicting interests. The concept of identity has been useful as an explanation of relations between stakeholders. The ongoing communication in the particular evaluation situation has led to a model which explains the relations between different actors as being part of identity cultivation for these actors. Furthermore, four principles for understanding web based IT artefacts were proposed based on the evaluation. The theoretical contributions from this evaluation are presented more in detail in section 5.3.
Chapter 5

The IT Artefact

This chapter is a results chapter targeting the first research question. Results are presented in a form of conceptualizations of IT artefacts. The concepts are presented, theoretically grounded, also empirically grounded by being related to the ICT evaluations presented in the previous chapter. In section 5.1, it is proposed that we should conceive IT artefacts as human-to-human communication media. Section 5.2 elaborates on the agent properties of IT artefacts, and the implications on communication that follows from those properties. Section 5.3 proposes a web-based extension of the conceptualization of the artefact, focusing its role as a communication medium in a multiple stakeholder context, and the increased complexity of IT artefacts in general following the networked society.

5.1 IT Artefacts as Communication Media

As discussed in section 2.1, we may consider a sign as either a prerequisite for action or a result of action. This way, all parties involved in creation and interpretation of the sign are acknowledged, which illustrates the pragmatic and social aspects of semiotics and results in a richer picture of communication. This line of reasoning can be transferred to user interfaces. The concept of user interface is often used, but it is rare to find thorough definitions about the meaning of the term.

It seems to be loosely defined through its context; the medium for user-system interaction; the part of the IT artefact which constitutes the intersection between the user(s) and the artefact. As a consequence, it should be noted that we use the term user interface a bit reluctantly. On the one hand, the term is appropriate since we are talking about a part of the system’s software and hardware; the parts with which the users interact. On the other hand, communicative features of user interfaces are not a property of the IT system alone. Following Gibson’s (1977) original notion of affordances, actions afforded by a system are not pure system properties. Affordances emerge in use.
and so depend on the reciprocal relationship between a human and an object acted upon (Bærentsen & Trettvik, 2002). Therefore, we picture the interface between the system and the human as something that belongs neither to human nor to machine and, at the same time, both to human and to machine. Although aware of this ambiguity, we find term user interface useful since it is an established concept in both practice and academia.

From a semiotic perspective, de Souza et al (2001) elaborate on three different types of communication taking place through the user interface:

- User-system interaction
- User-user interaction
- Designer-to-user communication

In order to understand and define user interfaces from a semiotic perspective it is necessary to take all these communication situations into account. In their paper (ibid) they emphasize the communication in a user-interface from its designers to its users. They describe the user interface of an IT-system in this respect in the following way: “They are one-shot messages sent from designers to users about the range of messages users can exchange with the system in order to achieve certain effects” (ibid p 462). This can be compared to the concept of action repertoire (or action potential) within the IS actability theory (e.g. Goldkuhl & Ågerfalk, 2002; Sjöström & Goldkuhl, 2002). The action repertoire of an IS is the possible actions which the system afford to its users. This action potential is a result of the designers’ work.

In their discussion, de Souza et al (ibid) focus on the communication between designer and user, while we argue that it is more important to focus the business communication going on: Users of the IT system actually communicate with each other, using the artefact as a medium for communication. This is actually pointed out by de Souza et al (ibid), but it is only discussed in relation to specific types of multi-user applications (e.g. groupware).

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22 It is important to have a broad conception of IT designers in this kind of discussion, including those who are responsible for the design of the IT system. Designers may be individuals with various roles, participating in the design process. This is further elaborated on in section 6.1.
We want to stress this kind of communication since we find this to be the core of an information system. A communicative perspective means that **IT artefacts are regarded as systems for technology mediated business communication**. In figure 3 we have described user interfaces contextually, not only in relation to the actual user, but also in relation to other human communicators. We distinguish between three different types of actions: *Business communication, user interface navigation* and *IT system design*, following the division above from de Souza et al (2001).

![Figure 5-1 - A communicative perspective on user interfaces (after Sjöström & Goldkuhl, 2004)](image_url)

We divide a user interface into four parts. One part is the action repertoire. This is to be seen as communication from the designer to the user. By interpreting the user interface the user may hopefully understand what kind of actions it is possible to perform. This part of the user interface is thus signs from designers telling the user what possible actions to perform.

In order to communicate something, through the system, to other persons, it might be necessary to read what others have said/done earlier. Within IS actability theory, the concept of *action memory* relates to this (e.g. Goldkuhl &
An action memory consists of messages about earlier performed actions and other important action circumstances. Before communicating something to other persons, the actual user may read parts of the action memory of the system. These presented messages are thus prerequisites for the user’s action. The messages are signs from other persons within the business and mediated by the IT system. To obtain such messages on the screen, the user probably performs some acts of retrieval. We consider this as a part of the UI navigation; which is described below.

After reading such messages, the user may act by expressing something. He may input something through the keyboard and then through the mouse click on some screen button. What is on the screen as a result of his input is a message from him. It is a result of his communicative action. After he has concluded his action (for example through a mouse click), this message will be taken care of by the system and possibly mediated to other users. The screen, at least before the concluding clicking, contains representations: results of a communicative act, with the intention to be forwarded to other persons.

The fourth and last part in our principal description of user interfaces is the UI navigation part. We include here instructions to the system to retrieve messages, besides instruction to move to some other part of the system. What possible navigation actions to perform is part of the action repertoire. This means that there is a reference from the action repertoire part not only to business communication actions, but also to possible navigation actions. Note that this part of the description does not have the same communicative character as the previous three parts – the only interpreter of UI navigation is the locutor performing the navigation. However, we find it important not to leave out the user navigation in this model.

In order to explicate this further we have described four types of communication taking place using IT the user interface in Table 5-1.
Table 5-1 Types of communication in different parts of the user interface

<table>
<thead>
<tr>
<th>Part of user interface</th>
<th>Type of communication and communicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action repertoire / affordances</td>
<td>A user interprets possible action types afforded by the system. (communication from designer to user)</td>
</tr>
<tr>
<td>Business communication (interpretation)</td>
<td>A user interprets messages from other users. These messages are mediated through the IT-system. (Communication from user to user)</td>
</tr>
<tr>
<td>Business communication (intervention)</td>
<td>A user creates messages to be mediated by the system to other users (Communication from user to user)</td>
</tr>
<tr>
<td>UI navigation</td>
<td>Interaction between user and IT system (No communication between human actors)</td>
</tr>
</tbody>
</table>

This socio-pragmatic perspective on user interfaces enhances communication aspects. A user is seen as both an interventionist and an interpreter. An IT user is taking part in communication with other business locutors and interpreters in some social context.

All these four parts of user interface can be described according to Bühler’s (1934) basic semiotic definition. Each part is 1) an expression of a human acting (symptom) and 2) is directed towards some interpreter (signal) and 3) refers to something (symbol). The user interface is an interactive action medium. It contains messages (signs) both directed to the user and from the user. This is of utmost importance to acknowledge. The user interface contains signs to be interpreted and signs, as results of user interventionist action, to be handled by the artefact and possibly forwarded to other humans.

Based on the above, we argue that the UI designer needs to treat the matters of business communication and UI navigation separately – one issue is to make sure that business communication is supported in a proper way (in relation to work tasks and business processes), another issue is to make sure that the navigation works properly. We may relate this to usability, which is one out of many attempts to clarify what is to be considered important when designing (or assessing) IT systems (e.g. Grudin, 1992; Ehn, 1995; Holmlid, 2002). Usability, once introduced by Shackel (1984), is an attempt to strike a balance between human factors and technological issues of IT systems. The concept of
usability has evolved in different research communities, and the focus of research has varied. Bevan (2001) points out that it is possible to discuss usability in at least two different meanings. One stream of usability research focuses ease-of-use issues (e.g. Nielsen, 1993), thus separating usability from utility (Grudin, 1992). Another stream conceives of the concept in a broader sense, including the issue of achieving specified goals with effectiveness, efficiency and subjective satisfaction in a specified context of use (ISO 9241-11). The latter conception of usability puts matters of social action and organization in focus (Maguire, 2001). Navigation, in our conceptualization, may be defined as an ease of use issue, which should be designed to support business communication, which is clearly the utility aspect of the IT artefact.

When socio-pragmatic aspects of user interfaces are to be analyzed, we need to acknowledge the communicative aspects of signs. In organizational semiotics, Peirce’s triadic definition of a sign has a great influence – this definition does however not explicitly acknowledge the creator of the sign, only the interpreter. Other semioticians, like Bühler (discussed in depth in sections 2.1-2.2), define a sign in a communicative perspective, which leads to a better foundation for an understanding of socio-pragmatic aspects of the sign. Based on our definition of the sign concept, we have presented a communicative view on the user interface concept. We acknowledge interactions on three levels: user-system, designer-user and user-user. The user-user level is made explicit in our view, making it a tool to understand socio-pragmatic aspects of IT-system use. We also propose that a suitable unit of analysis for socio-pragmatic aspects of user interfaces is the so called ae-message (discussed in section 2.3). In order to understand the socio-pragmatic aspects, we need to focus on something larger than a single sign. Our socio-pragmatic view on signs and user interfaces can be regarded as a complement to the ideas of Connolly and Phillips (2001) and Baranauskas et al (2002), who proposed that the semiotic ladder proposed by Stamper (2001) can be used as a tool to understand different aspects of user interfaces at different levels. The proposed communicative view on interfaces facilitates an analysis at the socio-pragmatic level of the semiotic framework.

The socio-pragmatic semiotic analysis performed in this paper has also led us to a concept of **pragmatic duality** in human-computer interaction. The prevailing perspective in HCI is that that this kind of interaction is to be seen as a user interacting with an IT artefact. The socio-pragmatic perspective is
critical towards this view on HCI and suggests that the user should be conceived as taking part in business communication with other human actors and that the role of the IT artefact (and its user interface) is a mediator and agent in this human-to-human communication. However, the socio-pragmatic perspective should not be interpreted as a rejection of the view that a human is interacting with an artefact. That would be naïve. Instead we suggest a view on the human-computer interaction as mainly a dual interaction. A user is interacting with the artefact and other humans at the same time. The IT artefact has the ability to interact in pre-defined ways with a user. The user must be able to understand how to manage the artefact, for example how to enter information into certain fields and click buttons on the screen etc. When performing such actions, the user is not only maneuvering the artefact. At the same time, he is actually communicating with other business actors. One can say that he (through acts of reading and writing) at the same time is instrumentally managing the artefact and communicating with other humans\textsuperscript{23}. In the same act he is doing several things simultaneously. An interpretative act (when reading information presented on the user interface) means both recognition of what other humans may have said and also finding out how to utilize the artefact. An act of intervention (when entering information onto the user interface) means both an informed act of managing the interface and a communicative act directed towards other humans.

Our view on the pragmatic duality of user interfaces can also be a foundation to understand the relation between IT system use and business processes. Speech acts and action pairs have been proposed as a low-level unit of analysis in business process modeling (Lind, 2001), while we propose the matching concept of interrelated speech acts (intervention and interpretation) as a core unit of analysis in IT design and IT evaluation. Thus, the pragmatic duality of user interfaces is a socio-pragmatic and semiotic explanation of user interfaces, which corresponds to both social action theory and business process modeling concepts. This conceptualization is useful to understand IT use as social action and how IT artefacts can be seen as communicative instruments in such social action.

\textsuperscript{23} Ågerfalk & Eriksson (2003) have described instrumental and communicative rationality in relation to usability. This is however done in a slightly different way than we do. We emphasize the pragmatic duality in human-computer-interaction.
5.2 IT Artefacts as Rule-Based Agents

This distinction between navigation and business communication points out that we are trying to understand different phenomena. The socio-pragmatic meaning of a sign is clearly related to communication between actors in the organization. So far we have discussed this issue mainly as one actor (an IT user) being an intervening actor and an interpreter. However, communication through an IT system is usually more complicated, since the IT artefact is a mediator with the pre-defined ability to mediate and transform messages. Thus, there is a need for a perspective of the IT artefact, which takes into account the increased complexity caused by the artefact’s agency properties. We must also acknowledge that IT does more than merely mediate messages. It also typically transforms messages based on rules defined by humans in the system design process. We suggest that (at least) six types of mediation/transformation need to be acknowledged when conceptualizing IT as a mediator for human-human communication. These six types are derived from the illustration of communication complexity shown in Figure 5-2. Note that the concept of the compound IT artefact will be further discussed in section 5.3.

![Figure 5-2 Six types of mediation/transformation](image)

First, there are one-to-one situations, where one person “speaks”, thus creates a message. This message is mediated and/or transformed by the IT artefact, and later interpreted by another person. A typical example of this is an e-mail sent from one person to another. Another example is where a person orders some product through a web site, and the order is received and interpreted by one
recipient. In the figure, this could correspond to message input message type A connected to output message type D.

Second, we may identify one-to-many situations: One individual could intervene using the IS, and several individuals could receive the message, or an automatically transformed version of the message. This corresponds to someone creating a message type B which is distributed to several actors interpreting message type C. A basic example of this can be picked from the evaluation of the scheduling system, where one person schedules a lecture. The IT artefact stores this message, and communicates it (directly and via other IT artefacts) to students, administrators and other teachers. Different views of the scheduled session are presented depending on how (i.e. which media and system part) you use to access the schedule).

Third, we may spot many-to-one situations. An output message in this case is aggregated from many input messages. Types A and B to type D. An example of such a situation is a number of salesmen who register sales in the system, which are later aggregated into a sales report used by a manager. In practice, very few reports are likely to be viewed by one sole actor. Still, in theory, this situation may occur.

Fourth, there are many-to-many situations. Several actors speak, and their messages (which may be of different types) are stored in the IT artefact. Based on this, several people receive and interpret a message which is constructed by the artefact as an aggregation of what has been said. This would correspond to input messages of types A and B which are aggregated into output message type C. Examples are available from all four evaluations. In the scheduling system, several teachers schedule lectures which are aggregated into a schedule for a class. In the Amazon evaluation, the web visitors’ behaviour is stored and aggregated into clickstreams, which are used to profile users. In the library’s search application, each message describing a publication is aggregated into search results. Finally, in the syllabus system, different views of the university’s courses are available, through selections of information from the syllabi which is assembled in course catalogues and on web pages.

Fifth and sixth, we may also identify additional situations which may indicate bad design: The one-to-zero and the many-to-zero scenario (types E and F in
the figure). If such situations occur, it means that people use the artefact in vain, i.e. by saying things which are sent into void (or stored forever) and never interpreted. I state that this may indicate bad design, because the reasons for this could be multiple. If the rationale behind the design is that things need to be stored for legislative reasons, for instance, it may be a valid solution. This type of situation, where there exists functionality which is not used, has been further theorized by Ågerfalk & Eliasson (2003) in the *D.EU.PS* model, which is a means to reason about different aspects of functionality in the use of an artefact: the desired, the existing, the utilized, the perceived, and the satisfactory. Ågerfalk & Eliasson (ibid) starts out from these categories and construct a Venn diagram with 18 classes of functionality, derived from possible intersections of the five categories, and show through empirical examples that they all exist in practice. This makes it reasonable to include one-to-zero and many-to-zero scenarios in this conceptualization, since they belong to the class of existing but not utilized functionality of an IT artefact.

The categories presented above show communication types which may occur when the IT artefact is a mediator. Thus, some *consequences* of the artefact as an agent are shown. Collins & Kusch (1998) discuss the concepts of mimeomorphic versus polimorphic actions. They state that polimorphic action is intentional action performed by humans and that a basis for performing such action is being part of a society, thus being able to adapt to the activities and relations therein. This is clearly in line with socio-instrumental pragmatism (section 2.2), which primarily points out that social action has social grounds and purposes, and triggers a question is a human affair. Based on these grounds and purposes, humans act in a polimorph and unpredictable way within a social community. Mimeomorphic action, on the other hand, is repeatable, predictable and formalizable, and can be performed by machines. Collins & Kutsch also state that humans perform mimeomorphic action, although they point out a difference: In a machine context, mimeomorphic action is governed purely by well-defined rules, and completely without social considerations. This separation of action types is important when regarding the character of action when using IT artefacts: A person has a need to act in a certain way towards a community, i.e. expressing certain things while acting or directing their action towards specific people. However, given the mimeomorph character of the IT artefact, there are constraints set for the actions performed by the person. Furthermore, as the actions performed by the IT artefact grow more complex,
especially with regards to mediation and transformation of the messages expressed by the user, the less aware the user of the artefact becomes of the social consequences of the actions performed. Thus, there is a steadily increased challenge in designing IT artefacts which provide to the user a transparency of communication and social aspects of use. Contemporary IT artefacts, e.g. web applications and other networked applications, apparently imply a greater complexity with respects to those issues (as shown in section 4.4). A major task for the designer is how to visualize this communication to the user, if this is considered an important design goal. There is a tension between the agency built in to the IT artefact and the potential to present the ongoing communication to the user in a transparent manner. This claim is further elaborated on in the next section through further theoretical discussion and examples from the four evaluations.

5.3 Increased Complexity: Interacting IT Artefacts

The evaluation of Amazon.com led to some additional reflections about the IT artefact; which may be characterized as a web extension of the previous concepts. The web is special - not only in the sense that the underlying technology is highly standardized and typically different from desktop application technology. According to Flores (1998) the web is also a different social phenomenon. Flores suggests that action taking place on the World Wide Web needs to be explained using theories on identity cultivation. The identity issue will be further elaborated below, since it shows great potential in explaining the social actions triggered by web artefacts. Figure 5-3 is an illustration of stakeholders in the study of the Amazon.com community. It shows the multiple interests for various stakeholders in relation to the IT artefact.
Figure 5-3 The IT Artefact in a Web Context (Ågerfalk & Sjöström, 2008)

Figure 5-3 requires some clarifications. For an individual accessing the web-based community on Amazon.com, we have identified two types of messages which affect the identity of that individual: The essential ones (which the person aims at communicating by contributing to the web site community) and the incidental ones (which are given off when the person navigates and performs action on the web site, e.g. information about their hometown). The web site owner (Amazon, in this case) leverages the community as a means to increase sales and attract advertising companies, which are attracted by a large number of visitors on Amazon’s web. The web site owner reveals information about their users’ identities to profilers (such as Doubleclick) and to advertisers, thus increases the advertisers’ ability to target individuals who are likely to be interested in their products. In doing this, they leverage their corporate identity. The profilers gather information from several web sites (not only Amazon.com) in order to create compound profiles of users. These profilers even further improve the ‘aim’ of the advertisers’ targeted advertising. Conclusively, there is a great deal of communication going on, which the user may be more or less aware of when engaging in the community on
Amazon.com or similar sites. Given the frequent occurrence of targeted ads on the Internet, it is likely that other instantiations of the relations shown in this Figure 5.3 will be shown in other studies of the World Wide Web.

The IT artefact in a web context shows some characteristics that separate it from more conventional views of the IT artefact, i.e. in intra-organizational settings where users’ tasks (as part of a pre-determined business process or similar form of institutionalized context) are often in focus. Based on the Amazon.com case we have identified four principles concerning the web artefact’s communicative and agency characteristics, with consequences for the conceptualization of the IT artefact as presented in section 5.1. Note that some design principles will be introduced below. They will be further described in the next section.

First, navigation actions need to be recognized as user-to-user communication. Even though the primary intention of the user may not be to communicate, there are many recipients of the “message” or request that is sent to the Web server when a user requests a new page. In the technical implementation of HTTP requests, there is no differentiation between “navigation” and other types of action. No matter what type of request the user makes to a web server, there is a certain amount of personal info which may be logged and used by the server application for a number of purposes, e.g. profiling the user. On the social side, however, there are many parties apparently interested in the moves we make on the Web. Thus, we need to take into account the communicative dimension of navigation on the Internet. This way, our conceptualization of IT artefacts allows for future studies where, for instance, social or ethical issues of the Web can be addressed. We refer to this as the principle of communicative navigation.

Second, in a web context, we need to handle user’s primary intentions and the more or less incidental representations that are the results of user actions. The incidental representations – the “technological give offs” – are put in place by commercial actors as instruments for positioning themselves or their partners. While O’Reilly (2005) speaks of data as the next “Intel Inside”, this commercial interest in information about people as a vehicle to position themselves is also a part of building a corporate identity (Flores, 1998). Flores’ identity concept also explains the behavior of people who actively share their
CHAPTER 5

opinions or experiences on the web. Take, for instance, the case of the identified reviewer on Amazon.com, Mike Tarrani. Apparently, his actions as a reviewer is an endeavor connected to the institution of identity. The Amazon.com web site can be explained as an instrument, which is used by parts of the user community to create and maintain their identity. From a commercial perspective, this information, contributed by the users, enhance the commercial value of Amazon.com and their services, in line with the Web 2.0 ethos. There appears to be huge incentives for individuals and companies to create and collect data in these continuously ongoing communication processes, supported by the great number of Web applications that are out there. We would argue that any useful conceptualization of the Web artefact needs to take into account these communicatively oriented issues related to people, corporations, and the Web as an arena for identity building activities. People sow seeds of themselves when acting on the Web. The Web then has to provide a fertile ground for growing these into a total commitment to some cause that can disclose a new world for an individual and a working out of that commitment so that others recognize that new world as making more sense than their former world, to paraphrase Flores (1998) as cited in section 4.4.1. In other words, the traces of action that we leave behind, essential and incidental are the foundation for the establishment and maintenance of our Web identity. In order to leverage the signaling incentive, Web sites then need to provide users with instruments to develop a proper understanding of the ongoing conversations and their contribution to the development of their own identity. We refer to this as the principle of identity cultivation.

Third, there is a risk that many users install plug-ins such as Google Toolbar, and activate features such as “safe browsing” and “page ranking” without actually understanding the consequences with respect to communication and privacy. These are examples of unreflective delegation of tasks to the IT artefact, which is unlikely to occur when communicating through some other medium. Therefore, issues of delegating actions to the IT artefact, and the ways in which such delegation is presented by designers and conceived by users, is an increasingly important issue from an ethical standpoint. This is also related to the more or less hidden communication taking place in the background in our case study, as a result of commercial interests. The scattered information about privacy policies raises the question if the users are really aware of the ongoing communication, which can be thought of as a type of surveillance of
web site visitors (Martin et al, 2003). We refer to this as the principle of reflective delegation.

Fourth, in relation to the distinction between essential and incidental action, it seems that some features of an IT system are configured once and then used for a long time. Over this period of use, the awareness of the particular configuration may fade. For example, consider the case of the Google Toolbar plug-in. A user may have had an understanding of, and an intention to actually share their surfing behavior with Google. However, it appears this intention will become weaker or completely forgotten as time passes by. In a sense, then, the essential action emerges into an incidental one over time. We refer to this as the principle of maintained intentionality.

The web is clearly a system of IT artefacts, continuously being shaped by the interests of a heterogeneous group of stakeholders. Sometimes these interests are conflicting. Thus, the communication taking place while traversing the web becomes more complex than communication issues in a non-web environment. An understanding of, and ability to describe, this complexity improves the odds of success in designing and evaluating web applications to support the users’ actions, and fulfill their needs and desires as social beings.

Finally, although the discussion stems from the empirical context of a web application, the line of reasoning may also be valid in a wider context; that of contemporary desktop applications in general. In contemporary IT artefact development, characterized by Enterprise Application Integration and Service Oriented Architectures, it is likely that communication which we are unaware of as users takes place. As a user, it is not apparent what is being logged, by whom it is being logged, or why it is being logged. Thus, we suggest that we always need to aim at understanding the impact of the underlying IT infrastructure on communication and agency, and bring this understanding to action when designing new IT artefacts. This is not a recommendation to always design for full social transparency. However, a designer should be well aware of what is being designed, and actively decide in what way the communication taking place should be visible for the users of the system through the user interface. This is an ethical issue, and as such it should be on the agenda in a design situation.
A designer thus needs to reflect about the social role of the IT artefact in relation to its technological context. The way things are stored, the IT infrastructure, and interacting IT artefacts impact communication. The designer needs to take this into account, in order to improve the actability of the new IT artefact – it is unlikely to design an actable IT artefact in isolation, since its communication properties need to be well understood by its users in order for them to perform meaningful social action. We need to understand the artefact as embedded both in a social environment and in a technological environment. The change of the social environment will be a result of the compound IT artefact (Figure 5-4), not the new application in isolation. Confer Figure 5-2 for a view of the compound IT artefact in a communication context.

Figure 5-4
A compound view of the IT artefact
This chapter primarily addresses the second research question: How can existing IS use qualities be described, interrelated and well understood based on the proposed concept of IT artefacts? Section 6.1 discusses a socio-instrumental view of the concept of use quality. Section 6.2 introduces the use quality matrix. Based on the proposed concept of pragmatic duality, it is argued that use qualities may be conceived at different pragmatic levels: Interaction-oriented qualities and communication-oriented qualities. Both these orientations of qualities may be either generic or specific to some genre of applications. Section 6.3 provides an example of how to conceive existing use qualities based on the use quality matrix.

6.1 A Socio-Instrumental Perspective on Use Quality

This thesis, in line with many IS scholars (e.g. Goldkuhl & Lyytinen, 1982; Orlikowski, 1992; Orlikowski & Iacono, 2001; Ågerfalk, 2003) proposes a view of IT artefacts as embedded in a social setting. The idea of problem solving as a social process is also in harmony with interaction design research: building IT artefacts with a high quality-*in-use* (Bevan et al, 1991; Bevan, 2001; Preece et al 2003). This is typically achieved through a user-centered design process and through the application of techniques (such as mock-ups, scenarios and prototypes) to promote learning and communication between users, designers, and other stakeholders (Preece et al 2003). On a more generic level, the idea of participative design as a means to achieve high quality in the end result is coherent with the Scandinavian IS tradition (Bansler, 1989) and the idea of socio-technical design (Mumford, 1995).

Moving back to the pragmatist roots of this thesis, Dewey’s (1938) view on inquiry is that it is an endeavor to change an indeterminate situation into a determinate one. This may be translated into a problem solving context. Inquiry is about understanding the situation-in-view (i.e. problems), and finding solutions, i.e. changing the situation to accomplish some goal or meet some
ideal. Dewey’s (ibid) definition of a situation is that it is a contextual whole consisting of objects and events. The IT artefact may be considered an object, and the use situation is characterized by a number of events (or actions) where the IT artefact is an instrument for action.

The concept of use quality is tightly connected to the idea of ideals. Löwgren (2006, p. 384) defines use qualities as “[…] properties of digital designs that are experienced in use and the designer is in a position to influence at design time.” A quality is always implicitly or explicitly related to some ideal, i.e. a statement that something is bad or good needs to be understood in the context of an ideal. A claim that the weather is bad requires knowledge of the locutor’s perception of ideal weather to make sense. Bevan (2001), as an example, simply describes usability as a “user’s view of software quality”. More elaborated definitions of usability include users, having goals, performing tasks using the artefact in some context (ISO 9241-11). Interaction design approaches emphasize the need of a user-centered design process, in order to come up with a design which is based on the variety of needs within different user groups (Bevan et al, 1991; Bevan, 2001; Preece et al, 2003). Understanding the tasks and understanding the users are often highlighted as two important aspects of design for usability.

In the evaluations, ideals have been present in different forms, e.g. as business goals (in the library evaluation) and as evaluation criteria (e.g. in the scheduling system evaluation). From a design perspective, we may work towards high quality taking different types of measure. First, solutions how to meet such ideals may reside in having certain artefact properties (i.e. following some usability guideline). Second, solutions may be discussed in terms of what to do – and what to focus – in the design process, such as adopting a user-centered process. Third, the solution to a problem may reside in organizational changes. The IT artefact thus needs to be conceived in a broad social sense, as an IT artefact in context, rather than being limited to the artefact as such.

Figure 6-1 shows relations between important concepts connected to design and evaluation of IT artefacts. Although the terminology in the figure is focused on design, one may easily adopt the model to an evaluation context. Or, more generically, we could use the concept of inquiry in a Deweyan sense, which encompasses both design and evaluation. The figure is created through
the merging two existing models: Orlikowski’s (1992) structural model of technology and Ågerfalk’s (2001) A3 model (explaining the relations between action, actor and artefact). On top of synthesizing these two theories, the concepts of design practice, design ideal, and use quality have been added to the model.

The A3 model, which is part of Information Systems Actability Theory, is represented in a different way compared to the representation by Ågerfalk (2001) – the relations between action, actor, and artefact have been named, the social setting has been related to them, and the encapsulation of these four concepts has been named “IT artefact in context”. The A3 model states that an actor performs social action using an IT artefact, which thus is an instrument in the performance of action.

Figure 6-1 A socio-instrumental contextualization of IT design

The integration of Orlikowski’s (1992) structural model of technology is transparent through the letters (a) through (d). Orlikowski states that we need to understand technology as a product of human action (a), which is shown above as the IT artefact as a result of a design process, taking place in a design practice. In Orlikowski’s (1992 p. 410) words, “Technology is an outcome of such human action as design, development, appropriation and modification.” Further, Orlikowski’s (ibid) view is that technology is a medium for human
action (b): “Technology facilitates and constrains human action through the provision of interpretive schemes, facilities, and norms.” IT artefacts are designed in a certain way and its properties are institutionalizations constraining and enabling certain actions in the particular social setting. In line with Gidden’s (1984) structuration theory, Orlikowski (ibid p. 410) explain the institutional conditions for interaction with technology (c): “Institutional properties influence humans in their interaction with technology, for example, intentions, professional norms, state of the art in materials and knowledge, design standards, and available resources (time, money, skills).” Orlikowski (ibid, p. 410) explains the institutional consequences of interaction with technology (d), still based on Gidden’s reciprocal relationship between agency and structure, in the following way: “Interaction with technology influences the institutional properties of an organization, through reinforcing or transforming structures of signification, domination, and legitimation.” Giddens (1984) structuration treats the matter on a more abstract level, where action in general is influenced by – and reinforces or transforms – social structures.

Figure 6-1 further explains the IT artefact as embedded in a social setting. Further, the notion of a design practice, which informs a design process and intersects with it in a user-centered design manner, has been integrated into the model. A design process is governed by design ideals, which I conceive of as socially constructed by the actors in the design practice. Those ideals may be sprung from various sources, such as experts/consultants proposing a certain quality framework or best practice approach, or representatives from the workpractice who proposes business goals or values as a form of design ideals. Finally, a use quality may be understood as a representation of a design ideal. Design ideals concern the IT artefact in context, as depicted in Figure 6-1. While conceiving use qualities as representations of such ideals, these too focus the IT artefact in context. A consequence of adopting this perspective is that one should be careful not to adopt a narrow view of use qualities in a design or evaluation situation – the ideals that govern our actions need to acknowledge the full context of the IT artefact in use, in action, and within a social setting.

A design process induces change in the social setting in which the IT artefact will be put into use. Sometimes, designers have limited opportunity to induce such change in the social setting (e.g. when designing off-the-shelf products, or when the development effort is an “IT project”, i.e. the development of
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technology without mandate to make changes to the social or organizational realm). However, in some situations, the designers also have access to proposing changes to business processes or attempt to influence the norms and roles in the social setting where the IT artefact will be embedded. People’s experience of the quality of the IT artefact will be formed as a consequence of both the properties of the IT artefact and by other experiences. For instance, a user-centered process will affect both the artefact as such, but also the users’ willingness to accept the changes at the workplace. Furthermore, apart from the introduction of a new IT artefact, there may be other organizational changes accompanying the introduction of a new artefact, such as new roles, workgroups and assignments. We need to conceive the use qualities of an IT artefact in the light of such changes to the organization. If particular individual states that an IT artefact is useless, it may indicate that the artefact as such should be re-designed, but it may also indicate that the particular individual (or the group which he/she represents through a role) has not been adequately introduced to the artefact. It may also indicate that the person needs more knowledge of the social context. This situation occurred in the evaluation of the search application: Some interviewees found the application difficult to use due to a lack of knowledge of academic databases. However, one of the goals of a university education is to gain knowledge on how to do research within ones field and how to assess the relevance and scientific quality of information in general. Therefore, it might be desirable that the students learn about the academic databases and how to critically assess the value of different types of publications, rather than designing a more sophisticated IT artefact which abstracts such knowledge, although the latter solution might be more useful for the students on a short-term basis.

The proposed socio-instrumental contextualization of the use quality concept is in line with Dewey’s concept of moral inquiry. It is relevant to speak of both desired IT artefact properties and changes in the social setting which are needed to change an indeterminate situation into a determinate. The empirical findings support this claim, and call for further conceptualization of the concept social setting: There are different social settings which are affected by, or concerned with, the qualities of artefacts. The library evaluation (the search application) shows us how the artefact induces changes in both client activities and library (organization) activities. The web shop example shows us a number of stakeholders which pay an interest in the design of that artefact, for different
reasons. The other evaluations also consist of a multitude of stakeholder groups, such as teachers, students, and administrators.

![Diagram of social contexts embedding the IT artefact](image)

**Figure 6-2 Social contexts embedding the IT artefact**

Figure 6-2 illustrates the multitude of social settings which embed the design and use of an IT artefact. We may speak of a social context as a source setting: The design practice which brings to existence the IT artefact. The process of designing an IT artefact takes place within a design practice, and it may be conceived as an endeavor to design an IT artefact and induce changes in the social settings in which the artefact will be put into action. These social settings – which are target settings – may be viewed upon from (at least) three different and equally important perspectives:

1. The core workpractice, such as Amazon.com, taking the initiative to start the design process, and which is typically the owner of the artefact.

2. One or more client workpractices, such as the visitors of Amazon.com, who are affected by the IT artefact in different ways. In the Amazon example their clients experience a modern way of finding literature,
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and share experiences of literature, making them better informed before purchasing books.

The stakeholder context – a “grand social setting” including other stakeholders that may be identified in relation to the development of the IT artefact. This may include partners, investors, legislators, competitors, environmentalists et cetera. This must not be overlooked, since it both constrains and at the same time enables the design process. In the Amazon case, there are various commercial actors such as advertisers and profilers. These actors are partners, which both enable and constrain the design of the web shop/community.

Based on this view of IT artefacts as being embedded in multiple social contexts, one may reason further about the concept of use quality. Such qualities belong in use situations; in the relation between actor and artefact. Moving back to Dewey’s (1938) definition of a situation, we need to understand a contextual whole consisting of objects and events. In such situations, the users experience the artefact and the users’ impressions of its qualities are shaped. However, in a broader sense, there are a number of stakeholders from the social settings mentioned above who are not users of the IT artefact, still important in the design process, and who may be affected by the outcome of that process. A broader conception of use qualities may need to incorporate the view of all these stakeholders. A conclusion is that we need to reflect about the immediate social settings where the IT artefact is used and the “grand social setting” in order to determine the ideals which are the basis for evaluating or designing the IT artefact and its context. This bulk of ideals, stemming from the various stakeholders, will be a relevant basis for assessment of the qualities of the IT artefact in its context.

6.2 The Use Quality Matrix

As discussed in the introduction chapter, many efforts have been made to develop concepts of IS use quality, which may aid evaluators and designers in their work. The introduction chapter further made the claim that the relation between different scholars’ quality concepts is typically implicit. Further, a number of evaluations have been performed in different social contexts. Two of the evaluated systems were embedded in collaboration-oriented business environments (#1, #2), one evaluation (#3) was performed in a service-oriented environment, where a library attempts at improving their communication of
available information to their clients through a new search facility powered by IT. Evaluation #1 may also be categorized as service-oriented, if we conceive of students as the university’s clients. The final evaluation (#4) concerned a web shop, complemented by a community where people exchange experiences about the available products. In HCI terms, one would say that these artefacts belong to different genres, thus we need to understand them based on different theories on design and evaluate them on the basis of different quality concepts. However, this research indicates that IT artefacts in all these genres need to be understood through the lens of “pragmatic duality”, i.e. that we need to understand both the technology and its affordances, and how the use of some technology is interpreted by others. That is; how we communicate with others while using information technology. The understanding of the communication that takes places is a pre-requisite to understand the role of the artefact from a socio-pragmatic perspective: What commitments we make, how others expect us to do things, or how identity and other social driving forces are essential to understanding the adoption and use of technology.

My impression after confronting this matter through these evaluations is that we may speak of various levels of IS use qualities:

- Interaction-oriented qualities, which can mainly be found in Human-computer interaction research. These qualities are often formulated in a generic and prescriptive manner.

- Communication-oriented qualities, which concern communication and social consequences of the use of IT. Given the presented perspective (pragmatic duality of user interfaces) this category is also categorized as “generic” use qualities, although they tend to aim at guiding our focus in the design process rather than being prescriptive.

- Genre-specific qualities, which are less generically applicable than the two categories above. As an example, designing an online community could include qualities based on Flores’ (1998) concepts of identity, strategies for technology use in e-learning (e.g. Keller & Hrastinski, 2008) or social qualities such as the concept of sociability (e.g. Preece, 1998, Preece, 2000; Lazar and Preece, 2002). As a contrast, the design of a task-supporting artefact such as an internal system for salesmen
may be designed with a different set of use qualities in mind (e.g. the ISO usability goals of effectiveness, efficiency, and satisfaction). Löwgren (2006) provides a rich overview of use qualities which are related to different genres.

Figure 6-3 illustrates the use quality matrix, which may be helpful to represent use qualities, in order to make it easier to reflect about the appropriateness to put them into action in a specific design or evaluation context. The use quality matrix is based on the notion of pragmatic duality – the idea that we always need to understand an IT artefact both from an interaction perspective (how the human understands the machine) and a communicative and social perspective (how the human interprets the social aspects of doing something using the artefact).

![Use Quality Matrix](image)

**Figure 6-3 The Use Quality Matrix**

The vertical axis of the matrix thus consists of two polarities: A use quality may be represented by a vertical line along this dimension. The function of the horizontal axis is to explain whether a use quality is generically applicable, or if it is genre-specific – only relevant in some specific context. The four categories which emerge in the matrix are ideal typical – a use quality may intersect all categories. The use quality matrix aids a researcher in considering these two aspects of a quality, thus it helps to develop clearer conceptualizations. As such, it may be seen as a progenetive tool for researchers, but it may also be helpful for practitioners, since it will aid them in determining the applicability of a use quality with respect to whether it is
interaction-oriented or communication-oriented, and in which genre(s) of IT artefacts it is applicable. The need for genre-specific theories is stressed by several authors in the general IS field (e.g. Orlikowski & Iacono, 2001), design-oriented IS research (e.g. Gregor & Jones, 2007), and human-computer interaction (e.g. Ihlström & Lundberg, 2004). Such theories aim at generalizing at a credible level, rather than being prescriptive for all types of IT artefacts in all contexts.

The use quality matrix may be useful to focus attention towards suitable quality concepts in design and evaluation situations: It helps determine which quality frameworks to adopt to ensure that we highlight both user-system interaction issues, human-to-human communication and social issues, and issues which are especially relevant given the genre of IT system at hand. By incorporating such focus on desired qualities at an early stage in a design or evaluation process, we are more likely to base the work on a well-reflected set of ideals. Three evaluations (#1 - #3) performed in this research process show IT artefacts which do not fulfill ideals of communication and social action; which leads to workpractice problems. Evaluation #4 is built upon communication issues, but may be criticized from an ethical perspective: It does not clearly show its users how their statements are part of a user profiling endeavor. At the same time, the commercial idea of the web shop/community, and a number of the design features, depend on the user profiling.

The use quality matrix should be conceived as an instrument to understanding and interrelating IS use qualities. This is readily applicable for practical purposes – it helps us ask certain questions in a well-structured manner, whether it is in the context of design or evaluation of an IT artefact in its context:

- Which use qualities are relevant for the IT artefact at hand?
  - Are there generic theoretical frameworks for communication quality which are relevant and useful in this situation?
  - Are there generic theoretical frameworks for human-computer interaction which are relevant and useful in this situation?
  - Given the genre of application we are evaluating/designing, are there specific frameworks which are relevant and useful?
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- How do we achieve the use qualities we strive for?
  - In what way do we need to adapt the design process?
  - In what way is it a matter of the characteristics of the IT artefact as such?
  - In what way is it a matter of the characteristics of the social settings which embed the IT artefact?

6.3 X-abilities: The Use Quality Matrix in Action

We may populate the use quality matrix with various quality concepts (from now on referred to as X-abilities) in order to relate them to one another. Such an endeavor is a major undertaking; however it is a useful exercise in this context, as it clearly points out the difference in focus between different quality concepts. It also stresses the need to work with combinations of existing theory, adapted to the current design or evaluation context. Three X-abilities have been selected for this exercise. The first one is usability, which is included due to its impact on research and practice. The second one is actability, which deserves inclusion since it belongs to the same ontological domain (socio-instrumental pragmatism) as the concepts presented in this thesis. The third one is e-service quality, which is included due to the increased interest in customer-oriented applications on the World Wide Web (e.g. Santos, 2003). These three X-abilities are further discussed in the three following subsections. A use quality matrix representing these three quality concepts is depicted in Figure 6-4. The positioning of these concepts into the matrix is not intended to be completely accurate – it is rough, still accurate enough to inter-relate these X-abilities to one another in order to better represent their meaning.
An important reflection at this point is that these different types of qualities allow us to take a look at the use of an IT artefact. However, depending on which perspective we adopt, we will perceive the quality of this artefact in different ways. There is a risk that the most well known quality concepts, or the ones which are applicable with a minimum of effort, are the ones chosen to determine the quality of an IT artefact (Rogers, 2004). I stress the importance of actively discussing qualities in context – every designer (or evaluator) needs to base their work on relevant qualities in the current situation. There is also a need to be aware of both generic quality frameworks (such as usability and actability) and genre-specific frameworks (such as e-service quality), and be able to determine how to combine these to come up with a useful framework, adapted to the current situation. The application of the matrix in this context is also important to motivate the existence of Information Systems Actability Theory, which is often interpreted by usability researchers, who tend to regard actability as a perspective on usability. A more accurate way of seeing this is that while both these X-abilities are concerned with the quality of the artefact, they stem from completely different theoretical roots. The work on ISAT is a struggle to theorize how human-to-human communication aspects, and the social structures governing such communication, should be understood and put into practice in IT design and evaluation situations. Usability, on the other hand, evolved from cognitive psychology and human factors, and is still largely influenced by those roots. This is further clarified below.
6.3.1 Usability

Usability is a broad field with many nuances. In this section we address a set of common usability principles (Keinonen, 1998): consistency, user control, appropriate visual presentation and task match, error handling and recovery, and memory-load reduction. These principles are derived from Shneiderman (1998), Norman (1988), Nielsen (1993), and ISO 9241-10, four commonly referenced sources for user-interface design (Keinonen, 1998). The conclusion about these principles is that they are interaction-oriented and formulated in a generic manner, as depicted in Figure 6-4. It should be noted that this is a small analysis; only focusing design principles from the usability field. The field of interaction design as a whole is a much broader topic, providing other instruments to come up with high quality designs. One such instrument is the adoption of user-centered methods (e.g. Preece et al, 2003), which clearly improves the odds of handling problems other than purely interaction-oriented.

Consistency

The usability principle of consistency is primarily related to the learnability of the IT-system; i.e. new things should only have to be learned once (Keinonen, 1998). The principle of consistency can be applied to various phenomena: the terminology in use in the system, the sequence in which things can be done, and the consistency in the design of different applications (Keinonen, 1998). Visual consistency also increases the perceived stability, thus promoting user confidence. Nielsen (1994) also states that platform conventions should be followed. This principle basically states that the user should be able to understand the terminology and design of the system effortlessly, which is a matter of the instrument’s consistency.

User control

The idea of supporting users’ internal locus of control (Shneiderman, 1998) relates to the user’s subjective feeling of first person participation and engagement in the interaction. It is also related to the design principle of direct manipulation interfaces. The rationale for this principle can be summarized as: “...interaction is more rewarding if the users feel they can themselves directly influence the objects, instead of merely giving them instructions to act.” (Keinonen, 1998 p. 26). This could be seen from a strict interaction perspective: we could try to give an explanation to why users prefer to be in control only by looking at user-system interaction. We could also conclude that
there is a need to make users understand the rationale behind possible sequence restrictions (what can be done in what order) as well as to the allocation of actions between users and systems (what can be automated and what cannot). This principle is basically related to interaction styles and cognitive matters.

Appropriate visual presentation and task match
Appropriateness of visual presentation is a concern that has arguably so far dominated the research on user interface design (Keinonen, 1998), and by implication research on usability (Holmlid, 2002). It is emphasized that users have to be provided with sufficient and not inadequate (irrelevant or rarely needed) information. “To be in control, the user has to be provided with all necessary information” (Keinonen, 1998 p. 26), where ‘necessary’ means that “the dialogue should present the user only with information related to the completion of the task” (ISO 9241-10, p. 3). Furthermore, it is assumed that the user should explicitly be made aware when operations have been completed successfully; the system status should be visible (Nielsen, 1993; ISO 9241-10). One of Shneiderman’s (1998) golden rules of design is offer informative feedback, which states that there should be system feedback for every user action. It also states that the response should be more substantial for actions that are infrequently performed and for ‘major’ actions. The principle of task match is the idea that information systems should present exactly the information that users need (Keinonen, 1998). The principle ‘appropriate visual presentation and task match’ is thus related to how information is presented and how well this information integrates with the business task at hand. This is a way of stating that there are genre-specific qualities of an application, which are summed up in the generically formulated criteria task match and appropriate visual presentation – a call to designers to make an effort to understand the users’ tasks and the users’ needs when it comes to visual presentations, and adapt to those requirements. The principle as such, though, must be conceived as generic rather than genre-specific.

Error handling and recovery
The principle concerned with error handling and recovery deals with how the IT-system should respond to the user in various critical situations. Nielsen (1993), for example, points out that it is better to express error messages in plain language (instead of error codes). Error handling includes warnings given by the system before hazardous commands, information about irrevocable user actions, error prevention strategies, detection of errors made, easy reversal of
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actions, and possibilities for the users to correct errors without re-performing the whole task. Error recovery is claimed to relieve anxiety and facilitate learning by doing (i.e. ‘trial and error’). Critical situations thus include, for example, those where hazardous commands and irrevocable actions can be performed. This design principle also treats how to avoid that errors occur in the first place, and how to handle situations where errors have occurred. Another aspect of this principle is how to facilitate the possibility to correct errors easily, without having to go through the entire task from the beginning. Shneiderman (1998) propose that actions, insofar as possible, should be possible to undo, since this encourages the users to explore the system (without taking any major risks). This principle is interaction-oriented.

Memory-load reduction
The notion of memory-load reduction addresses a basic principle of human cognition: people tend not to remember unrelated pieces of information accurately. It is expected that many errors will occur where precise recollection is required, which is why interaction should rely more on recognition than recall (Nielsen, 1993). It is argued that recall is prone to error, while people are good at recognizing objects (Norman, 1988). The system should therefore present alternatives and patterns so that people can select among given options (Shneiderman, 1998). Therefore it is important that information is meaningful and easily provided. Nielsen (1993) states that objects, actions and options should be made visible, and that the user should not have to navigate between different dialogues when formulating a message. Nielsen further states that instructions on how to use the system should be easy to retrieve when this is appropriate. This principle is purely cognitive and interaction-oriented.

6.3.2 Actability
ISAT has already been presented in this thesis (section 2.3 and continuously), but a brief discussion is required here to motivate the positioning in the use quality matrix. This will be done through a short discussion about previous research which compares actability to usability.

Ågerfalk (2004) provides an analysis of usability principles from a communicative perspective. Keinonen’s (1998) categorization of common usability principles is approached from a language/action perspective. Ågerfalk concludes that usability principles are typically focused on human-computer
interaction phenomena, while social qualities are only peripherally included in typical usability evaluation criteria. Socio-instrumental aspects are not currently made explicit in common usability principles, even though some principles may be interpreted (or perhaps re-interpreted) as related also to business communication. Usability principles originate from cognitive theories rather than from theories on human behavior, human communication and an understanding of the organizational context in which IT-systems (mostly) are designed. ISAT proposes that social action theories can be used to understand organizations, and hence explain the use of IT-systems as socio-instrumental action within some wider action context. ISAT recognizes that interaction-oriented concepts are important to understand certain qualities of an IT-system, such as the learnability and the system’s ease-of-use. However, this should be seen in relation to the communication and social action that takes place in the business context. The ISAT evaluation heuristics capture various aspects of communication action which are supported by IT as a medium and as an agent, and prescribe how to visualize such aspects in the user interface to make the users more aware of the social actions they perform while maneuvering the IT system. At the same time, some of the ISAT heuristics also incorporate what has “already been said” by usability researchers. For instance, the combination of usability principle of task match and visibility of system status (Nielsen, 1993) and Gibson’s concept of affordances (1978) may very well be seen as similar to ISAT principle situational context awareness, which states that the user should always be aware what they are doing and what they are supposed to do. Such similarities may often be found when comparing usability and actability, but a closer look at them reveals that the underlying philosophies are different. There is a risk, though, that the underlying philosophies of this type of “checklists” are not adopted by those who put them into action in practical design or evaluation work.

Sjöström (2003) presented a re-formulated version of the ISAT evaluation heuristics, highlighting parts which were directly concerned with social action aspects of user interface design:

- Make the users understand the social context by making the actors visible in the IT system. This way, the users will be aware of the origin of messages, and whom they are sending messages to.
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- Allow the users to understand when other actors will interpret their messages. This can be done by making it transparent when messages reach their intended interpreters, and if messages are pushed to them or pulled by them.

- Promote qualitative utterances by 1) making information about previous actions available in the action memory and 2) making the actors visible in the IT system in order to make clarifications possible and promote users to trust the information.

- Promote a suitable quantity of information handling by 1) displaying and requesting an adequate amount of information in screen documents and 2) making the actors visible in order to allow users to retrieve more information if needed.

- Promote users to understand what they are supposed to do by 1) using expressive user interface components, 2) making information about previous actions available in the action memory and 3) allow focus and work task changes.

Actability design principles are biased towards communication action aspects of user interface design. This is surely a consequence of the theoretical roots on which ISAT is based, e.g. semiotics and various social action theories. However, as shown by Ågerfalk (2004), there is a tight connection between interaction-oriented properties and communication-oriented properties of IT artefacts, which has led to a formulation of actability heuristics which incorporate both interaction-oriented and communication-oriented aspects. To some extent, actability guidelines overlap usability guidelines. It is also evident when studying actability heuristics that they are formulated in a generic manner, rather than being limited to a well-specified category of IT artefacts.

6.3.3 E-Service Quality

The terms “e-Service” and “e-Service quality” are contemporary buzzwords, and they are likely to be interpreted in different ways by different individuals. In this context, I consider an e-service in a broad sense: it is a web site designed for service quality; one media among others which is used as a means to leverage communication with an organization’s clients. The concept of
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pragmatic duality is highly relevant in this context, since communication and social relations are vital for the consumer’s experienced service quality (e.g. Edvardsson, 2005). Edvardsson concludes that there are two categories of service quality clues: clues of experience related to functionality and clues of experience related to emotions. According to Edvardsson, negative emotions affect the customer’s perceived service quality more than positive emotions. Service researchers describe an established service culture as a way of avoiding negative emotions among the customers (e.g. Lewis & Entwistle, 2005). Edvardsson emphasizes the importance of responsiveness towards customers; especially in relation to customers’ negative emotions and complaints, and that it is important to have repair mechanisms to compensate customers who are not satisfied with the service(s) offered. In order to facilitate such ‘reading’ of customer emotions, and to facilitate repair mechanisms, one can conclude that there is a need for bi-directional communication channels between the service provider and its customers. An IT artefact – typically a web site – may be conceived as one such communication channel; however it should be seen in the context of other means of communication.

Johansson (2003) discusses how customers perceive different communication channels in relation to different actions (orders, cancellation of orders, complaints et cetera). The study concludes that companies with a heterogeneous group of customers should offer their customers a variety of communication channels, to prevent them from being shut out from the services offered. The study also shows that formalized communication channels (like a web site) are often preferred for orders and cancellation of orders, while other communication channels (like the telephone) are preferred for complaints. From Johansson’s (2003) work, it can be concluded that there is a risk in launching an e-service to replace existing communication channels. One should see the e-service as a complementary service to customers, which can be used for certain purposes. The ‘usability’ of the interactive product which facilitates the e-Service is an important quality aspect, but it needs to be regarded in the light of the service context as a whole. An e-Service needs to be regarded as part of a service context, where the design of other communication channels between service consumers and the service supplier needs to be taken into consideration. Potential usability problems need to be backed up by other working communication channels in order to prevent the service consumer from developing negative emotions towards the service as a whole. One e-
service quality might thus be its support to guide its users to other communication channels, and other means of consuming the service.

In order to include a broad range of quality aspects into this chapter, it is interesting to analyze some group of use qualities which does not stem directly from the information systems discipline. The following discussion is based on a framework for e-service quality developed by Santos (2003), who performed a large empirical study and generated a number of quality categories through a grounded theory approach. Her theoretical influences are mainly found in service management and marketing, although some references to human-computer interaction are included in her work. Santos concluded that we need to separate between an *incubative* dimension of qualities and an *active* dimension of qualities. Both these dimensions are described with a finer granularity as a number of use qualities. As discussed below, these qualities are specialized (they concern the domain of e-services), and they span between interaction-oriented and communication-oriented qualities. All of them are genre-specific. Santos uses the term e-service quality. The definition of e-service in this context is unclear. It appears to be derived from a broader concept of service quality, applied in a web context. The empirical data includes web sites for e-commerce.

Santos’ *incubative* dimension matches the “designer-to-user” view of the communicative view on user interfaces. It may be seen as static parts of the web site with respect to aesthetics and how content is formalized - a number of characteristics of a web site which are determined during its design: *Ease of use, appearance, linkage, structure* and *layout*, and *content*. The first four issues are clearly interaction-oriented, while the content of the web site is oriented towards communication from the organization to its client.

Santos’ *active* dimension matches the “user-to-user” views of the communicative view on user interfaces: it deals with a number of qualities which require organizational activity. Given the conceptualization of the IT artefact’s agency characteristics, I conceive organizational activity in a broad sense, including both human action and action performed by the IT artefact as an agent. The active dimension is divided into several qualities: *Reliability, efficiency, support, communication, security*, and *incentive*. 
Santos’ (ibid) work shows that reliability is an important matter – an organization’s clients need to be able to trust that the expectations that come into existence while using the web site are fulfilled through a proper service delivery. This is oriented towards communication: If an actor says something, a social relation (an expectation) is established. This social relation needs to be properly addressed to avoid communication breakdown between the parties.

Furthermore, Santos’ mentions efficiency as an important quality. This incorporates the speed of downloading, search and navigation, which makes me classify this as interaction-oriented.

Interestingly, Santos discusses support from both an interaction-perspective and from a communication perspective. In order to achieve e-service quality, there is both a need for help sections on the web page (such as FAQs), and functionality which puts the client in contact with the organization (e.g. through e-mail or telephone). The offering of free advice and suggestions (e.g. home-improvement advice) are also considered as quality improvements.

The quality of communication is described by Santos in the following manner (Santos, 2003 p. 242): “Communication in e-service consists of online communication […] and traditional communication methods (telephone, fax, and postal mail). A good-quality Web site must offer many contact methods”. From a service perspective, we need to speak to the customer on the customer’s terms. The web site should reveal other contact options than e-mail or forms to allow the customers to rapidly get in contact with the organization when needed. This is purely communication-oriented.

Furthermore, Santos’ study shows that the users’ perception of the security of the web site influences their overall impression of the web site quality. Technical solutions (such as encryption) and social solutions (such as online card guarantees) may be used to enhance client confidence in security. Santos’ description of security is apparently primarily concerned with the users’ trust of the technological solutions, which is communication-oriented – it is a matter of communicating to the user that the web site is secure.

The final category concerns incentive, which Santos defines as “the encouragement given by the Web providers to consumers to browse and use the
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Web site, including rewards for doing so” (Santos, 2003 p. 242). The web is often the preferred communication channel from the organization’s perspective due to the low transaction costs. Incentives the preferred transaction costs may both attract and retain online clients, and is therefore an important quality issue when designing commercial web sites. This is clearly socially oriented: The organization communicates the incentive to the customer. This may be communicated on the web site and using other communication channels.
CHAPTER 6
Chapter 7

Concluding Discussion

This chapter contains a discussion about the research questions and the corresponding results (section 7.1). Implications for practice, including the status of the results as a practical theory, are discussed in section 7.2. Implications for research are discussed in section 7.3 followed by an outlook into ongoing and planned research which builds upon the concepts presented in this thesis (section 7.4).

7.1 Re-visiting the Research Questions

The purpose of this work was to develop a communication-oriented conceptualization of IT artefacts, which allows for a theoretically sound and coherent formulation of use qualities for such artefacts. As a result, I have proposed that IT artefacts in general need to be recognized as communicative and social in their character. The concept of pragmatic duality has been presented: We need to make sense of several types of communication taking place when the IT artefact is a medium: The interface as such (in particular its affordances), and the human-to-human communication action which takes place through the use of the artefact. This context is to be understood as emerging – people, and their abilities to make sense of the IT artefacts everyday and working lives, constantly evolve as a result of experience which is gained through action. Figure 6-2 illustrates these dynamics, including the interplay between the social structure and the reciprocal relationship between the social setting and the actions performed using the IT artefact as an instrument. This is a partial answer to the first research question:

- How can the ICT artefact be conceptualized to adhere to the dual perspectives presented in the IS field – the task-solving perspective, and the interaction-oriented perspective?

The question has been further explored in chapter 5, where a number of concepts are presented, highlighting the IT artefact as a socio-instrumental medium and as an agent. The communicative view of user interfaces and the
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concept of pragmatic duality were presented in section 5.1. The agency character of IT artefacts was explored in section 5.2, and the agency-medium tension was discussed in section 5.3. The agency-medium tension addresses the problem to design in a way which clearly reveals the ongoing communication, in an increasingly complex world of interacting artefacts and sophisticated information processing (as illustrated in Figure 5-2). As designers and evaluators, these concepts may aid us to ask a number of relevant questions in the development or assessment of IT. A number of such questions, derived from social action theory, were applied in the evaluations presented in chapter 4. These questions are the result of an ongoing exploration of the social character of IT artefacts, which has been heavily discussed within the language action community since its inception in the 1980’s. Furthermore, the notion of IT artefacts was further elaborated, resulting in the concept of the compound IT artefact (Figure 5-4). It was concluded that there is a need for designers and evaluators to understand the social consequences of an IT artefact in relation to interacting IT artefacts and the IT infrastructure at hand. The concept of identity shows great potential in explaining the relations and driving forces for people in the complex web based IT artefacts (as depicted in the partially abstracted model shown in Figure 5-3).

The second research question is focused on the concept of use qualities, and the way we may conceive such qualities given the presented conceptualization of the IT artefact:

- How can existing IS use qualities be described, interrelated and well understood based on such a conceptualization?

The question was explored through the discussions in chapter 6.1. First, the concept of use quality was discussed on an overarching level, and related to the concept of design ideals, which may differ between different stakeholders. The concept of use quality was explained in the context of a source setting (design), and several target settings (use). A perspective on the relation between use qualities, human action, actors, artefacts and the embedding social setting was proposed. Further, the use quality matrix was introduced in section 6.2. It is an instrument to aid us in assessing use qualities in relation to one another. The matrix is useful as a tool to reason about the relevance of qualities in a certain situation, both when it concerns design and evaluation of an IT artefact in its context. It makes us aware of both human-to-human communication issues and
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human-computer interaction issues. It assists a practitioner in reflecting about specific qualities for the genre of IT artefact to be designed or evaluated. Section 6.3 is included as an example on how to operationalize the matrix by determining the character of a set of design principles from usability, actability, and e-service design.

In addition to the results presented in chapters 5-6, a philosophical and ontological manifesto was presented in section 0. This manifesto may also be viewed upon as a theoretically grounded result of this work. Although it is originally grounded in theory, the empirical work performed has strengthened my belief in the value of adopting this perspective on people and information technology. I consider the manifesto to be an easily accessible and powerful condensation of the theoretical perspective in this thesis. As such, it is a helpful means to communicate a rather complex pragmatic philosophy to people with none or little experience in such matters.

7.2 Implications for Practice

Rogers (2004) stated that research within the IS field tends to be conducted and presented in a way which makes it inaccessible for practitioners, e.g. by being targeted solely to the academic community, thus hard to make sense of as a practitioner. Cronen’s concept of practical theory is aimed at the opposite: It draws on American pragmatism and advocates that we need to evaluate a theory based on its qualities in action, i.e. applying the instrumentalities of a theory in an inquiry situation should assist the inquirer in:

- Identifying the situation-in-view
- Constructing judgments (systemic hypotheses)
- Taking action to improve the situation

Cronen (2001 p. 30) suggest that a practical theory “[…] should lead to greater sophistication for all parties involved including the professional inquirer. Its use should make one a more sensitive observer of details in action, better at asking useful questions, more capable of seeing the ways action are patterned, and more adept at formic systemic hypotheses and entertaining alternatives.” In this work, a number of instrumentalities (concepts, models, examples et cetera) have been presented, which may enhance the understanding of the characteristics of IT artefacts in their social context. These instrumentalities
may be used in all three activities presented above. However, the empirical data
in this thesis has mainly been focused on evaluation, which corresponds to
identifying the situation-in-view and the construction of judgments. The third
activity, taking action to improve the situation, has been partially represented in
the evaluations, but needs further work to be properly assessed\textsuperscript{24}.

The evaluations performed in this study have shown that communication-
oriented use qualities tend to be disregarded in the design of IT artefacts, which
causes a number of communication problems in the workpractices where the
technology is implemented. The concepts presented here may aid practitioners
in identifying human-to-human communication issues related to the IT artefact,
and helps explain such issues through various concepts derived from social
action theory. Consequently, these concepts also aid an inquirer in overcoming
such problems by pointing out the need for (re-)design of an artefact or the
need for changes in the artefact’s embedding social setting. This is in line with
Cronen’s (2001, p. 30) aim for richness in instrumentalities: “In practical
theory […] we look for richer, more useful ways to explore what is involved in
[...] a client’s ‘story’” This view of theory is coherent with the concepts
proposed in this thesis.

In Dewey’s view, everyone is an inquirer. The view of inquiry as a social
process thus needs to be based on instrumentalities which make sense to
everyone, if they are to be useful in inquiry. My belief is that the concepts
presented here are understandable for a broad range of people; however there is
a need for the evaluation experts to present them in a pedagogical manner. As a
participant in some inquiry situation, one shouldn’t have to be too involved in
the philosophical background and the socio-pragmatic terms which frequently
occur throughout this thesis. As Cronen (2001, p. 30) puts it: “A practical
theory should provide instrumentalities for including the person using it as a
part of the inquiry process. Practical theories reject both a subjective and an
objective understanding of inquiry. Thus they need to be able to take account of
the practitioner as participant when that is useful.” Some of the concepts in this
thesis are easy to understand for a large target group, others may require a re-
packaging and an introduction to make sense to a people without an academic

\textsuperscript{24} This is further discussed in the research outlook section (7.4).
background. In order to fulfill Cronen’s thought on practical theory; there is a need for guided inquiry process, where some actors properly introduce the instrumentalities presented here to include everyone in the process. Arguably, this type of guidance is needed in all inquiry processes involving the development of information technology.

Cronen (ibid, p. 30) states that “A practical theory should provide sufficient guidance for the use of its instrumentalities. Definitions, descriptions, models, and case examples all contribute to guiding its use. Meeting this criterion is not a matter limited to providing formal definitions with the form of analytic propositions.” Guidance, in this case, is provided both through the presented concepts as such, but also through the case examples and the various evaluation questions presented throughout the thesis. These show how we may conduct evaluation activities. The four evaluations show a number of alternative evaluation approaches. A number of operationalizations of the communicative perspective have thus been provided, focusing different aspects of social interaction. Basically, in order to perform inquiry, we need a sociological complement to the communicative perspective.

Further, the concept of use quality presented in chapter 6 advocate a focus on ideals at an early stage in the process of evaluation and design: There is a need to (re-)construct design ideals, as they are essential to governing design and to making statements about the quality of an IT artefact in its social context. Practical guidance to inquiry is provided by the use quality matrix. The relation between various use qualities may be structured using the matrix, which allows for a broad approach to inquiry.

The matrix further suggests that we should start out an evaluation by posing the question which ideals to strive for in an evaluation or design situation. Finding solutions to meet those ideals is considered a creative design process, conducted in interplay between parties from different social settings: The design practice, which typically intersects with target practices (through the participation of workpractice members and sometimes the clients of the workpractices). The use quality matrix suggests that the communicative perspective preferably should be used along with genre-specific theory to help us judge the situation-in-view. Such genre-specific theory could, for instance, be design ideals and use qualities related to the development of e-services, on-
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line newspapers et cetera. I would not state that this perspective alone is enough to produce various systemic hypothesis about a situation, but it advocates and allows for multiple (and complementary) theories which aid us in the social construction of such judgments. This is in line with another one of Cronen’s criterion for practical theory (2001, p. 30): “A practical theory should allow for further development of old methods and creation of new ones. As a practical theory is employed in a new and different kind of situation, methods may have to be developed or adapted in response.” The communicative perspective is based on the principle that it should be used both broadly (as a perspective) and operationalized through a combination with sociological concepts. The results in this thesis call for – and allow – integration with other theory in at least three explicit ways: 1) the communicative perspective per se needs to be complemented by sociological theory to understand the problems in the situation-in-view in depth. The characteristics of the complementary theory need to be determined in the specific situation. Two tools for determination have been provided. 2) The socio-instrumental perspective on use quality defines the compound IT artefact in context, suggesting that our complementary theory should include explanations incorporating the social impact of the IT artefact, given its characteristics within its technological environment. 3) The use quality matrix points out various domains where we may search for design ideals which are suitable in a given situation: The two polarities generic v. specific and interaction-oriented v. communication-oriented.

Cronen (2001 p. 30) adds another criterion for practical theory: “A practical theory should facilitate the creation of alternative systemic hypotheses. The details of experience are typically amenable to more than one coherent explanation. A single explanation blinds the inquiry process to alternatives and stymies an investigator when a particular line of inquiry is unfruitful.” Due to the openness of finding sociological complements to the communicative perspective, there is not really a limit for creating “alternative systemic hypothesis” about the situation-in-view. Although I have proposed a number of instrumentalities to reason about how to select (or construct) ideals as part of inquiry, it is a creative and situation specific process which I believe cannot be completely formalized. In the end, there is a tension in every inquiry between the resources available and the degree of sophistication of the theoretical
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Frameworks used to identify the situation-in-view and construct judgments about it.

This discussion has covered Cronen’s criteria for practical theory as depicted in Table 3-1, except for the first one, which I interpret as a more abstract formulation, which is implicitly represented in the formulations of the other criteria. Conclusively, my impression is that it is fair to classify the results in this thesis as a practical theory. However, in order for it to be more useful for practitioners, it should preferably be represented in a more popularized way, with less philosophical terms residing in the instrumentalities, and in the form of method components to support various aspects of inquiry.

7.3 Implications for Research

Following a pragmatic philosophy, I claim that any social science concept is living tissue and that it will always be subject to change in future academic discourse. However, the concepts presented in this thesis constitute one answer to the call to theorizing the IT artefact put forward by Orlikowski and Iacono (2001). Ideally, the concepts presented here will be adopted (and refined) by other scholars, who wish to make an explicit statement about their perspective on the IT artefact as part of their research. I therefore claim that this theory may be progenetive, i.e. used by other scholars as part of their research design and their theory generation process. While the concepts presented here are in the intersection between social action theories and IS theory, there is a potential to incorporate this work with research in many academic fields, e.g. semiotics, sociology, information systems, service management, and interaction design.

On the one hand, the aim of the research has been to create loosely coupled concepts which may be used in various contexts, e.g. incorporated into existing development methods. On the other hand, the concepts are also adding to the cumulative research within the theoretical frameworks Socio-Instrumental Pragmatism and Information Systems Actability Theory. As an example of this, the library evaluation showed the ease-of-integration between a workpractice analysis using both interaction diagrams (a SIP concept) and the communicative perspective on user interfaces. Further, this work has been partly based on ISAT and made some explicit contributions to it, such as the analysis and update of the actability definition and the addition of some evaluation heuristics.
As discussed in chapter 2, this work is based on the theoretical frameworks of socio-instrumental pragmatism (SIP) and information systems actability theory (ISAT). The results presented here are thus a contribution to those particular theoretical frameworks. The various publications based on the evaluations in this study have addressed ongoing research within communication-oriented communities such as LA/P, OS, and pragmatic web, and may thus be seen as a contribution to those communities as a whole.

### 7.4 Research Outlook

My endeavor to conceptualize the IT artefact will continue. Future research will be closer integrated with a design perspective. The idea of design-oriented research has gained interest in the IS field, and shows great potential for theory development. The idea of design theory is clearly related to practical theory as presented here. Both these classes of theory are based on a pragmatist philosophy – we need to determine the quality of a concept based on its usefulness when applied to a problem solving situation. A set of design-oriented research projects are active at the time of writing this. In these projects, the concepts presented here are applied in the design process, which may be seen as a way to test the concepts as hypotheses. IT artefacts are being designed, and changes to the embedding social settings are being induced. At a later stage, there will be an opportunity to evaluate the outcome of these projects, thus collect empirical data about the value of these concepts as instruments for design of IT artefacts and changes to the embedding social settings. This has been partially reported by Sjöström & Goldkuhl (2008), but the research is longitudinal and will not be finalized until 2011.

This work has led to a number of abstractions of problem types and principles which may be refined and represented in a more useful format. The notion of *socio-instrumental design patterns* is being researched and the first publication on this topic is available from Sjöström (2008). The goal is to connect design ideals with problems and solutions in a broad sense: Solutions may belong both in the design process, in the IT artefact as such, and in the social setting(s) where the IT artefact is embedded. The design pattern structure is helpful to contextualize a number of use quality concepts and make them easier to understand and more readily applicable in practical design situations.
CONCLUDING DISCUSSION

Furthermore, the evaluation of Amazon.com pointed out some interesting ethical issues concerning the emergence of web sites driven by the interests of multiple stakeholders. The work presented by Ågerfalk & Sjöström (2007; 2008) will be refined through a more extensive empirical study and further theoretical exploration.

Finally, an important means of refining the concepts presented here is to relate them to theories which are the result of a tougher peer-review process, well known in the IS community, and often referred to. This study has paid a lot of attention to semiotics and social action theory, while at the same time the accumulated body of knowledge in the IS field has been peripheral. More established IS theory will be addressed (through the measures mentioned above and in other ways). The point of such a turn is twofold: Both to improve this work through feedback from other communities, and to communicate the results of my research into those communities.
CONCLUDING DISCUSSION
References


REFERENCES


Bevan N (2001) “Quality in use for all”. In User interfaces for all (Ed, Stephanidis, C.) Lawrence Erlbaum.
REFERENCES


REFERENCES


Cronholm, S., Goldkuhl, G. (2006) Handlingsbara IT-system. [In Swedish]


REFERENCES


REFERENCES

the 3rd Intl Conf on Action in Language, Organisations and Information Systems (ALOIS 2005), University of Limerick.


REFERENCES


ISO 9241 (1996) “ISO 9241-10 Ergonomic requirements for office work with visual display terminals (VDTs):– Part 10: Dialogue principles”

ISO 9241 (1994) “ISO 9241-11 DIS Ergonomic requirements for office work with visual display terminals (VDTs):– Part 11: Guidance on usability”


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REFERENCES


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Appendix A: Action Diagrams

This appendix explains a few symbols used in action diagrams, a diagram type which is part of the change method CA/SIMM. Confer Goldkuhl & Röstlinger (2005) for a more detailed presentation of CA/SIMM. Only the symbols in use in the thesis are described here.

The diagram, describing a part of some process, is read from the top and downwards. There is an exception to this: An end arrow on a line may be used to illustrate a flow upwards or sideways in the diagram.
APPENDIX A: ACTION DIAGRAMS
Appendix B: Interview Template

This appendix shows the way interviews and observations were conducted in the evaluation of the library's search application. The questions have been translated from Swedish to English.

Stage one: Profiling the respondent

Ask the user about his/her:

- Background
- Role (at the University, e.g. "student")
- Institution
- Experience from computers and the Internet

Ask about information demand and task:

- How would you describe your need for information? Is it broad or narrow?
- What answers do you want? What are your questions?
- What activity/task are you working on?
- What tools and sources do you use normally to find the information you are looking for?

Stage two: Adapting observation session to the respondent's situation

If the need for information is broad, e.g. "keeping track of what is going on in my field", the following tasks are given to the user in the observation session:

- Which databases are relevant for your field? How do you limit your search to those databases?
- Find a journal article which you know about [within your field]
  - Download a full text version of the article
  - If there is no full text version available using the IT system, what alternative way of finding it will you use?
- Find a journal article which you do not know about [within your field]
  - Download a full text version of the article
APPENDIX B: INTERVIEW TEMPLATE

- If there is no full text version available using the IT system, what alternative way of finding it will you use?

  - Find journal articles from last year [within your field]
  - Find a text book you know about [within your field]
    - Is the book available in the local library?
    - Is the book available through the remote loan service?

If the need for information is narrow, e.g. "finding a certain article" or "learning more about a specific theoretical concept", the observer asks the respondent to clarify the need for information by specifying authors, years, name of the theory and journal, and relevant keywords in the search. (This is done to ensure that the respondent thinks about the search conceptually before starting using the IT system.) In the observation, the respondent is asked to conduct searches based on the specification he/she made.

Stage 3: Observation of respondent using the IT system

The observer describes how things will be recorded, and highlights that it is important for the study that the respondent talks during the observation, to reveal what is going on and what he/she is thinking.

If the user get stuck during the observation, the observer waits for a moment (approximately a minute), then asks these questions (in order, with some delay between dem):

1. What are you thinking right now?
2. Have you considered if there is another way to conduct your search?
3. There is a help function that maybe will help you forward.
4. [Last resort] You could do it this way.. [The observer explains what the user can do to resolve the problem]

The observer should be careful to help the observer, since it influences the study. On the other hand, if the user gets stuck, the observer will not be able to see how the user solves all tasks. There is a need to strike a balance between these two issues during the observation.

Stage 4: Post-observation interview

Questions:

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APPENDIX B: INTERVIEW TEMPLATE

- Did you find what you were looking for?
- Did the search session solve your need for information?
- How will you follow up this search?
- Were the search results relevant? Were they understandable?
- Would you have preferred talking to a librarian, instead of using this IT system to solve your need for information?
- Did you find any information you weren't really looking for, but that you found interesting enough to do a follow-up on in the future?

Stage 5: Manners and exit

The observer thanks the respondent for his/her contribution to the study
APPENDIX B: INTERVIEW TEMPLATE
Appendix C: Example HTTP Request

http://www.amazon.com/s/ref=nb_ss_gw/002-6061363-2284806?url=search-alias%3Daps&field-keywords=Fitzgerald+Open+Source&Go.x=0&Go.y=0&Go=Go

GET/s/ref=nb_ss_gw/002-6061363-2284806?url=search-alias%3Daps&field-keywords=Fitzgerald+Open+Source&Go.x=0&Go.y=0&Go=Go HTTP/1.1
Host: www.amazon.com
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3
Accept: text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/plain;q=0.8,image/png,*/*;q=0.5
Accept-Language: en-us,en;q=0.5
Accept-Encoding: gzip,deflate
Accept-Charset: ISO-8859-1,utf-8;q=0.7,*;q=0.7
Keep-Alive: 300
Connection: keep-alive
Referer: http://www.amazon.com/
Cookie: session-id-time=11798172001; session-id=002-6061363-2284806; ubid-main=104-1608502-5738317

HTTP/1.1 200 OK
Date: Tue, 15 May 2007 12:53:56 GMT
Server: Server
x-amz-id-1: OTEF1VDYTCHV9EFAAA7J
x-amz-id-2: DytYOW9qtroJ1dEMV6eqOoj0nU6+DXKW
APPENDIX C: EXAMPLE HTTP REQUEST

Set-Cookie: session-token=G9qQ3EnFqLkORm3b72bAxDLMoOu8ylH/huNZIyoySaZWSX5/7jUqIVpq5F3kaWRzf7HRI/Q6a186tflHcVobYxfanaAr+M1CRxmQPARK6uRaarF+o+0Of1ID4bfWZCo9xfzrbj7U2Rg47MPXDKh1to6bZs/OtThs7LaweHxiiEhFPeEr/2McrRk4GRWeyh3FX0uFM0U=; path=/; domain=.amazon.com; expires=Tue May 15 13:03:56 2007 GMT
Vary: Accept-Encoding,User-Agent
Content-Encoding: gzip
Content-Type: text/html; charset=ISO-8859-1
Connection: close
Transfer-Encoding: chunked

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