

Mind the Gap

A Procurement Approach to Integrating User-Centred
Design in Contract Development



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Mind the Gap

A Procurement Approach to Integrating User-Centred
Design in Contract Development

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Abstract

Usability professionals seldom get a chance to actually do their job. Instead, they have to argue that usability is something important that should be attended to. This was the initial problem that motivated this thesis. In spite of decades of evolution within HCI this problem is still highly relevant, and existing approaches to solve it yet have to prove their effectiveness. When approaches to integrate HCI into systems development have been discussed, there has seldom been a discussion about how a given approach may be more or less useful in different development contexts. Nor has there been much discussion about how HCI activities relate to the overall procurement-development process. One reason for this may be that existing approaches to HCI integration are suited primarily for product development and, to some extent, to in-house development. At least these contexts are most common in existing case studies.

In this thesis, I focus on the problem of HCI integration in contract development. This context poses particular challenges, mainly because two parties with different goals are involved – the procurer and the supplier. They regulate business relations and responsibilities via the contract. In both existing practice and in research the user-centred design (UCD) process has, at least implicitly, been assumed to belong to the supplier side. It is the suppliers, i.e. consultancy firms, that have employed usability professionals and that have tried to integrate HCI into their development processes. By taking a procurement perspective instead, I question this assumption. I present three case studies that start with a survey of common problems in current procurement practice and end with trying out an approach to work with UCD in systems acquisition. While my interest initially concerned successful HCI integration, I also discuss how the suggested approach deals with several existing problems that procurers face. In particular, the approach links abstract business goals that any systems acquisition

starts of with, to detailed systems requirements that it aims at defining. This facilitates for procurers to focus on the goals that the future system should help enable and linking these goals to the requirement specification that the contract is based on.

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I hadn't planned to write a thesis. In fact, a few months ago I was quite certain that I would not. I would only write a few papers, where after I would jump the ship. But I did write it, much thanks to Anna Stockhaus who suggested that I should. Thanks, Anna, for your never-ending enthusiasm and for your help with both my papers and with this thesis. Of course, neither this thesis nor any of the papers would have been completed, had it not been for my friend and supervisor, Henrik Artman. He was the one who recruited me to this research project, and has supported me to 100%, often more, since then, on both a professional and personal level. Thank you, Henrik, for believing and listening and for all the help with everything I have done throughout these last three years.

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music and the humour that made late evenings durable. Thanks for joining, Anna – it's fun to have you onboard. Thanks for the laughter and for never agreeing, Mattias – you'd make a good researcher.

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1 Introduction

What are we taught in Human-Computer Interaction (HCI)? I believe my training in HCI was thorough and of high quality. Yet, I was more or less unprepared for the challenges I faced during my first years as a usability consultant. They were more organisational and social in nature than core HCI. Common questions were “how do we integrate HCI activities into the development process and the work of other competencies, such as strategy, design & communication, branding and technology?” and “how should we document our requirements and synchronise documentation and prototypes?” Even in projects, you often worked with many other tasks than the planned usability activities. It was, for example, common that the usability professional took on a role as informal project leader, since he/she often were in contact with project stakeholders and members such as the designer, the systems analyst, the client and the users. Managing this role soon became more stimulating than the actual work with user research, interaction design and usability evaluations, which soon became routine. Despite this, it turned out that this would still be child's play compared to the real challenge. This one had to do with HCI, or,

rather, the absence of it. The major challenge proved not to concern actual systems development work at all, but to actually get the opportunity to work with HCI in the first place.

As a usability professional you quickly learn that preaching about usability is part of the daily routine. Actually being involved in time to do a decent job is still a dream for many practitioners. Of course, the role of the usability professional is not alone in having too little time to complete something fantastic on a restricted budget – these are constraints that we all face, especially as consultants. But what usability professionals have to fight for is often to get a budget in the first place, or being involved in a project in the right phase, rather than when all that can be done is “putting lipstick on the pig” [32]. Frequently, the usability role is introduced in a company culture that has focused mainly on technical issues for the last decades [1,6,12,31,57]. This makes it hard to get acceptance for the usability competence and to integrate the User-Centred Design (UCD) activities into the systems development process. On top of this, the usability professional is regularly involved too late in the process, or the results from his/her work are not integrated with other development activities. In both cases the consequence is limited opportunity to affect the requirements and, hence, the resulting product being developed [1,12,20,30,31,41, 49,50,57].

I would like to claim that this is one of the greatest challenges we face today. As long as we are not allowed to do our job it does not matter how sophisticated methods we have, or how effective or competent we are in designing good interfaces. Yet, this is a something which is discussed surprisingly little in research. For example, at CHI'04 there was but one presentation that dealt with this issue [50]. If you scan the literature on the subject you will find that most studies takes for granted that there is a resistance to introduce HCI in organisations.

The most common response is to promote HCI through “usability champions” and business cases demonstrating the benefits of working with HCI (e.g. 1,12,20,30,31,38,41,49,50,57). This solution

presupposes, however, that the organisation employing the usability professional and the organisation that develops the product is the same. This might be the case in in-house and product development, which are the development contexts that the majority of the literature on the subject concerns. However, many systems are today tailor-made in contract-based projects (see [33] for an overview of different development contexts). When problems and solutions about integrating HCI into systems development are addressed in research, contract development is seldom the context of study. If success stories of HCI integration are scarce in general, they are almost non-existent for contract development. This is surprising, since contract development constitutes a large part of all information systems development.

Why is it that so many projects still fail to adopt a UCD perspective? Why is it still so difficult to introduce a UCD approach? I believe, as Dilbert suggest in the strip below, that the answer lies in the acquisition, rather than in the development part of the overall procurement-development process. Until today, the research within HCI has mostly focused on the supplying organisation as a means to develop usable systems. However, if we go out and study actual projects I believe it becomes evident that UCD can also be viewed as an issue for systems acquisition. This is also what I will explore in this thesis. That is, if acquiring organisations can use a UCD process as a tool to identify what it is that they should acquire. My hypothesis was from the outset that a procurement approach to working with UCD can circumvent many of the problems that usability practitioners encounter today when introducing HCI in organisations today. The idea that acquiring organisations should engage in UCD activities might sound like crazy talk, but as you will get aware of during this reading I believe it is not.



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Figure 1: That's crazy talk!

1.1 Research Approach

As introduced in the previous section I am interested in strategies for creating action space for UCD in everyday systems development. I have set out to explore an approach that challenges existing norms about the role of HCI in the overall acquisition-development process. By advocating a procurement approach to systems development, I hope to make it easier to introduce and appreciate a UCD approach in practice. My aim with the research is to understand more about systems development from a larger perspective, from procurement to delivery, and to evaluate strategies that integrate UCD already in procurement. From a practical or applied perspective, I hope to achieve a better understanding of such strategies and to share them with others. From an academic perspective, I hope to challenge the idea that HCI is, or should be, a systems development activity, and fuel discussions of the role of HCI that is not locked on a development approach.

My work is based on the hypothesis that an acquisition approach to integrating UCD in contract development, such as the one that is described in this thesis, is more viable than existing approaches. My research questions were:

RESEARCH APPROACH

1. What characteristics are important for a procurement-oriented approach?
2. Can a procurement-oriented approach to user-centred design (UCD) overcome some of the difficulties in introducing UCD that have hindered earlier supplier-oriented approaches?

To explore this in a research project I planned to:

- ★ Investigate common problems in acquisition of usable systems
- ★ Develop a work-model for how to acquire usable systems
- ★ Try out the model in case studies and discuss how the approach worked out

Apart from adding to existing knowledge I hope that I will stimulate discussion and a widened search for solutions, by proposing a new approach to integrating HCI in systems development. This approach suggests a new role for the usability professional, and an HCI curriculum that integrates more with business and organizational sciences than is common today.

1.1.1 Some Words about the Author

Before moving on to methodological issues and the main body of the thesis it might be appropriate to disclose a few things about me. These are things that I believe are important to know when evaluating the approach, its reliability and validity.

I am foremost a practitioner. I have worked as a usability consultant for five years in three different companies. A common interest during these years has been to integrate the HCI approach into the companies that I have worked in. This interest was formed already during my master's thesis when I examined socio-cultural reasons for the difficulties to integrate such an approach in a large product development company [64]. After trying out different strategies, with

more or less success, I started to question the whole idea of converting technically oriented supplier organizations to a UCD approach. During the work on my master's thesis I had started to think of UCD as efforts to uncover and define requirements, and I began to see similarities between my work as a usability professional and the work procurers has to go through in defining their requests for proposals. In particular, this thought grew stronger as I came in contact with my current research group.

This occurred when the IT industry in Sweden was collapsing in 2001. Therefore, it didn't take much for me and some colleagues to decide to finally do something about this ourselves. In August 2001 we started a company, www.antrop.se, that explicitly aimed at working with UCD in procurement processes. We were inspired by the architect metaphor and the ideas that had been developed in the Procurement Competence Research group [65], and hoped that this could be a successful approach to integrate UCD in systems development. During our first months I was also contacted by the Research group that wondered if I wanted to participate as a doctoral student from the beginning of 2002. I accepted and decided to work half time as a doctoral student and half time as a consultant for my company. My plan was to get access to case studies as a researcher and improve the work processes of the company by learning from the research results.

Other researchers often question the validity of my approach since I sit on two chairs at the same time. How can you trust my research if you know that I develop methods and processes that I will also use in practice? This is certainly a legitimate question. I usually answer that for me the important motivation was initially successful application of UCD, something that I, and the rest of the field, have failed to accomplish satisfactorily. I decided to leave a secure position as an employed consultant to a much less secure position as a company founder. On top of this I agreed to spend half of my time on research, something which was quite demanding. I would not have done all this if I was not motivated. Of course, I have also tried be as objective as

possible in my case studies through choice of field studies and methodology, as discussed in section 1.1.4 "Validity".

I hope that you, as a reader, will keep this background in mind when considering the thesis. My goal is to produce usable research that can benefit those that struggle with HCI today.

1.1.2 Method

This thesis is built on case studies. The methodological approach can be described as *case research*. Case research is a qualitative approach and is, hence, useful in the study of "why" and "how" questions, rather than "how much" or "how often" [13]. It's particularly useful for contemporary events over which the investigator has little or no control [29].

The case study inquiry, according to Yin, copes with the technically distinctive situation in which there will be many more variables of interest than data points. As a result, it relies on multiple sources of evidence, with data needing to converge in a triangular fashion. A case study also benefits from the prior development of theoretical propositions to guide data collection and analysis. Yin defines case studies as [29, p. 13]:

A case study investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

Thus, with a case study one is capable of capturing complex relations between entities and the context in which they reside. While this is the main strength of the approach it is also its main weakness. Since phenomena are studied within a context which influences, or interferes, with the entities under study, the observer must interpret and convey this context to the reader.

There is a spectrum of approaches to case research along the dimension of how active or intrusive the researcher is. In the one end

of this spectrum, we find the *participant observation* approach [3] and, even further out, the *action research* approach [3,13]. The “participant observation” approach ranges from “the complete observer” to “the complete participant”. In the complete observer role the researcher is removed from sustained interaction with the informants. The complete participant, on the other hand, conceals the observer role and participates in the ongoing activities as a native member of the local society. In action research, the researcher takes an active part in the ongoing processes and contributes intentionally to the positive outcome of the activities. By doing this he/she obtains an in-depth and first hand understanding of the process [13].

A primary goal with action research is to produce applied research – research that can be used in real situations and that help practitioners. This requires a preunderstanding of the context or culture that will be studied, access to real projects and first hand experience from these projects [13]. It is through active participation in activities that the researcher will gain the necessary understanding.

Ideal action research can rarely satisfy all demands within one and the same project [13]. Therefore, I have included three different case studies in this thesis that used different methods and that studied the research questions from different perspectives.

In the first case study I took on a role somewhere between “the complete observer” and “the complete participant”. I participated temporarily in the company that I studied under the premises of doing research, but I also took part in activities as a member of their team. The goal was to understand how acquiring organisations work with requirements elicitation today and how they document and communicate what they want.

In the second and third case study I wanted to try out the idea of acquiring usable systems by working with UCD in the acquisition process. In particular, I wanted to examine the approach where a freestanding Interaction Architect was hired to do this work (see

section 4.5, page 37 for more information about the Interaction Architect). Since there were no Interaction Architect companies in Sweden at the time but the one I participated in founding, I decided that I would concentrate on the action research approach. In order to be able to compare results I chose two case studies with different methods. In the second case study I participated in a project as a consultant. In the third case study I did not participate at all but merely interviewed stakeholders that had. Both of the case studies were first run as regular consultancy projects and were selected as case studies for my research after the projects had ended.

The second case study gave lots of input about the approach from first-hand experience. Apart from getting first-person insight into the case this also gave control over the execution. If I had instead chosen to study someone else, it would have been harder to exclude factors such as choice of method, competence or general political or interpersonal factors that could affect the outcome of the case. By participating myself, I would be able to adopt and evaluate the Interaction Architect approach as I moved along. The results from the second case study are presented in paper two (page 63). A comparison between case study two and three is presented in paper three (page 79).

1.1.3 Relevance

I focus in particular on contract development. Since there is very little research on UCD in this context [22], any research, in particular with a practical focus, is interesting. Furthermore, since we still have not succeeded in integrating UCD in systems development, especially not in contract development, this discussion is still highly relevant. Since I claim that the approach I take also opens up new windows I would say that this makes it even more important.

When introducing new models or tools there is a risk that the researcher ends up with a conclusion as “I tried it and I liked it” [61]. Obviously this says little about the relevance of the research. One way to avoid criticism of that kind is to focus on applied research, which is

what I have done in this thesis. I argue that the studies included in this thesis are indeed relevant, since they focus on an omnipresent problem that still, after several decades, is noticeably present in practice.

Some would say that this is a practical problem that has little academic and theoretical value, and that the industry is best equipped to solve by themselves. To those I respond that, on the contrary, I believe we have too little focus on applied research. While we develop an infinite number of methods and tools for HCI and new interface solutions for interaction design, many usability practitioners are only allowed to use checkboxes and radio buttons, and see it as a gift to get to do a regular interview-based user research in a project. Furthermore, if one company would find a way to successfully integrate UCD and get the clients to pay for it, I do not believe that they would be very happy to explain to others how they did it.

1.1.4 Validity

The case studies reported here must be said to have high validity in the respect that all are based on empirical data gathered from real situations. Two of the three case studies were even performed as regular consultancy projects without any discussion of using them in research until after they were finished. As mentioned in the previous section good action research requires access to several case studies that differ in scope and focus. By comparing results across case studies the validity of the research increases. At the same time, the results presented in this thesis are from specific case studies and it is difficult to generalise from this. What is possible, however, is to indicate a general direction [13], a direction that I believe is interesting to pursue further research on.

In this thesis, I present an approach to work with UCD that proved to be successful. Of course, there are many factors that affected the outcome, apart from the choice of approach. For example, the motivation of the procuring organization as well as the competence of the usability professionals involved in the case studies presented in the third paper was very high. This should be kept in mind when the

results are interpreted. Apart from this, a success story or a confirmed hypothesis rightly raises concerns about validity. The hypothesis that was presented in the research questions was mainly a result of my previous professional experience. As pointed out in [13] constructively applied preunderstanding of the corporate environment and the business is essential, but it should be used as a resource – not as a filter to bias an investigation. To avoid this I have triangulated the results within and across case studies. I have also had someone else perform important post project interviews to assure a higher validity.

While the advantage of action research is improved access, a common problem is to unite the roles of researcher and consultant [13]. This conflict has certainly been present in this research. My role as a researcher has been combined with my role as a consultant in and founder of the company that was involved in two of the case studies. While this has increased the quality of the data and the results in terms of better access and preunderstanding, it naturally raises concerns about validity as well. My hope is that you, as a reader, trust me that none of these positions motivated the other but rather that both the efforts to build a company and to pursue research was motivated by my wish for more successful application of HCI in the industry. It is also important to point out that these circumstances provided me with a unique opportunity to not only get access to cases where an Interaction Architect was involved, but also to be able to affect the set-up and execution of one of the case studies.

However, I don't ask you to buy into the argumentation presented here merely because of what I say. As I present in the section on method I tried to keep as an objective approach as possible in both of the main case studies, given the circumstances. For example, in the first case study I chose an organisation that neither my company nor I had any relation with whatsoever. In the second case study, I let my supervisor handle the interviews with the project members to avoid bias. Even though the second case study is presented as a success story I also present a critical analysis of the process.

1.2 Thesis overview

In the next chapter, Frame of Reference, I will introduce the research problem in a wider context, as well as discuss the perspective on UCD and usability that is used in this thesis. By comparing and discussing different directions that have developed within HCI, I hope to explain how the approach I advocate relate to these directions. Hereafter I move on to describe characteristics of current attempts to integrate HCI in contract development, and common obstacles that exist.

All this serves as a background to the approach I advocate and describe in the main part of this thesis, Acquiring Usable Systems. In this chapter I present the argumentation for a procurement approach and present a tentative model for how this could be done. This chapter could also have been called “general results” since it summarizes the thoughts and experiences that have emerged from my research.

Before presenting the full version of the papers in the last chapter I finish this thesis with some general discussions and conclusions that can be drawn from my experiences as well as some ideas of future work. Each of the papers is also presented briefly in Presentation of Papers.

2 Frame of Reference

In this chapter I will present a background to the research problem that I address, as well as a brief theoretical go-through of different directions in applied HCI. The latter part is included to point out what I mean with words such as “usability” and “UCD”, given that they are used in the results of this thesis.

2.1 Perspectives on UCD

Human-Computer Interaction (HCI) and User-Centred Design (UCD) is a wide area of disciplines and practices. Hence, if you say that you work with HCI it is not at all clear what your training is, or which methods and theories you use. Löwgren and Ehn [9,63] give a review

of how practical approaches to User-Centred Design has developed in HCI and information systems development (ISD). They describe how both have developed along similar paths from a rationalistic and objective approach (e.g. general theory, early usability engineering and construction) through more contextual perspectives such as contextual design and participatory design, towards design approaches such as interaction design and design ability (see Figure 2).

As a practitioner, you seldom choose a theoretical perspective or method to follow consciously. Rather, you use a mix of tools in every project, based on the requirements posed by the particular circumstances. Since this thesis is based on real-world case studies this is also the approach that has been used in the case studies. However, when analyzed more closely, it is clear that several theoretical perspectives influence the overall approach.

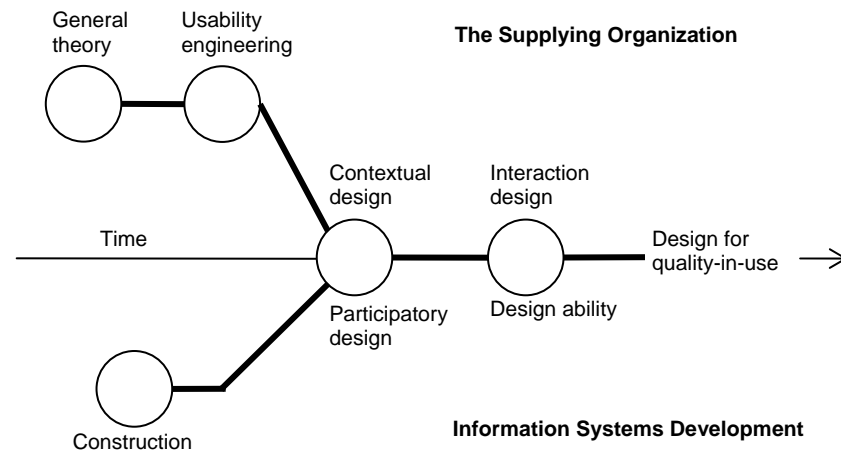


Figure 2: The development of User-Centred Design in HCI and information systems development (ISD) over time. Note that the figure describes the development of practical approaches to work with HCI in projects and not theoretical directions within the field, such as CSCW. Adapted from [9].

2.1.1 The Cooperative Approaches

One perspective that has influenced the approach presented here is the cooperative approaches to HCI, such as participatory and cooperative design. The main argument in these approaches is, as indicated by their name, participation [11,18,26]. Originating from a call for participation in workplace changes in Scandinavia during the 70's and 80's, one of its fundamental ideas is that users should be involved in development. The focus was on “user participation, communication and democracy in the design process” [9], pp. 304.

Kensing and Blomberg [34] points to three issues dominating the discourse of PD; the politics of design, the nature of participation and methods, tools and techniques for executing cooperative projects. Kensing and Blomberg conclude that the discourse within PD has been focusing on provisions for execution of individual projects, and only recently on organizational and company issues [4,11,35]. Interestingly, the cooperative approaches have often worked with both management and users (e.g. [4,10]). Worth noticing is that when talking of organizational change, PD refers to the kind of change that goes from the bottom up [51].

The idea of actually involving users in the development process is fundamental to the approach to HCI that is described in this thesis. However, the reasons for arguing for user involvement does not necessarily need to be the wellbeing of the anticipated end-users, which has been the core thought in participatory and cooperative design [e.g. 11,26]. Albeit this might be a benevolent attitude, the motivation that employees will have an improved work situation will seldom be a sufficient reason for companies to invest efforts in HCI. As I will argue later on, the driving force must instead be direct business benefits.

2.1.2 From Engineering to Design

Early commercial approaches to HCI have been called “usability engineering” (see Figure 2). This approach came from software engineering and general theory and presumed that “the ‘problem’ to

be solved is comprehensively and precisely described, preferably in the form of a requirements specification” [54, pp. 87]. However, as Löwgren points out people seldom tend to work like this in actual projects. He argues that the misfit between normative models and actual practice comes from a misunderstanding of the problem at hand (p. 88):

In short, professional software development models in general are based on an engineering design perspective. In one sense, this is perfectly appropriate given that they were intended to govern the internal design, i.e., the construction of the software. There is no doubt that they contribute to the verifiability, maintainability and other properties that are crucial to the quality of the product from a constructional point of view. The problem arises when they are interpreted as models for external design, i.e., design of the external behaviour and appearance of the product, the services it offers its users and its place in the organization.

He gives a short description of the development of design methodology, an interdisciplinary topic attracting researchers from different design disciplines, such as architecture, engineering and industrial design. When compared to the development of HCI it is clear that our field has developed through similar stages as design methodology – from an objective engineering perspective, through a subjective contextual perspective towards a focus on design ability and the role of the designer (Figure 2). One of the most important insights from design methodology, according to Löwgren, is that design problems and solutions cannot be separated. He cites Jones [16, p. 213]:

First, recognise that the ‘right’ requirements are in principle unknowable by users, customers, or designers at the start. Devise the design process, and the formal agreements between designers and customers and users, to be sensitive to what is learnt by any of the parties as the design evolves.

The problem is both understood and solved through iterative design in which the design space is explored and solutions are tried out. As illustrated in Figure 2 there is an overall trend in HCI to view UCD as a design process, where both the problem and the solution are unknown from the start and developed in parallel [5,6,7,9,19,28,46,54]. A necessity for success in this perspective is a competent designer that defines a vision for the future system-in-use [5,28,54]. This contrast with much of the HCI literature, where the designer is often a developer. The cooperative approaches, for example, were a response to the fact that developers rarely or never met real users. To remedy this projects were set up where developers should cooperate with users and, in this way, achieve usable systems. However, as pointed out by, for example, Cooper [6,7] and Löwgren [19,54], design and development are very different activities. It is almost inhuman to demand from one and the same person to not only be knowledgeable in both, but also to be able to combine these often conflicting activities. Instead, the design approach suggests a role similar to the architect or industrial designer that is trained specifically in understanding and designing use, and whose deliverables *directs* the development efforts. This presumes that the design process should *precede* the development, much like the architect designs the house *before* it has been built and not afterwards or simultaneously [5,16,54]. Löwgren [54, pp. 93] describe it as:

First, we must note that the design work in the design disciplines addressed by design methodology is separated from the construction of the designed artefact. The results of design may be prototypes, detailing the appearance and behaviour of the final result, and specifications of requirements on the construction. The corresponding approach for software development is to separate external design from internal design and construction.

While HCI professionals today foremost are trained to work with user requirements the new design professional must also be sensitive to business requirements. A successful commercial UCD project must bridge the gap between the wishes of the client, the needs of the users,

and the actual business objectives, preferably by satisfying both users and management. Edeholt & Löwgren argue that it is the designer's responsibility to do this [46].

2.1.3 From Usability to Quality-in-use

The definition of usability, according to ISO 9241, is: "The effectiveness, efficiency, and satisfaction with which specified users achieve specified goals in particular environments." At a first glance such a definition seems wide enough to encapsulate not only the interaction with a person and a computer, but also the use situation in which the interaction occurs. However, traditional usability definitions, such as this one, has some limitations. The most prominent limitation is its static construction. For understandable reasons the focus in the definition is on productivity enhancing systems. Historically this is where HCI has been strong and it is only recently that other types of interactive software, such as games, have been discussed. Productivity is also a relevant focus in most in-house and contract development projects, which is the focus of this thesis. However, using the same definition for all types of software still poses some problems, as described by Löwgren [19, p.32]:

Productivity tools are generally good if they support the users' professional goals without violating their personal goals, as Cooper (1999) puts it. This is the traditional domain of HCI theory and practice. But in the design of an interactive art installation, or a game, or a social communication device, or a program format for interactive TV, the term good has other meanings. Interaction design should recognize this variance and address it in a relativistic way; no single method or quality concept can be applied as a panacea or generalized insensitively.

Löwgrens suggestions is instead to move towards the concept of use-qualities [19, p.32]:

The traditional quality criterion of HCI has been usability, mainly connoting task efficiency and absence of usability problems (a survey of the usability concept is given in Löwgren, 1995). Usability is strongly connected to the user interface, which is seen more or less as a separable layer mediating the transactions between user and system. Use qualities, on the other hand, comprise the whole system and the whole use situation. In the extreme case, this may entail structural, functional, emotional, aesthetical and ethical aspects of the use context. Interaction design cannot simplify and sidestep this complexity in a general way; rather, the appropriate tradeoffs and priorities must be addressed in every design situation anew.

Thus, what defines high quality depends on factors such as what use and which users that need support, the application, the context and the goals. The quality of a table typically includes stability and a hard and tolerable surface. The quality of a chair, on the other hand, includes flexibility and a soft and comfortable surface. But a table should not always be hard and durable. In cowboy movies, for example, tables should rather break easily in order to not hurt the actors. Thus a different activity with a different goal introduces new criterions for what quality is. This may probably seem like a step back for many enthusiasts of HCI standardisation but is in my opinion a very promising way forwards. Any usability consultant who has worked for some time knows that he/she often has to argue that "it depends" without getting much understanding from the project leader or the client, since they consider usability to be something more exact. A change in vocabulary would certainly facilitate a more flexible discussion of what usability is.

By moving towards interaction design the focus is also turned towards the *use* of interactive systems, rather than on the user. This might seem like a subtle difference but in an actual design situation the result can be quite different. Arvola [60] characterizes the difference between User-Centred Design and Use-Centred design by posing two different questions: User orientation starts out with the basic question

of who the user is. Use-orientation, on the other hand, starts out with the question of what the use is.

Arvola concludes that Interaction design is, accordingly, *the design of the use of an interactive system* rather than the design of an interactive system per se. Consequently, use qualities such as usability are not properties of the system in itself but of the *system in use*. It is not possible to assess, measure or predict such qualities only by evaluating the system. The point is that it is not only the system that is designed but rather the future use of it, focusing on what users wants to *achieve* by using it. From this follows that interaction design is also goal oriented, as described by Cooper [6,7]. Activities and tools may change but goals often remain. The interface or the system is never interesting in itself in productivity-oriented systems. It is merely a means to an end – the goal of using the system¹.

Thus, as the term implies, use quality focuses on quality aspects of usage. The goal of the UCD process is to identify which qualities are important and design the interaction in order for these to emerge. However, in commercial settings it is not only the user who judges what qualities are important, but also the purchasing organisation. Those who pay for the development of the system also have some goals and intentions with it. Therefore, the professional designer must balance qualities that are important for both the business as a whole, and for the future users. As described by Arvola [60, pp. 24f]

Use-oriented design is slightly different in focus from the more often referred to notion of user-centred design (or user-oriented design). The latter focuses on users, while the former includes the change of practices and business (...)

¹ On a theoretical level the concept of goal directed design, as described by Cooper [7], is closely coupled to theoretical frameworks in Socio-Cultural History, for example Mediated Action and Activity theory. See 60,64 for an overview of connections.

2.1.4 The use of Perspectives in This Thesis

As I stated in the introduction to this section the work models that was tried out through action research in this thesis, and which I have tried out in practice as a consultant before, do not easily fit into a theoretical paradigm or approach. Hence, even though I agree with the arguments for the design approach to HCI a process that will actually be used in practice should also exhibit traits of usability engineering. For example, the aim of the usability engineering process is to come up with a precisely defined requirements specification. The approach has been criticized for separating analysis from design and presuming that requirements and measurements can be set up before the design process is started. I agree with the criticism of early usability engineering approaches (e.g. 9,19,54,63), but I also believe that this criticism has become less and less relevant as usability engineering has matured. Contemporary alternatives (e.g. 2,7,12,21,25,68) may still separate analysis from design in one sense (user research is separated conceptually from prototyping), but there are few who believe that it is possible to know in before hand what qualities and requirements are important. Rather, the whole process from interviews with users to detailed interface design is a continuous process to define the requirements and use qualities of the system.

In real life projects many stakeholders have a rationalistic view on systems development and believe, for example, that problems can be defined clearly before they are solved. A benefit of usability engineering models is, therefore, that they are easy to use when communicating with clients about the work that lies ahead. The phase-by-phase model gives a sense of security and control which a completely *tabula rasa* design process may not give. Explaining how a project will run through planned phases gives a sense of security that you do not get if you are told that we do not know anything by now and we are not sure when we will. On the other hand, I think it is equally important to emphasise the values of the design approach that problems, use qualities and solutions are developed in parallel and are unknown from the start. The design process is a necessary process to

go through to be able to define a precisely defined requirements specification.

Thus, when comparing a design-oriented approach to a more classical usability engineering approach I see benefits of using both. The interaction design approach recognizes that the separation between understanding, solving and evaluating in different phases is likely not the best solution in order to reach high quality-in-use. On the other hand, by speaking about our work in metaphors borrowed from usability engineering, the approaches we propose can become more understandable, predictable and less frightening for those who pay for it. In particular, I find the metaphor of HCI as requirements engineering, as advocated by Carlshamre [61], useful since it brings out the core of what professional HCI practice is, or should be; to understand goals and requirements and design solutions that support these. The most important feature of both contemporary usability engineering and interaction design approaches is, however, the dual focus on both business and user requirements, and an understanding of the normative rules of commercial systems development.

When it comes down to the use of words such as usability and quality-in-use it is important to recognize that you do not have the luxury of using precise definitions in actual projects, but must adhere to those that are in use in society. As a practitioner, you quickly recognize that the term “usability” is understood by most procurers and developers to be only an interface design issue. As a usability professional, you are too often recruited to a project in the design phase when it is too late to affect more relevant issues such as the match between system services and user needs. Despite this, I have still used the terms “usability” and “user centred design” instead of “quality-in-use” and “use centred design” in the included papers. The reason is that my main objective with each of the papers was to reach out to as many as possible and complicated definitions would hinder rather than help such an effort.

2.2 UCD in Contract Development

In this thesis I will primarily focus on *contract development of interactive software* and, to some extent, on in-house development. The reason for this extended focus is that they share some characteristics. While a product development organisation can be said to work towards a common goal – the product – in-house development organisations per definition house very disparate departments. On the one side there is the core business and on the other there are supportive departments, such as the IT-department. As noted in [31,11] the gap between business and IT departments in in-house organisations may be as common as that between a procuring and a supplying organisation in contract development, in the sense that they have different objectives and value different qualities.

The main motivation for focusing on contract development contexts is that there are virtually no success stories of development projects with a UCD perspective in this context. In fact, there are very few analysis about contract development at all. The majority of all available case studies concern product development or, in a few cases, in-house development. At the same time, quite a few development projects are run as contract development, so the need for better integration of HCI in this context is huge, especially since it poses the biggest difficulties for introducing HCI [33].

Another reason, which is discussed more thoroughly in the chapter

Acquiring Usable Systems, is that there is a direct relation between the use of a developed system and the performance of the organisation in contract and in-house development settings, but not in product development. At least this holds true for contract development of tailored systems,

2.2.1 Actors

In Figure 3 I try to illustrate the relations between procurers, suppliers and users that exist in contract development.

A development project in a contract development setting starts somewhere when the acquiring organisation identifies a need that a new system may address. The overall goal is often to increase profit or decrease costs, for example by increasing productivity. The person or group that initiates the project and that is responsible for the overall budget is called “formal procurer” in the illustration. He or she starts a project group, the “operative procurer”, and assigns a budget. The operative procurer is responsible for the acquisition project and the contacts with suppliers and report progress to the formal procurer.

Figure 3: The relation between the different actors that are discussed in this thesis

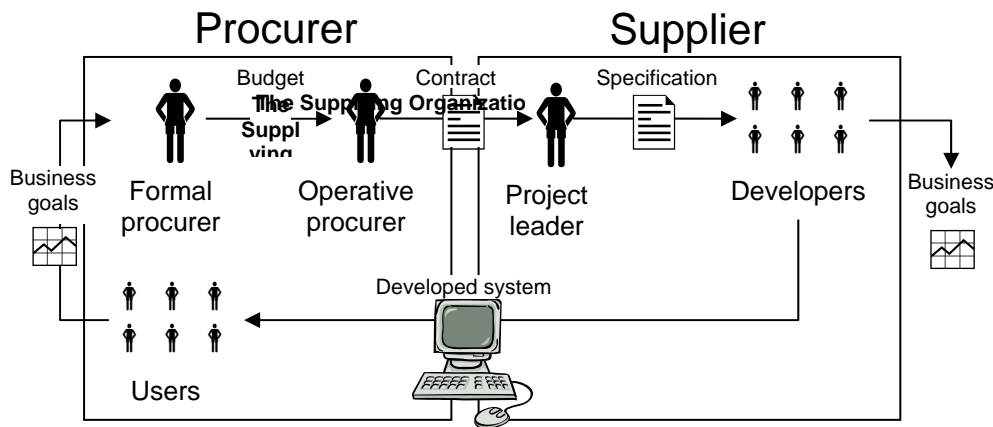
The operative procurer contacts and selects a supplier, and negotiates a contract for the development project with a representative from the supplier organisation. The supplier organisation assigns a development team that builds the system according to the specification in the contract. The business goal of the supplier is to sell the time of the developers so the longer project the better profit. Finally, the system is delivered and installed for the users in the acquiring organisation. If everything worked out right they will now realise the initial business goals that motivated the project by using the system.

Of course, this is merely a theoretical abstraction of the actual processes that take place in any development project. The idea was not, however, to accurately describe the details of systems acquisition and development, but rather to give an overview of the different actors, activities and relations that exist in such a process, since I will refer to these extensively in this thesis. There are few studies within HCI that focus on the whole process as described above, from acquisition to delivery. A good starting point is, however, the case studies by Näslund and Löwgren [22,39], the project review by Følstad, Jørgensen, & Krogstie [47] and the cases that have been documented within our research project, including those that are presented in this thesis [42,51,55,56].

2.2.2 Current UCD practice

As you may have noticed I refer a lot to UCD in this thesis. Therefore it might be suitable to define what I mean with this not only from a theoretical point of view, but also from a practical standpoint.

I have chosen the Delta Method, a UCD method developed in Sweden, to represent a typical UCD process that is used in contract development projects [67]. Of course, there are a number of methods available for UCD and each usability professional may work



differently from a colleague, but any mainstream method would do for my purposes. As you will notice further on, my focus is not primarily on how we pursue our work, but rather *when* we do it.

The delta method starts with a Systems Definition phase (SD), where the project team performs a high-level analysis of the user categories that will use the system, and their requirements on the system services. This feeds into the selection of participants for the following phases – user profiling (UP) and Task analysis (TA). The goal with the user profiling is to form an understanding of the users, their present work situation and tasks. When the user profiling has been carried out, and a number of user categories have been established, the project team selects representatives from each category. These are asked to participate in an interview, which mainly consists of a task analysis. The purpose of the interviews is to make a survey of the users’ present tasks and to give an idea of how the users perform their tasks. The interviews should also be of help in formulating the requirements for the planned system, by identifying what aspects of use and usability that are important to the users. The results are documented as scenarios and design recommendations that give an overview of the future system and its services. Other methods, such as the one developed by Cooper et al [7], are less task focused and more goal oriented and also deliver tools such as personas [6,7,48,58] from this initial user research phase. Once again, the choice of method is in the end a decision for each project. My purpose is not to account for the variety of methods in UCD but rather to describe basic concepts that I will use in this thesis.

A characteristic of UCD methods is their iterative nature. This normally starts when the initial user research phase is finished. The system is designed both conceptually (conceptual design, CD) and, later on, in a prototype (prototype design, PD). Prototypes are evaluated with presumptive users to find problems, and the results of the evaluations feed into the requirements (requirements definition, RD) and the next iteration of the prototype. At some point usually after one or, at best, two iterations, in contract development projects,

the use quality is deemed good enough and the prototype and the requirements are finalized. Their role in the overall development project is to communicate what services the product should have and how it should behave.

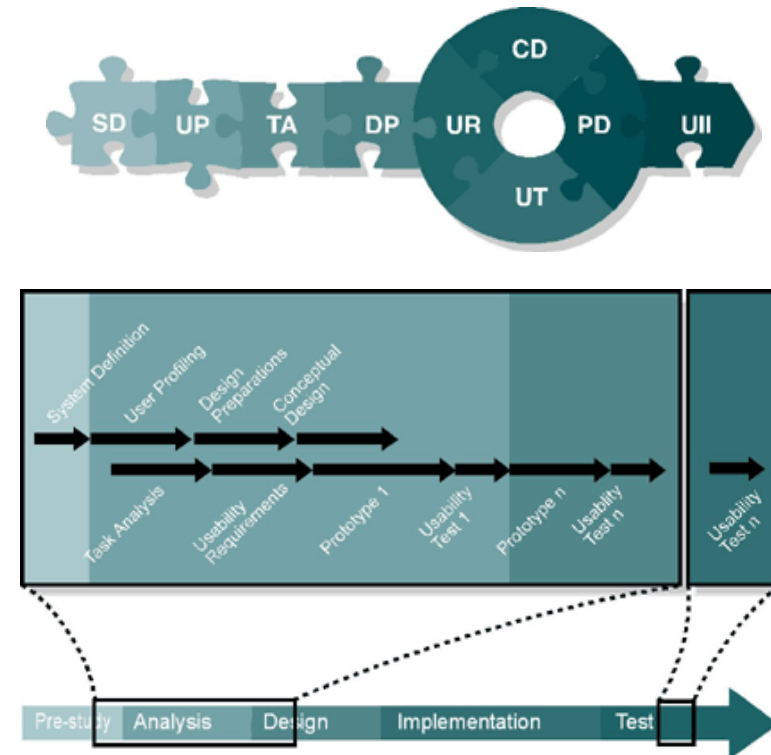


Figure 4: The delta Method and its role in systems development. Adopted from www.deltamethod.net

The UCD process can be said to proceed through two overall phases. The first one, the user research, aims at understanding requirements of use and discovering *what* functionality the product should have, and why. The second phase, the iterative design, aims at detailing *how*

the interaction with this functionality should work. This is the same distinction as that which is often made between *utility* – that the product offers relevant services - and *usability* – that interaction with the services is smooth [24].

Ideally, as illustrated in Figure 4, the UCD process should be performed early on in the systems development project. The earlier it is done, the better are the chances that it can affect the requirements and, hence, the product. The later it is done the more restrained you will be by the technical architecture, rather than defining it based on the UCD process. The person responsible for performing the activities described above is referred to as “the usability professional” in this thesis. I have chosen this neutral term instead of existing labels such as usability architect, information architect, interaction designer etc, to avoid confusion. In practice, for example, it is not always one and the same person who performs all the activities but there can be different roles that handle user research (e.g. ethnographers), interface design (e.g. interaction designers) and usability testing (e.g. testers).

2.2.3 Approaches to Integrate HCI in Development

Unfortunately, as described in the introduction, UCD projects seldom start early enough, or usability is not discussed as a quality aspect at all. Therefore, the actual responsibilities of the usability professional are equally often to market, or *champion*, usability, as it is to work with hands on UCD activities.

The champion approach (e.g. 1,12,21,30,31,41,50,62) address the rational in working with usability from a business perspective. The arguments goes that a UCD approach will cut development time and that a usable product will decrease costs and increase profits.

Another approach is to integrate usability in the systems development process, for example by bridging usability and requirements- or software engineering (e.g. 61,66).

The choice of approach depends, among other things, on the kind of organisation you work in. What is interesting, however, is that there are two quite different approaches for how to raise the awareness and interest for HCI. Usability is not entirely an issue for systems development, as for example, choice of programming language. Neither is it only a strategic issue since it concerns the use of a particular system. Rather, usability, or quality-in-use, is related to both of these perspectives (see Figure 5).



Figure 5: Usability is related to both business strategies of why a system is developed, as well as the systems development process of the technology.

What is remarkable with both approaches is that it assumes that we must accept that others do not understand why a UCD approach is valuable. Is this not very odd? How can anyone *not* want usable systems or how can anyone *not* see that a precise and evaluated requirements specification will facilitate cost estimates and cut development time? The questions are rhetoric. In the end I believe it comes down to a misunderstanding of the role of HCI and design in systems development. The proponents for both perspectives presented above have, often implicitly, assumed that UCD is mainly a concern for the supplier organisation. By questioning this assumption I believe we will find new ways of moving forward.

2.2.4 Common Obstacles

As described in the theoretical background the main focus within HCI has been to facilitate cooperation between developers and users, or, in later studies, between designers and users, where the designers have worked in the developing organization. Thus, as noticed by Holmlid & Artman [42,51,52,65], the work of the usability professional is commonly understood as activities that should be incorporated into a systems development process [6,8,24,25,27,62]. This perspective is prevalent in both theory and practice. In client–supplier relations, it is

usually only the supplier who has access to usability competence. In contract development, this is usually an IT-consultant company that delivers tailored systems to clients. In in-house development it is often the IT-department.

Figure 6 illustrates a generic acquisition-development process where a procuring organization acquires a tailor-made system from a contractor. From an academic perspective, we know about the relations between the management in the acquiring organization and the business representatives in the developing organization from research in management studies. We also know about the relations between the developing organization and the users, since this has been the focus in HCI and UCD (B in Figure 6). What is not so thoroughly researched is the relation between the management and procurement group on the one hand, and the users in the acquiring organization (C in Figure 6) on the other. Since the focus in HCI research has been to strengthen the relation between developers and users it has been assumed that HCI is a development issue. Consequently, few studies in our field have focused on systems acquisition [42,52,65].

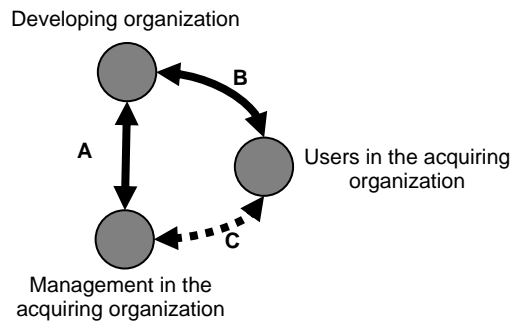


Figure 6: Asymmetrical relations in systems procurement and development. A dotted line denotes that there has been little focus devoted to the relation in research. Adapted from Holmlid [51].

There are also few studies of attempts to work with HCI in contract development. Näslund [22] and Näslund & Löwgren [39] describe two cases and Winker & Buie [41] summarize “HCI challenges in government contracting” from a CHI 1995 workshop. Grudin [33] discuss some general problems of working with HCI in contract development. As a former usability consultant in systems development consultancy companies I recognize the issues that are highlighted:

2.2.4.1 The Acquiring Organisation

Traditionally procuring organizations have not been very interested in HCI issues. As described by Winkler & Buie [41], p.35:

Historically, very few RFPs [Request for Proposals] have specified HCI features or usability activities beyond such generalities as "Motif compliant GUI" or "user friendly interface." Bidders hesitate to increase their proposed price by including features and activities that an RFP does not mandate, and contractors may hesitate to add them even after winning, for fear of gaining a reputation for cost increases and overruns.

Although there are few studies of procurement projects it seems that acquisition projects are commonly handled by the IT-department. They may adopt a technical approach and focus more on internal qualities such as performance, reliability and scalability, than on external qualities, such as fit between services and interaction to business and user goals [22,23,39,47,59]. As was the case in the first case study in paper one, and in [42,43], this might be the procedure even though the operative procurer does not have a technical background. Moreover, most procurers would probably expect that they will receive a usable system – they consider it the supplier’s responsibility to assure issues of quality-in-use [43]. When usability is perceived of as interface design issues it is logical to assume that this can be handled during, rather than before, the development process. In this way utility aspects of usability are often missed. Ideally, a user centred supplier would be able to add such activities but, as highlighted in the above quote, bidders cannot add user research

activities or other activities to address utility issues since they must respond according to that what has been asked for. Adding activities that they know are necessary for high quality-in-use will make their bid more expensive, which may cause them to lose the deal.

In more recent years, however, usability has become a more requested quality, especially in the public sector. For example, a study of 16 e-Government systems development projects in Norway from 2004 show that procurers value usability [47]. 14 of the 16 interviewed project leaders from different procuring organisations said that users should be involved during the requirements phase. 13 interviewees also claimed that they had had sufficient user involvement, or too much, in that it slowed down the process. What is interesting is, however the analysis of what UCD activities were actually carried out in the projects. The authors conclude that although users were involved, this was motivated by democratic reasons rather than reasons of achieving high quality-in-use, since none of the projects used established methods in UCD. The most common approach was rather to have user representatives in the project team.

2.2.4.2 The Supplying Organisation

Sadly, it seems that suppliers do not value HCI as a competence in the same way as, for example, system architecture or programming. Suppliers are reluctant to employ usability professionals. If anyone is responsible for UCD this person is seldom trained in HCI. His or her main competence is often mainly technical but he/she may have gone through a crash course in HCI, or, even worse, the person in question may only have an interest in HCI but is not professionally trained at all [49]. This is particularly common in contract development settings since it is harder to keep experts in HCI fully booked than it is to sell technical competencies. Partly because procurers do not require the competence, but also because the advantages that a HCI approach offer are not mainly in the interest of the supplier, at least not in the short term. Even though suppliers might want to keep long lasting relationships with customers by delivering high-quality products, benefits such as shortened development time and decreased need for

user training are benefits that apply to the procuring and not the supplying organisation [40].

Apart from consequences such as hard-to use products and project overruns due to late changes to requirements the results is also that HCI efforts are sub-optimized in projects due to lack of expertise. Furthermore, the respect for HCI as a competence in its own right, that requires special training just like any other, is diminished. In addition, usability is often perceived of as only concerning interface design issues. *Utility* aspects such as identifying user needs and corresponding system services are handled elsewhere, and surprisingly often in a slipshod manner. Any usability professional knows, however, that a product that only has high utility or usability, but not both, will never become appreciated.

2.2.4.3 The Focus

In an excellent analysis of the role of current procurement-supplier relations Ottersten & Balic [23] conclude that delays and cost overruns are not unique to IT-projects. On the contrary, these are inherent characteristics of the project as a work model since the very idea of a project is to proceed with something that one cannot foresee how to solve. The problem is rather that costs for delays and overruns are compared to the project budget and specification, and not to the realisation of the business goals that the project is ultimately about. A delay may, for example, be acceptable if it would help realising some goals that would otherwise not be met, and that are worth more than the cost of the delay. The problem, as highlighted by the authors, is that the procurer and the supplier only have the project in focus. The person responsible for the business goals is, although economically responsible, often detached from the project and only briefed from time to time on the progress.

As illustrated in the case studies by Näslund and Löwgren [22,39], this project focus is strengthened since procurers and suppliers mainly discuss features and functions but not the use of these functions or the effects that the usage of them could have on the organisation, i.e. the

realisation of business goals. The goal of the acquiring organisation is a functioning application and they expect to receive tangible deliverables. This anticipation is forwarded to the supplying organization via the contract and the time plan. For the contractor, adherence to the contract and other promises made to the customer are seen as more important for the outcome of the project than the future usability of the system [23,33,41]. Therefore, tangible output is rewarded higher than problem exploration. Developers and designers are measured in terms of finalized design decisions rather than number of alternative designs explored. The result is that only superficial or cosmetic changes can be done after usability evaluations. Concerns about the relevance, appropriateness or usefulness of the design are disregarded, since there is no time to deal with such changes at this stage (e.g. 22,39).

The point is that if functions is all that is asked for, functions is what you will get. But this has often little to do with how these functions work in actual usage [23,32]. Ottersten & Balic concludes that if acquiring organisations would be able to relate a design- or requirements decision to the overall business goals such decision would be much easier to take.

2.2.4.4 The Contract

Some inherent problems with contract development were described by Grudin already 1991 [33]. He argues that the contract may impose a wall between the procuring organization and the designers in the development organization. Näslund & Löwgren illustrate this in their case study [39, p.238]:

The contract, which was based on a specification of functional requirements, divided explorative activities in two parts: Before and after the formulation of the contract. It imposed severe restrictions on the designers' possibilities to explore the design space. However, the contract did not transfer the knowledge achieved in early design exploration. Hence, the designers were constrained, without the knowledge of the rationale for the constraints and without the necessary visions for the system and its use.

As Grudin notes interaction can occur before the Request for Proposal (RFP) is issued but communication between designers in the bidding organization and anyone in the procuring organization is sharply monitored to prevent a bidder from acquiring an unfair advantage. This is particularly true for governmental contract development [41].

2.2.4.5 The Users

Due to the project focus described above the goal is to deliver on time and according to the specification. Any changes to the requirements are to be avoided. One source of change is user input. As Grudin describes [33 p. 64], this even occurs when the project has been split up in a design and development phase, since the developing organization also has an interest in developing the system.

When the contract for design is awarded the designers work to the specification; by avoiding contact with the user organization, they avoid influencing the subsequent bidding on the more lucrative development contract. Since the follow-on development can be awarded to another company the designers do not necessarily know who the developers will be. [...] The designers and developers have other reasons to avoid contact with users. Contract compliance is based on conformance to the written specifications. Any deviation from the specification is to be avoided

Thus, users are kept out of the process since there is otherwise a risk that they might want to add or change requirements, which there is

no time or resources planned for [22]. Especially in government contracting with fixed prices.

2.2.5 Towards a Procurement Approach

Since User-Centered Design is associated with development, the concept of “early involvement” in UCD is also interpreted from a supplier and system development perspective. “Early” is commonly understood as the beginning of a supplier’s engagement, after a contract with a procuring organization has been signed. What often seems to be forgotten in these discussions is that a lot of work has already been done when a contract is in place [42,43]. In the case studies in both the first and the second paper, for example, the operative procurement group had worked for several months or years. In order to acquire a new system the procuring organization must to some extent define the business goals for purchasing it, and specify what they are looking for. Although this is not perceived of as systems development activities, it constitutes the first requirements specification work. Particularly in contract development (and in larger and more formal in-house development projects), the contract, which is based on this work, frames what can and cannot be done during the systems development project.

Unfortunately, the clients’ efforts to define what to acquire seldom involve a usage perspective either (Figure 6). In Figure 7 I try to illustrate a common scenario: A client goes to a technical supplier with some idea of how a technical solution could enhance business, but without involving a usability perspective. The supplier then specifies and implements the system, also without involving usability professionals, because of the obstacles accounted for above. In the few cases where the developing organization does have usability competence it is often hard to get this involved in the project early enough and often the usability professional only gets to address superficial interface changes rather than core issues of utility [32,39,41]. The result is that usability requirements on functionality and interaction are left out, at least in a professional manner, both in the acquisition and the development process. As in the first case study

presented in the first paper there may be some user involvement in the acquisition phase. However, this is mainly intended to aid the democratic process of introducing a new system, but not the process of specifying a usable systems that helps realising business objectives in use [42,43,47].

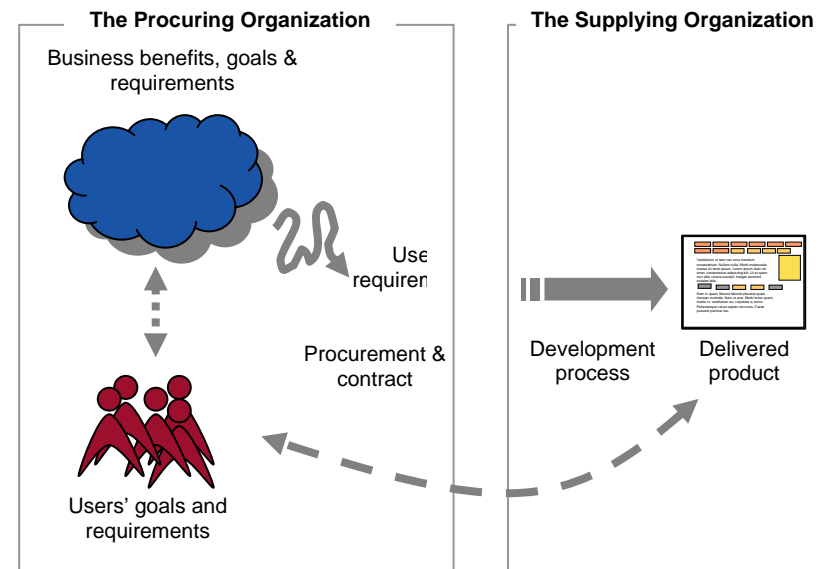


Figure 7: How development projects are commonly acquired and run today. Procuring organizations try to go directly from business objectives to technical requirements. The users’ perspective is seldom included professionally in either procurement or development.

From this perspective I would like to argue that “early” is not enough. No matter how well a supplier manages to integrate UCD in their development processes they will often have to agree to contracts where the client organization has already decided what they need, or want. But when these decisions are made without a professional investigation into actual usage, there is still a need for the supplier to

involve usability competence. The problem that suppliers with a UCD focus encounter in these situations is that their usability initiatives partly collide with what the client organizations *think* they have already done. After all, as mentioned in the section “Perspectives on UCD” the UCD process is mainly a requirements process. The goal is to define what technology, functionality and interaction is most appropriate for the usage requirements. In many ways, this is also the goal of the procurement process – to define what system functionality best suits the business’s needs. But while procuring organizations today often focus on a more abstract business process level, usability professionals focus on an activity level of what people actually do and need. In this thesis I argue that both perspectives are equally important for a successful investment in new technology.

Given the common goals of UCD and systems acquisition, I propose that UCD has some important contributions to procurement processes. There are today no methods for requirements elicitation that are developed specifically for procuring organizations. Instead, they often have to use a method such as the Rational Unified Process (RUP) that have a technical focus and was developed mainly for systems development. Procuring organizations must therefore often invent their own methods for how to make the leap from abstract business goals to concrete system requirements, and the path they pave is seldom straight or easy, as illustrated in Figure 7. Without an effort to focus on actual everyday usage the procurement will run the risk of being based on abstract and idealized models of usage, and/or have a technical focus [43,59]. As argued above, both of these directions may hinder possible future activities that focus on usability.

In the next section I will present the included papers briefly, after which I will present the general results in the chapter

Acquiring Usable Systems. The papers and the results discuss a suggested approach to integrating UCD in systems development, and how it worked out. My purpose in doing this is to widen the discussion of possible solutions to the integration problem and, in the long run, to facilitate an introduction and appreciation of UCD in practice.

3 Presentation of Papers

3.1 Paper 1

The first paper, “Procuring Usable Systems - An Analysis of a Commercial Procurement Project” was presented at HCI International 2003 and presents the first case study. It describes how usability was dealt with in a procurement of a content management system. It was necessary to gain a deeper understanding of regular procurement processes. Apart from reviewing the literature (which was done quite quickly since there is little written about procurement in relation to HCI [52,65] I therefore decided to participate in a procurement project as a “participant observer”. An opportunity arose to participate in a procurement of a content management system in a large Swedish bank. I spent two to three days a week for six months

with the procurement group during their preparation of the request for proposal (RFP) and the selection of a supplier.

Data was collected through participatory field studies including participatory observation, interviews, video and audio recordings, as well as from documentation resulting from the ongoing work, such as draft reports, mails, and meeting notes.

The results indicate that the procurers found it difficult to define usability requirements, communicate what they needed to suppliers and select a supplier. The reasons that were identified were that they lacked tools and experience to do so. For example, interviews with users were not planned at all until I introduced the idea. When they were done, however, the results show that idealized views of how work should be done were superimposed on the users' stories of how they actually work, and why.

In the discussion the acquisition process that was used is compared to a regular UCD process that separates activities that aim at learning what services that are important to realise usage goals (interviews etc) and how these services should be designed (design and evaluation). An analysis of the process that was used shows that the acquisition group mainly focused on the first phase – identifying what requirements to include in the RFP. The consequence was that the project members agreed on the what part of the equation, but had different views of how a system with these requirements should behave. However, when the suppliers responded to the RFP they all fulfilled the requirements more or less (the what part). It turned out that they differed mainly in how they envisioned that their solutions would behave (the how part). Since the acquisition group had not worked through this and lacked a common ground on the issue, the task of selecting a supplier got more difficult.

From these observations, I conclude that proper usability activities at an early stage could have facilitated the procurement process and the discussion with suppliers, as well as integrated usability into the

development process. A brief outline of how such an integration could be made is described in the paper.

3.2 Paper 2

The second paper, “Procuring a Usable System Using Unemployed Personas” was presented at NORDICHI'04 and presents the second case study. In this the role of the Interaction Architect was tried out in a large procurement project (this role is introduced and explained in the next chapter). It continues where the first paper ended in that it develops the model for how to make use of UCD in systems acquisition and evaluates it in practice.

In this case the Swedish National Labour Market Administration (AMS) hired Interaction Architects in their procurement of a redesign of their website for employment exchange. The user-centred design process was part of a larger project to define how the website could be reorganized to better support new organizational goals. The project was managed by a procurement group that had already defined the organizational requirements for the website. They hired usability consultants to learn about user requirements and to specify an information architecture and design. They suggested a process with a user research phase and an iterative design phase. The primary deliverables would be personas and an evaluated prototype.

The case study was conducted as a participatory observation field study where I participated as a usability consultant from the usability company throughout the user research and design phase of the overall project. The data collected from the project was complemented with reflections of the process by other project members through interviews with the project leader from the usability company and with members of the procurement project group.

The results show that the process and tools that was used was highly appreciated by the procurement group. It helped them understand the relation between different types of users, their goals and the overall business goals. While the UCD process was initiated to learn about user requirements it also helped the acquisition group to analyse and reflect on their own business requirements. Even though these had been elucidated before the UCD process started they became much more clear during the detailing of the requirements during the design process. In particular, these insights came during a halt in the project, in between the two iterations in the UCD process. The project had been planned very tightly to accomplish a lot in little time. To accomplish this a pause between the research and design phase had been omitted and the usability company provided two senior consultants to work on the project. The effect was, however, that events progressed too fast for the project members to follow, why the project leader decided to halt the process.

The halt emphasizes the importance to evaluate requirements against both user and business goals during the UCD process. This facilitates for the acquiring organisation to link detailed requirements about services and design to overall business goals, via an understanding of how different users with different goals will use the services to realise the desired business goals. Tools such as personas and prototypes helped the procurers to understand and prioritize among requirements, as well as to communicate their work to the organization. These tools will be used in their continued work to specify and develop the system.

This case study underlines that the user centred design process, which is commonly perceived as a systems development issue, may as well be used in organizational development or systems procurement. Success factors include having access to competence in UCD and an active procurer who is engaged and wants to participate in and understand the work of requirements specification, in order to become confident and secure in one's own abilities to know what to procure.

3.3 Paper 3

The third paper, "Crossing the Border: Redefining Early in User-Centred Design", is submitted to ACM Transactions on Computer-Human Interaction (TOCHI). It reviews and discusses the procurement approach based on the experiences from two case studies, the second one presented in the previous paper and the third one, which is presented briefly in this paper. While the second paper was a detailed analysis of a particular case this paper takes a more holistic perspective and discusses general advantages and disadvantages of the procurement approach. One of the cases is the one presented in paper two. The second case describes an acquisition of a new intranet for a government agency. Both cases used a similar approach with an external usability consultant. The consultant was responsible for designing a prototype that should communicate the requirements, based on user research and discussions with representatives from the organization.

The results from the case studies suggest that the procurement approach effectively deals with issues of early involvement and integration of user requirements in systems development. The clients in the case studies valued the UCD work and based their forthcoming systems development on it. Apart from integrating a UCD perspective before a contract for the development was signed, a number of other benefits were accomplished, including an integration of business and user requirements and a facilitated communication among stakeholders.

The conclusions are much in line with those in paper two. A procurement approach may be beneficial for both usability professionals and for procurers. Usability professionals may find it easier to actually do their job and assure that the results are used. Procurers may become better equipped to order a usable system, as well as to monitor and manage the development process.

4 Acquiring Usable Systems

In this chapter I intend to summarize the thoughts that initiated this research project, and that have developed during the last years. In a way, the chapter could as well have been called “General results and discussion”, but this is not entirely correct. While I do summarize the result of the *outcome* of the empirical studies and the reflection process, the *actual* results are presented in the papers in section 7,

Included Papers. The thoughts presented in this section constitute a reflection and summary that is more general in nature than the results and discussions in the included papers.

I start off by presenting the argumentation for the procurement approach, based on the background described in

Frame of Reference, and the result presented in the papers. I conclude by presenting a tentative model for how to work with usability issues in systems acquisition.

Consider a situation where you plan to buy something for your household, for example a Microwave oven. After some research in a store, you find one that seems like a good trade-off between price and features. The sales representative explains that it has a built-in timer for heating your morning tea or bread automatically while you sleep, an electric grill for preparing food, 20 different defrost programs for different kinds of food and much more. After a month or so, you notice that you become more observant about other people's microwave ovens and notice other features such as size, ease of use etc. You realize that you only use your own oven to defrost bread with and you get frustrated each morning since you have to navigate the display with more than ten clicks even for this simple task. Furthermore, since you have a small kitchen there is suddenly one less surface to work at since the microwave oven occupies one. You start to regret that you did not buy a slightly more expensive one instead that could be placed in a corner and that had an analogue display with digital feedback that could be turned on with one switch with the hand. Of course, it did not have half of the features of the one you bought, but it would serve your purposes twice as well.

I am sure that I am not alone in recognizing this story. The main problem that you encounter when you invest in new things is that it is very hard to know what you need until you start to use it. As described in

Frame of Reference, use qualities are properties of the usage, not of the application or product. They only manifest themselves in actual usage. Now, when purchasing regular consumer products we often have an opportunity to regret the purchase within one or a few weeks, at least in Sweden. But this is not an opportunity that procuring organizations have when acquiring tailor-made systems. This is what makes system acquisition so difficult.

4.1 The Gap

According to the CHAOS report, an annual survey of 40 000 American systems development project since 1994, the amount of projects that have been delayed with increased costs and decreased functionality has been more than 50% each year [69]. According to a report by Lederer and Prasad [36] 63% of all development projects become more expensive or take longer time than expected, even though there is an understanding of the necessity of adequate cost-estimates. Some of the most common reasons that are mentioned are that users often request changes or that there is a lack of communication between users and analysts. The interesting question is, however, why users come with change requests during development.

In Figure 8 I try to present the different levels that I believe are necessary to analyze, in order to be able to define the requirements when acquiring a system. First of all the customer has got to be clear about why the business as a whole needs the new system. When a bank decides to go online the motivation for this can, for example, be decreased costs, better knowledge of customer patterns or increased customer satisfaction. These are business benefits that may motivate the acquisition of a new system. A business case may show that the cost of developing the system is lower than what it gains through decreased costs or increased productivity.

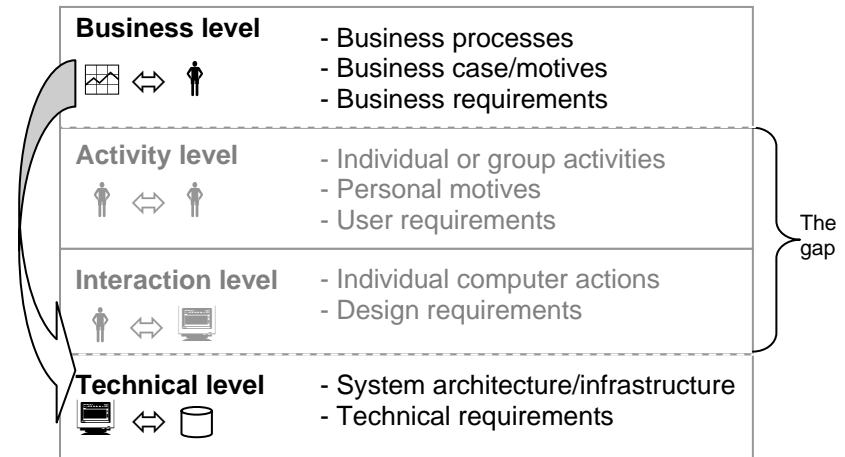


Figure 8: Levels of systems requirements

On the next level, the Activity Level, user requirements are identified that correspond to user goals. This results in proposed systems functionality. In the online bank example a user goal may be to keep track of the interest rate on one's loans and a proposed systems function may be a text messaging service that notifies the user when the interest rate changes. Furthermore, the interaction with this feature may be designed and evaluated in an effort to establish the requirements for the system. This would be done on the interaction level. Finally it is possible to specify technical requirements that support the desired functionality (the technical level). The decision to develop this functionality is, of course, still a business decision. The technical solution it requires may, for example, be too expensive, but in uncovering user needs and goals it is possible to establish a link between a) what the business wants to achieve, b) what features may realize this in actual usage and, finally, c) the cost of developing it in relation to what it could gain.

Unfortunately, the process described above seldom occurs in actual procurement projects. As described in Frame of Reference, and as was

the case in the first case study (paper one), procuring organizations often only analyze their needs on a business level and then go on to acquire a system (Figure 8). That is, they may invite users to workshops, use reference groups or add a user in the project group, but they do not research user requirements using structured methods, as we are used to in HCI. For example, in a survey of studies of Norwegian e-government software development projects the general conclusions are that e-government projects suffer from non-optimal procurement processes, lack of end-user involvement and non-optimal government project management [47]. Project overruns were, again, mainly attributed to weak or incomplete specifications. As pointed out in [23] It is assumed that the purchased technology automatically will realize the business objectives. In short, *the activity and interaction level are often skipped, or at least not defined with professional usability and interaction design competence*, as depicted in Figure 8. The result, as mentioned above, is delayed projects or unexpected costs, since the requirements surface later on during the development phase instead.

Ironically, as Lederer and Prasad [36] point out, computing managers often blame the users for the incorrect project estimates. They are accused for lacking in understanding of their own requirements and for coming with change requests late in the development. However, user responsibility for changing requirements does not play such an important role in influencing the preparation of the estimate, according to the study. Rather, the complexity of the proposed application and its required integration with existing systems were the most influential on cost estimating. Another way to interpret the reasons for late change requests is, hence, an inability of the systems development project to elicit user requirements at an early stage. This is also the conclusion that the authors make [36, pp. 55f]:

These findings confirm the view that estimators should thoroughly understand the user requirements that motivated the proposed system before they estimate its costs. By doing so, they can probably reduce and thereby control the frequent requests for changes that would have ensued had they failed to understand the requirements sufficiently at the outset.

Given this, I argue that there is a gap in current procurement processes. This is between abstract and idealized business goals and requirements that a procurement project starts from, and concrete technical requirements that a procurement project aims at specifying.

4.2 The Proposal

The main argument in this thesis is that *user requirements and interface design (UCD) may serve as a bridge to this gap*. The reason is that user and business goals are interrelated - business value is generated through product usage. Whether it is a business to consumer, business to business or an internal system that is acquired, the aim is to realise some business goals. But as pointed out by Balic, Berndtsson, Ottersten, and Aldman [44, p.1] an interactive system can never realise such goals by itself - someone has got to use it.

What often seems to be forgotten is that the generated business value corresponds to the level of usage [...] and the product's quality-in-use [...]. In other words, business value is generated through product usage.

Whether it is a consumer that purchases something over a website or an employee who registers a transaction, the actual *usage* is central in realizing the desired business goals of, for example, increased sales or increased productivity [23]. Consequently, understanding usage should be a central task in procuring any interactive system. In order to be able to specify what to acquire a client organization needs to

understand the requirements of both the current and the future usage of the system being procured. This may seem obvious but as I have discussed, it is surprisingly often ignored, or done from an economic or technical perspective, rather than from a perspective on use.

The proposal that I put forward in this thesis is, therefore, that the UCD process could be introduced already at the stage of systems acquisition to aid acquiring organisations in detailing requirements and making concrete the link between business goals and particular design decisions.

When I have discussed this with practitioners and researchers, they often unwillingly agree to the chain of arguments, but find it difficult to agree to the proposed solution. Why should acquiring organizations engage in something that is not at all their core business, especially when this is what they pay suppliers to do today? The question is perfectly reasonable. The simple answer is that it seems like they have to. As described, we cannot say that we, as usability professionals, have been very successful in integrating a usability perspective in contract development. How many contractors employ usability professionals? How many have seamlessly integrated UCD as a way to deliver interactive systems? At least in Sweden these are extremely few [49]. The question is if it is just a matter of time or if we are actually perusing the wrong approach. A more thorough answer, is, however, that UCD seems to better fit as a process to define what it is you want to purchase rather than how to build it. The two major reasons for this claim are that

1. UCD aims at solving the problem of knowing what qualities to emphasize before these qualities have emerged in use
2. There is a direct link between the presence of these qualities and the extent to which the future system in use will realise the desired business goals.

4.3 Consequences for Systems Acquisition

What, then, does this demand from the procuring organization? Firstly, it requires procuring organizations to divide the systems development project into (at least) two parts – one for defining what to acquire and one for developing the system. Today procuring organizations often decide on a budget and then let a supplier define, implement and evaluate the system. Sometimes it is even the supplier that defines the budget as well.

Secondly, as proposed above, the procurement organization should define the systems requirements themselves using use centred design, and let the result of this process guide the contracting and budgeting of the development project. The requirements definition in the procurement should be based on user and business goals. The result is not a static requirements specification that must be followed to the point. Rather, it is a vision of what kind of system they have in mind. This vision will inevitably change when the requirements are further detailed to describe not only aspects of utility and use, but also of construction.

If the procuring organization should perform the UCD work as part of requirements specification a line must be drawn somewhere for how detailed they should go. Löwgren [54, p. 94] suggests that such a separation could be set between internal and external qualities:

Software development informed by recent work in design methodology should aim at separating external design from internal design and construction. (...) This has implications for how we view the designer's role, as well as for the structure and management of software development projects. A problem which remains to be addressed is how to deal with constructional aspects affecting the use of the final product. Response time, reliability, maintenance, etc., all affect the users' experience of the product [...]. Yet they cannot be adequately addressed in the design work since they are determined by the final construction.

A tentative answer is that the designer - much like the architect - is responsible for coordinating the construction work in such a way that it satisfies the design vision to the greatest extent possible.

Since external and internal qualities are intrinsically interdependent it is, of course necessary to merge them in a further detailing phase, when a contract for development is awarded, but the important point is that the *external qualities define the internal qualities*, rather than the other way around. From an academic point-of-view this is obvious, and it is a quite reasonable interpretation of the ISO 9126 standard of software engineering and software quality [15]. However, contemporary systems development often work the other way around.

Thirdly, procuring organizations need access to professional usability competence. The difference between the first and second case study (paper one and two) emphasize that it is not enough to only perform the UCD activities or to have a general interest, but it is necessary that this is done professionally by trained usability practitioners. If not the result, as in paper one, is often of poor quality and may not support in the way that it could have done [22,23,42,43,47]. As argued in the theoretical background the usability professional should be trained in UCD methodology and design, and have experience from working in a commercial setting.

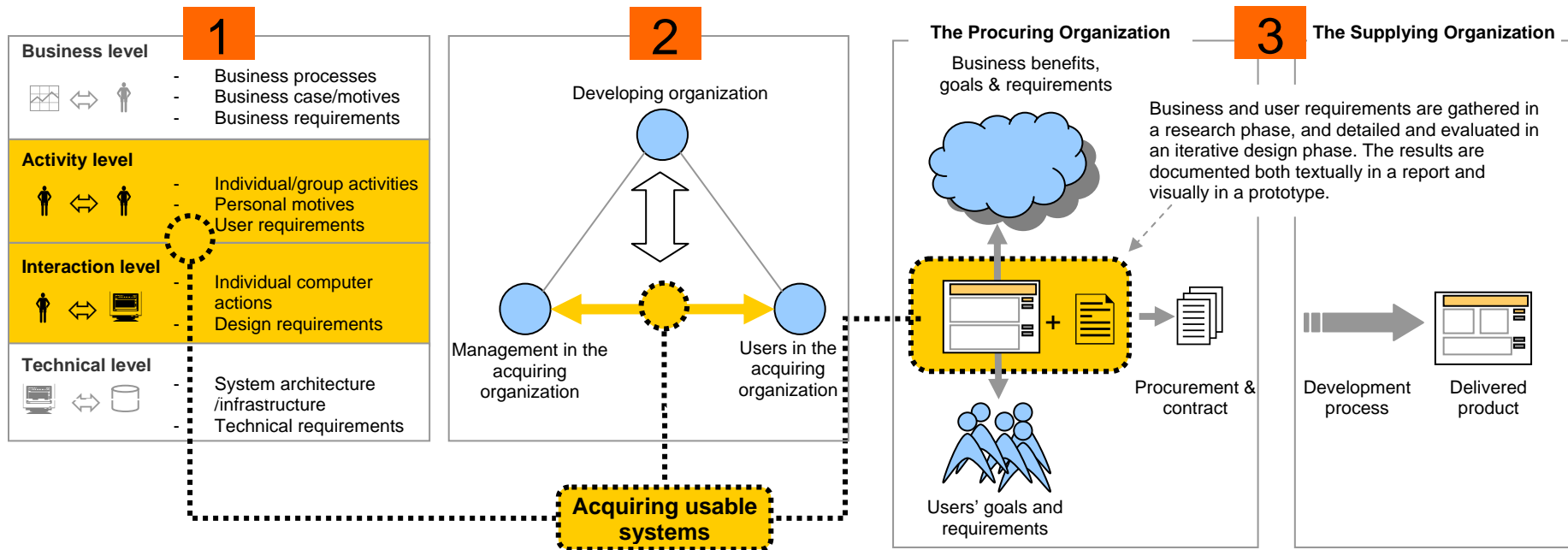
4.4 A Tentative Model

From this background that describes the general results of my research, it is now possible to outline a tentative model for how to *acquire* usable systems. The model I present here is the major result of my research, together with the thoughts about acquiring usable systems outlined above.

In Figure 9 I try to summarize the main concepts behind the model that was used in paper two and three. The illustration is divided into three parts that each illustrates one part or perspective of the model. Each of the illustrations will be explained and discussed in more detail as the model is described below. A more detailed model of the UCD activities is also included in Figure 10.

- ★ The first illustration shows what the model adds to contemporary procurement processes from a levels of requirement point of view.
- ★ The second illustration show how the model integrates with and changes the relations between the management, the users and the supplier.
- ★ The third illustration shows how the model is introduced from a process perspective.

When it comes down to it, UCD is about defining the requirements for what to build or purchase. This might seem obvious for some, but it is seldom spoken about in our field. Often UCD is instead separated from the requirements process by separate methods, roles and definitions, or it is involved after the requirements specification during development when the opportunities to affect the requirements are limited [32,61].



In the approach that I propose here requirements are, hence, defined through a process that focuses on use- and business qualities from start to finish, as depicted in Figure 10. The first phase in the process serves to understand usage and business needs, and to integrate these in one overall requirements specification that defines *what* services that seem necessary to support use and the business objectives. Requirements about current use and wishes or assumptions about future usage is gathered, based on interviews, observation or cooperation with users. When analyzed by a skilled designer this information can be transformed into high level requirements of, for example, system services that correspond to user and business needs and goals.

Figure 9: A proposed alternative model: user requirements and UCD are used as a bridge between business objectives and technical requirements in the procurement.

The second phase aims at detailing a vision of *how* the system should behave and how the interaction with the services should be designed, in order for both the users and the business to reach their goals. Of course, new requirements are also found in this phase and earlier defined requirements may be skipped. As mentioned before the design process is as much about problem exploration as problem solving, but the initial research phase provides a solid ground for this.

The result from the UCD process is represented both textually in a report and visually in an interactive prototype (Figure 10). This constitutes a vision of the system-in-use to start from in the development phase.

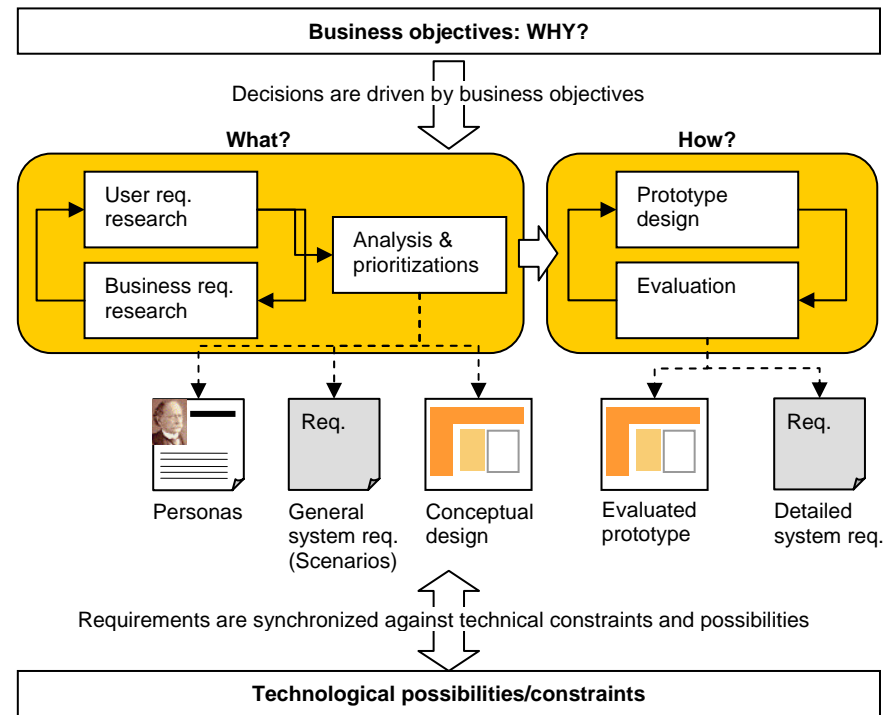


Figure 10: A simplified illustration of the UCD process that was used in some of the case studies in this thesis.

In the following sections I will present important properties of a procurement approach.

4.4.1 A Procurement Approach

It should come as no surprise that the most important feature of the model that I advocate is the focus on UCD as a way to define requirements as part of systems procurement, rather than systems development. As noted above, and as is apparent in the detailed model in Figure 10, the proposed change is not on how we work with UCD, but rather when. By uncovering user needs methodically in a user research phase, it is possible for procurers to prioritize between business and user requirements. An initial vision of the future system in use can hereafter be detailed in an iterative design and evaluation phase. In this way, the UCD process makes it possible for procurers to move more systematically from abstract business goals to a detailed, and evaluated, systems vision, as was done in the case studies in paper two and three (Figure 9-1).

This approach also opens up for an early involvement of the UCD competence. While early is often defined as the beginning of the supplier's engagement UCD activities are with this approach initiated even before this point in time.

Apart from aiding the procurer this will also facilitate for suppliers. Today suppliers often complain that requests for proposals are too vaguely defined and that it is impossible for them to estimate a fair fixed price. The results from paper two and three indicate that by going through a UCD design process the procurer gets much more sensitive to what his/her real needs are, and what kind of solution he/she is looking for. This, of course, makes it easier for the supplier to respond, as is evident when comparing the process and outcome in paper one and two.

4.4.2 Business Motivated but User Driven

From a UCD perspective, UCD does not become an additional cost, but a necessary step to take. User's goals and requirements are included seamlessly since it becomes apparent that it is necessary to attend to them, in order to secure the investment in new technology. Even though overall business objectives direct the process it becomes

evident that user requirements are often more important than business requirements since *business value is generated through product usage*. For example, paper two describes a design decision where user requirements got precedence over business requirements since the user requirements were directly linked to business objectives. In this way, UCD does not become something costly that you unwillingly add at the end. Rather, it becomes a vital strategy that is integrated long before development starts. Therefore, user and business requirements will, with this approach, always shape the technical requirements rather than the other way around, as is often the case today.

Although the main focus is on uncovering and evaluating user requirements this approach also opens up for evaluating against business requirements and objectives. As summarized in paper three this proved to be very valuable for the procuring organisations in the case studies; they could early on evaluate the requirements against their objectives through a structured process. In this way they also got more initiated into the requirements.

Hence, as illustrated in Figure 10, user requirements drive the definition process but are continuously synchronized against overall business objectives and requirements, as well as technical constraints and possibilities.

4.4.3 Design Competence and Ability

Based on the theoretical background and empirical cases I argue that it is important that the usability professional is both professionally trained and experienced. This might seem obvious but consider how much it contrasts with current practice where systems are purchased and products and projects are green lighted before we know what they should be for, without any design and a plan for evaluation. As emphasised by Buxton [45] It is important not to forget that we get what we measure and reward, so it is critical that these criteria is in line with our objectives.

For example, the case studies in paper one and two differ significantly in how secure and competent the procurers felt. In the first case study the procurers were not sure what the users' needs were and they had troubles being clear on what they wanted from the suppliers. In the second case study the procurers were confident in what they wanted, and what they did not want, after going through the structured UCD process.

This does not imply that the usability professional has got to be employed from free-standing architecture firms, as in the second case study. It does, however, imply that the UCD activities should not be led or carried out by someone without the necessary competence, such as a project leader or developer, as in the projects that were examined in [42,43,47] and in paper one.

The design perspective also affects the process. External design should precede internal design, user and business research should precede detailed design, as illustrated in Figure 9.

4.4.4 Communicability

The process depicted in Figure 9 and Figure 10 is designed to enhance communication in several ways. Most importantly, the UCD approach in itself enhances communication, in part because it requires extensive communication. Compared to regular procurement projects that end up with a request for proposal based on mainly business requirements the UCD approach also take user requirements into account and use these to bridge business and technical requirements. As demonstrated in paper two, communicative deliverables, such as personas and scenarios (see 6,7,48,58 for more information on these tools) can be used to communicate requirement in early stages. When the design process starts the requirements also get more communicative since they are represented not only textually but also visually in an evaluated prototype. This enables the procurer to describe not only *what* he/she demands, but also *how* he/she prefers that solution to function, and *why* the solution is important from a business perspective. Although this should not be treated as the final

representation, it does help suppliers to more clearly understand what is requested, and what measures they need to take to develop it.

This separation between “what” and “how” (see Figure 10) is, of course, an abstraction. In reality, the design process starts already from day one as the designer starts to conceive of solutions, as described by Löwgren [19, p.37]:

When viewed from a distance (or through the eyes of some methodologists), the design process might appear as a straight line through the abstraction levels: from abstract to concrete, from general to specific. It moves from vision through concept and sketches to a specification and finally a product. But if we move closer, we will discover a different structure. The line moves up and down the abstraction spectrum from very general thoughts on foundational principles to very specific work on a particular detail [...]. The straight line is simply the average or the point of emphasis, which obviously moves from abstract to concrete in the course of the (successful) design process.

However, I have found these abstractions very useful in practice. The abstraction and simplification of the process makes it much more understandable for other stakeholders, which is necessary for them to buy in on the concept. Further more, and even more importantly, the separation between “what” and “how” also has significant importance for the process. By keeping the separation in the actual project there is a chance for the acquiring organization to pause and comment on the initial results and requirements before moving on into the detailing design phase. This makes it easier for them to understand and keep up with the work, which is necessary if they are going to use it afterwards to acquire a system. For example, in paper three the main difference in process between the reported case studies was that the first did have such a pause in between the phases while the other one did not. The first case study also had a relatively smooth work process while the second project had to halt to get all project member back on track.

4.4.5 Continued Engagement in the Development

Since the model I present only details activities in the procurement process it could be interpreted to mean that the usability professional should only be involved in that stage. This is certainly not the case. As the literature describes, and as any practitioner with experience knows, there are no such things as “frozen” requirements specifications. No matter how well the prototype has been designed or how methodically it has been evaluated, new requirements are bound to come up during later phases, as external and internal qualities meet. This is especially true if the technical requirements are not detailed by the procurer, but by the contractor. Furthermore, as described in the quote on page 19, no matter how much efforts that have been invested in creating communicative deliverables these can never replace the designer who created them. While the deliverables represent the result of the design process the designer also knows *why* the deliverables are designed the way they are. He or she has been present when uncountable decisions have been taken of what *not* to include in the requirements. Knowing what decisions have been made during the design process is as important information as what it results in, especially when trade-offs must be made between different quality aspects later on.

4.4.6 Renegotiable Contracts

One problem in many procurement projects is that they are planned and run based on a fixed budget, rather than on business and user needs. That is, it might be reasonable to increase the development budget to realize some business objectives that will otherwise not be met, and that will save even more resources than what was spent. Budgets are often set top-down in organizations. Management decides that they shall spend no more than a certain amount on IT-development and divides this amount among the departments. Each department then must spend that amount or any remaining funds will be transferred back to central management by the end of the year. This behaviour is then propagated down to individual development projects that each get a part of the departments’ IT-budget. They

produce tenders that are sent to contractors and that describe what they want and how much it can cost. Hence, when the contractor gets the request for proposal, he/she has to respond to both a pre study and a development project all at once, and often to a fixed price. Since it is very difficult to estimate how long the development will take until the requirements are more detailed than how they are often presented in the request for proposal, they will have to approximate the resources needed for the development project. This estimate is likely not to the advantage of the procurer.

As Löwgren [19, p.39] proposes, an obvious solution would be to break up the process in smaller steps where the result of each step guides the decisions and budgeting of the next, using renegotiable contracts:

The view above, that problem setting and problem solving proceed jointly throughout the design process, obviously question the traditional contract development models. Are there alternatives that deal with the nature of the design process in a better way? An obvious improvement is to break the development process into smaller steps, where decisions concerning design direction, delivery time and cost are re-evaluated at each step.

The model presented here is based on this idea in two ways. On the one hand the idea of following this approach leads to more detailed, evaluated and communicative request for proposals that are easier to use when discussing the next phase with suppliers. On the other hand the UCD process in itself is split up in two overall phases of “what” and “how”. It is possible to change direction or abort the project already after the initial phase, when a general picture of the requirements has been defined.

4.4.7 The Active Procurer

Finally, as illustrated in the case studies reported in paper two and three, it seems that it is not sufficient to include UCD competence and use the UCD process in order to succeed with a procurement.

Although these measures will aid in bridging business, user and systems requirements and integrate the three these deliverables must, just like the final system, be used in order to affect the systems development. This requires an Active procurer that wants to understand and participate in the process of defining the requirements, even when the UCD process is handled by an outside usability professional. This is particularly true in government contracting since it poses high demands on democratic decisions and transparent processes and arguments. Judging by the results in paper two, the UCD process and its deliverables seem to facilitate such a process.

There is a subtle, but important, difference between an active and demanding procurer. A demanding acquiring organisation may be actively involved, but primarily by demanding deliverables and results, not necessarily by working themselves in the project. The word active emphasizes this other aspect of an acquiring organisation that is involved in the work of defining the requirements, and who wants to understand how and why decisions are taken [51].

4.5 The Interaction Architect

The model that I suggest requires a new role that is today lacking in procurement projects. If acquiring organisations should perform the UCD process as part of systems acquisition in a professional way, they need access to UCD competence. For larger organizations, this might involve employing a usability professional that gets to be responsible for systems acquisitions. For smaller organisations that only acquire a new system once every decennium, at most, such a solution is not feasible. For them, hiring UCD competence, much like the architect helps procurers of new buildings, seems more suitable.

In the quote on page 31, Löwgren compares the role of the usability professional to the construction architect. This comparison is quite

common in the UCD literature (e.g. 5,19,28,45,46,53,67). For example, Kapor [17, p. 4] write:

Architects, not construction engineers, are the professionals who have overall responsibility for creating buildings. Architecture and engineering are, as disciplines, peers to each other, but in the actual process of designing and implementing the building, the engineers take direction from the architect. When you go to design a house you talk to an architect first, not an engineer. Why is this? Because the criteria for what makes a good building fall substantially outside the domain of what engineering deals with.

There are many similar comparisons with other lines of business, such as product development and filmmaking (e.g. 45,46). Of course, there are many differences as well, but in using it as a simile, I would like to stress the *point in time* in which this role is involved. As emphasized by Kapor you don't go to an architect when you have already built the shell of the building, or when the construction is nearly finished. Neither do you involve an architect after you have chosen what to build in detail, and who should build it. Rather, you use the competence of the architect to understand what it is that you need, and to define this in a format that is understandable by contractors. The architect's design process gradually makes you more aware of what your needs are, and how these could be solved. Solutions are presented in sketches and mock-ups, and cover both the building in itself, but also how it fits in its intended context, based on how it should be used.

I will refer to the role that possesses similar competence in a procurement project as the *Interaction Architect*. The responsibility of the Interaction Architect is to secure quality issues of using the system *before* a contract with a technical supplier is signed, as well as to monitor the progress during the systems development. The idea is to provide UCD competence as part of a systems acquisition, without having any interest in also implementing the specified system. Thus, the main difference from contemporary UCD practice has not got so

much to do with *how* we practice UCD as *when*. The change I advocate is a process modification where the usability professional (i.e. the Interaction Architect) is involved already in the procurement process rather than only later on in the development process.

There are several reasons for advocating the title "Interaction Architect" rather than using existing titles, such as usability architect, information architect or interaction designer:

- ★ The simile of the role that the construction architect have is fundamental.
- ★ I do not want to focus on usability as an isolated property of the interface, as it is commonly understood in, for example, usability architect. Rather, I want to focus on the use of, or *interaction* with, the system, since usability is a quality aspect that emerges *in use*, and does not exist solely in the system or interface.
- ★ Interaction can also be understood in a wider form to describe the interaction with other stakeholders and perspectives that the interaction architect must keep up with, for example with the procurement group and with business requirements. The Interaction Architect, like the industrial designer and the architect, should focus on business objectives first, and then on user goals.

It is important to emphasise that I do not claim that we in HCI should copy the exact methodologies of architecture. As Winograd [28] points out, the model of the architect as distinct from the builder is not prevalent in most of the world. Most everyday buildings are designed without the involvement of an architectural firm, by people whose training is in engineering, rather than in architecture. Do-it yourselfers and small contractors make additions and changes to houses without the benefit of any formal architectural or engineering

training. However, I do believe that the comparison is useful as a metaphor, or simile. In the words of Winograd [28, p. 16]:

Having laid out the many areas of similarity, we could equally well point out substantial differences that distinguish software design from architecture - every comparison would be a starting point for a debate. The point, however, is not whether we can find a fit for every aspect of architecture in our understanding of software design. As with all metaphors and analogies, the value of looking at software design as architecture lies not in finding precise answers, but in raising provocative questions.

Having said that, I do find the comparison with other design disciplines such as industrial design and architecture very interesting. Similarities can be found on several levels; from a contemporary process perspective as well as from a historical perspective [5,28,46,53,54,67].

4.5.1 Defining the Role

Earlier comparisons with the construction architect have argued that the comparable role in UCD should have technical competence in addition to competence in interaction design [5,67]. The construction architect does not only specify an aesthetic and usable building. He/she is also responsible for the internal qualities of the construction, such as high stability and endurance. For example, Johnstone [67, p.8] write:

One fact stands out with respect to the role of an overall coordinating architect: It is not enough to be well grounded in either human factors or the technical issues of developing software. Knowledge of both is critical. Thus, just as architects became detached from much of the building process during the industrial revolution, those dealing with non-technical facets of software requirements will become less relevant unless they stay abreast of the technical developments. Conversely, the industrial revolution saw the construction of buildings which had basic functionality, but little else, including usability.

Johnstone proposes that the requirements engineer is suited to take on this role. However, while there are many similarities between architecture and user-centred design, I believe most of these are on a process rather than on a product level. We can learn much about the role that the architect has in the construction process but we should not stretch the metaphor too far when it comes to the product, i.e. the building or the information system. Buildings and information systems differ, for example in dimensionality – a building extends primarily spatially while an interactive system extends *temporally* and changes during use [46]. An information system is used to accomplish something in another way than a house is used. Therefore, I would argue that the most important competence of the Interaction Architect should be in user-centred design. The Interaction Architect is involved in the systems acquisition to bridge business and technical requirements. This is done through an examination of current and prediction of future *use* of the system. This would likely be difficult to accomplish for a requirements engineer since their major training today is in technology and not in UCD.

Furthermore, I believe it is difficult for the Interaction Architect to encompass deep knowledge in both technology and design in one and the same person. It is, as highlighted by Cooper [6], difficult to focus on both of these often conflicting perspectives at the same time. Alternative solutions would instead be to have interaction designers, graphical designers, system architects etc. to work inter-disciplinary in

the procurement process in an effort to define a more coherent requirements specification that comprises both internal and external qualities. Yet another alternative is to focus on external qualities in the procurement and deal with internal qualities later when the development starts, as was done in the case studies in this thesis. If UCD should become an issue for procurement the line has to be drawn somewhere. I believe, as proposed by Löwgren [54], that the best place to draw it is between internal and external requirements and qualities. Although internal qualities also affect the user experience and are interdependent with external qualities, decisions about what services the product should offer and how it should behave are more important questions from a procurement perspective.

4.5.2 Introducing the Role in Systems Acquisition

To conclude, I suggest a new role for those who acquire interactive systems. This role is today situated on the supplier side of the equation. The Interaction Architect can either be employed by the acquiring company or hired from an “architect firm”. For large procurement organizations the change is therefore not that big - it only requires a shift in competence. They often use a team of procurers or purchasers today, but these are seldom trained as usability professionals. For smaller organizations it is hardly cost-efficient to employ a full-time Interaction Architect. Small organizations may only procure one large system per decade. For these it is more feasible to hire an architect from an architect firm when needed.

The concept of free standing architect firms has not been discussed much in literature. The only instance I could find is in Winograd’s comments on Kapor’s design manifesto [17, p. 11:

As software design continues to mature, perhaps we will see a similar evolution: from the individual artisan-programmer (far from an extinct species today); to a master architect builder [...] to a commercial environment that includes software architectural firms that vie for awards for originality and elegance of their designs, but that are not responsible for construction (implementation). Kapor’s call for a software-design profession that is distinct from programming suggest this separation of function between design and construction

Yet, Winograd describes a reality which is not very different from the one I have experienced, and which I describe in this thesis. An important point laid out by Winograd, is that the architecture firm, unlike the UCD oriented supplier, *does not have any interest in also developing the system*. As described in the section “Common Obstacles” there seems to be a problem with objectivity when the supplier is responsible for not only defining the requirements, but also for fulfilling them and evaluating the outcome. Even though, or because this is so common in contract development I believe it is an issue that should not be overlooked. I have not examined this particular feature of the interaction architect in the case studies that I report, but I do believe it is an interesting issue for further research.

4.6 Applicability

As I have mentioned several times by now my focus in this thesis has been on contract development (see Figure 2, page 10). The reasons I mentioned in the introduction was:

1. Contract development poses particular problems that are not as evident in, product development. For example, the objectives of the procurer and the supplier are in direct conflict (see the discussion in section 2.2.4 for more information)

2. There are few studies concerning HCI issues in contract development settings, in particular that reach from procurement to delivery

However, given the reasoning presented above another, more fundamental reason becomes evident:

3. The *use* of the system that is developed for the procuring organization will be directly connected to the performance of that organization. If the system is not used the set-up business goals of investing in it will not be met.

Thus, a direct link between the usage of a developed system and the overall business goals requires that the system is somehow connected to business processes. This is often the case for systems developed in contract- and in-house development. The actual usage of, for example, an online bank or an internal system is directly connected to the performance of the organization. In product development, on the other hand, there is often only an indirect link between the usage of a particular end customer and the profit of the product development company, in that usable systems *may* lead to higher satisfaction and increased sales.

Figure 11 illustrates the applicability of the ideas that are presented in this thesis to various development contexts. My main focus is contract development, but mainly projects that aim at developing a product from scratch, rather than adjusting a third-party product, such as a system for enterprise resource planning (ERP) or content management. The latter case is, from a procurement point of view, a mix between a product development and contract development situation. The procurer acts as a customer for a product development company in that he/she purchases a product, but at the same time the product is not an off-the shelf product, such as a word processor, but must be adapted to suit the company's processes and needs. This adaptation work is usually quite complex and requires the

involvement of consultants from a supplier organisation, which makes it a contract development situation.

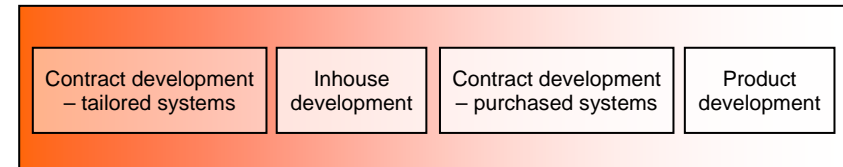


Figure 11: The relevance of this thesis to different development contexts. Light background indicates little relevance.

The basic idea in the approach that I advocate is that the acquiring organization should think carefully not only what services they need but also how they should work in a future use situation. When adapting third-party software the extension to which it can be modified is constrained to the software architecture. For this reason it might seem pointless to go through a process of defining what you want - if you can't get it. Furthermore, the whole point of purchasing an ERP system may be to streamline the organization by adapting work processes to that of the system, rather than the other way around. However, the first case study indicates that there is indeed a need for a more structured procurement process based on the future use of the system even in these settings. Had the procurers in the case study grounded their requirements in use and worked through a design and evaluation phase based on these requirements, they would have been much more confident in what they needed. But while such a process can be quite independent on technology in a “building from scratch” project – the goal is to select technology based on business and user needs – a “system adaptation” approach is much more depending on the possibilities offered by the kinds of systems that is searched for.

So what about the other development contexts, in-house- and product development? Although I have not studied how an Interaction Architect approach (employed or free-standing) would work in in-

house development, I believe that the opportunities would be about the same as in contract development. Following the same argumentation, I do *not* believe that the approach presented in this thesis is applicable to product development. First of all there is no clear distinction between a procuring and supplying organization in product development, as it is in contract development. The whole organization works (ideally) towards the same goal – to make high-quality products that increases sales. Therefore, the difficulties to introduce HCI are not the same as in contract development. Furthermore, there is no direct link between the use of a delivered product and the performance of the organization. Other reasons such as positioning and marketing may have higher impact than product quality. For product development I believe existing work in the field, such as the champion approach (e.g. 1,31,50) and integrating UCD with requirements engineering (e.g. 61,66) is more suitable.

5 Conclusions & Future Work

I have argued that one of the greatest problems that we face in practice is that of successfully integrating the HCI process into the overall acquisition-development process. The proposal I make is that we should redefine the role of UCD and what we mean with early involvement. Instead of viewing UCD only as part of systems development I argue that procuring organizations should use UCD to actively seek to understand what they need, in order to realise their business goals of acquiring a new system. Is this crazy talk? Should an acquiring organisation really have to bother about such issues at all? Considering the results and conclusions presented in this thesis I believe so.

My argumentation is based in part on theoretical grounds, but mostly on empirical experiences from three case studies. In my first case

study I presented difficulties that were experienced in a procurement project that lacked access to usability competence. In the two following case studies a model for working with professional usability competence was tried out. These case studies address many of the problems that were found in the first one. My overall arguments and proposals based on the results are:

- ★ An inherent problem when purchasing something that should be used is that use-qualities are not apparent in the purchase situation, but become evident after the purchase, when the product is *in use*. At the same time, it is essential to be able to specify what use-qualities that will be important since there is a direct link between the utility for a particular user and the success of the overall investment in technology. Systems that are not useful for the users will not create the expected business value.
- ★ To address this, procuring organizations should divide the systems development project into (at least) two parts – one for defining what to procure and one for developing the system.
- ★ Rather than relying on the supplier the procurement organization should themselves define the systems requirements using use centred design. The result of this process should guide the contracting and budgeting of the development project.
- ★ In order to accomplish this, procuring organizations need access to professional usability competence. In this thesis, I have labelled this role *The Interaction Architect*, to emphasize the similarities with the construction architect. The Interaction Architect can either be employed by the procuring organization or hired from a freestanding company.

- ★ Apart from competence in UCD a key success factor is also a procurer who wants to understand the process and the outcome, in order to use the results actively to control the development project.

In this final section I will summarize what I believe are the greatest contributions of this work, while trying to critically reflect on the results and the process.

5.1 A Critical Review

I started of this research project with a hypothesis that a procurement approach to UCD would, professionally performed, address the omnipresent problem of integrating usability in the development process at an early stage. During my research this hypothesis was not falsified but rather strengthened by getting to learn how the approach was not only beneficial for the HCI practitioner, but also for the procurer as a way of bridging abstract business goals to systems requirements in an effort to secure investments in new technology.

This begs for suspicion. Were there no problems? What alternatives are there? Yes there were problems. For example, as reported in paper two the project had to halt halfway. Since this did not occur in the third case study that was presented briefly in the third paper it is likely that this was caused by a too pressed schedule. However, the results are still interesting since they emphasize the need for a HCI process to plan for and evaluate against both business and user requirements. On the other hand, the approach I suggest has yet to prove its success in the overall acquisition-development process since no system has yet been delivered in either of the case studies discussed in the third paper.

What other approaches to work with HCI are there and why is there a need for a new one? Since this is what the whole thesis is about I

will not elaborate on this too much but it might be useful to summarize the thoughts. The approach I advocate is directed towards procuring organizations. In general, I would say that earlier approaches have been directed towards supplier organisations and that usability has been perceived of as an issue for systems development.

As discussed in section 4.6 on “Applicability”, I believe the choice of approach depends largely on what development context you work in. In product development, for example, where there is no direct link between usage and business benefits, a merging of UCD and requirements engineering might work better. In contract development, however, I would argue for a procurement approach. The common way to address the problem of late involvement and bad integration of a usability perspective is to market the UCD professional in the organisation in order to get increased acceptance. The problem that, in my experience, often occurs, is that it is still difficult to get the usability consultants fully booked, since they are involved in the project during a much shorter period of time than, say, the programmers. One solution to this, as described in [62], is to have the usability professionals to also work with other issues, such as programming, and have the programmers work with usability. To me, this seems like a terrible sub-optimization of usability. To use the simile with construction again, it would be like educating all the plumbers, electricians and builders in architecture, and let the architect work with construction. As we all know this is not how it’s done. The architect focuses only on architecture and often come from a free-standing architecture company. Even the contractor has a lot of sub contractors that each is specialised in it’s own area, and that keep fully booked with the help of this narrow focus.

But my concern with the marketing approach is, in the end, not that it has failed, or that the result when it does succeed often results in sub optimization of use qualities. For me, it all comes down to the basic question if usability is, or should be, a systems development issue. I do not believe this. Usability emerges in use but it is necessary to

understand already at the point of purchasing, since it is key in realising the desired business goals that motivates the purchase. UCD is intended to deal with such problems by simulating the future use situation and foreseeing what qualities that will become important, and how they can become realised. My argument, using the simile of construction, is that, since the need emerges before the point of purchase this is where the solution, UCD, should be introduced.

5.2 In the Rear-View Mirror

In the second chapter I presented my research questions as:

1. What characteristics are important for a procurement-oriented approach?
2. Can a procurement-oriented approach to user-centred design (UCD) overcome some of the difficulties in introducing UCD that have hindered earlier supplier-oriented approaches?

That is, I wanted to 1) investigate into common problems in systems acquisition, with regards to the ability to acquire a usable system, 2) develop a work-model for how to acquire usable systems and 3) try out the model in case studies and discuss how the approach worked out.

I have used case research as a methodology, why it is difficult to generalise the results very much. However, I have learnt much about the first question, both from the first case study of a regular procurement process, and from the two that followed when a UCD approach was used. This knowledge provides a base on which further knowledge can be built.

In the two case studies that used a UCD approach common issues such as early involvement and integration were addressed, but

weather or not this will have the wanted effect on use is too early to say anything about. Thus, a procurement approach seems promising, for several reasons, but much needs to be done before we can say anything more general about its applicability and success or failure.

The third research question is related to the second but focuses on the particular role of the Interaction Architect that was introduced in the two last case studies. In the case studies the role was introduced from a free-standing architecture company, that did not have any interest in also developing the system. Since current practice may be said to have problems with objectivity, when the supplier is often responsible for defining, realising and evaluating the requirements, an approach with a free-standing architect is interesting to study. Even though such an approach was used in the two later case studies in this thesis none of these has yet continued into development. Therefore it is difficult to say much about the outcome of this particular approach, other than that it worked well to use an outside usability professional in the work of defining requirements as part of systems acquisition.

In the end, though, you, as a reader, must make your own judgement based on what you have read as to whether or not these results are relevant and valid. In particular, my choice to pursue research on projects in a company that I have founded should be considered, especially since I conclude that the approach is successful. However, looking back I would not have chosen another research approach. The opportunity to have such close contact with the reality in which my research would be relevant has been invaluable. I also believe that it had a positive affect on the quality of the collected data. Since I did not chose to use the case studies in my research until after the projects were finished I did not have any affect on the projects as a researcher.

5.2.1 Overview of Contributions

As noticed by a reviewer to my second paper it is not the fact that the two case studies with an Interaction Architect were successful that make them interesting, even though successful reports are scarce. No, what I believe makes the greatest contribution is the overall approach

in itself, in combination with its apparent success. We have in the field of HCI mostly focused on project execution and, hence, on the supplier side of the overall process. By questioning this and instead assuming that UCD should be an issue for systems acquisition, new doors open up. In particular, the procurement approach to UCD suggests several benefits:

- ★ The UCD process is used to bridge business and systems requirements in the systems acquisition. The result is a vision and a requirements specification that is used to procure the system. In this way the result of the UCD process integrates seamlessly into the overall development project since there is only one requirements specification or system vision and usability is not separated as something extra.
- ★ Procurers appreciate UCD when they see it as a necessary step to detail their requirements in order to assure that the system-in-use realises business goals.
- ★ The UCD process is carried out early on, even before a contract with a supplier has been signed. Since the contract regulates the responsibilities of the supplier, and since it is based on the result of the UCD process, the chances that the final product gets usable increases.
- ★ The procuring organization can use the UCD process to define, prioritize and evaluate both business and user requirements already in the procurement. In doing this they get much more sensitive to what services that are necessary and how the product should behave in order to realise both the users' and the business' goals. This, in turn, makes it easier to monitor and manage the following development project.
- ★ Since the UCD process is iterative and use communicative deliverables the project group in the procuring organization

gets several opportunities to get the rest of the organization or management to comment on and buy in on the results.

In terms of contributions I also believe that the particular approach with an Interaction Architect constitutes a contribution in itself. As described earlier on, the simile to the construction architect is not at all new, but most often, the discussed similarities have concerned the role in itself. In this thesis I try instead to draw attention to the role that the architect plays in the overall process of procurement and construction.

Lastly, this thesis discusses the role of HCI. Today UCD is conceived of as a systems development activity. By approaching systems acquisition instead of systems development, questions arise as to HCI as a curriculum should not approach business development and management more. With this, I do not mean organizational development as it is discussed in, for example, participatory design. I want instead to emphasise business development from a commercial perspective where HCI could help organizations to transform their business objectives into systems requirements for applications that, when used, realise the desired objectives.

Given that we tend to perceive usability as a system development process it is hard to switch perspective and see it as a business development process, or as part of systems procurement. However, as I argue in this thesis, there are several benefits in switching perspectives, for HCI practitioners, users, suppliers, and those who eventually pay for the lot – the acquiring organizations. If, however, we want this change we, as usability professionals and researchers in HCI must start recognizing the important links between usability and business development, and the role that UCD can play in securing investments in new technology. At the writing of this thesis there is a worldwide debate on the usefulness of information technology and as

to whether it matters or not². In spite the annual CHAOS report that points out that the weak link is in communication with users, few in the debate, at least in Sweden, have touched on these issues. The proposal given in this thesis is that there is a missing link in current acquisition processes; one that we, as usability professionals, can bridge. It is the members of the HCI community, in practice or in academia, that have the power to redirect our focus towards procurement.

5.3 Future Work

When the research group I participate in started it was very rare that HCI was discussed as an issue for systems acquisition. Today, however, almost four years later, it is a hot topic. The work I have done in this thesis is an attempt to concretize the procurement approach in practice, and evaluate the results. Although I am satisfied with the outcome I am also aware that this journey has just begun. The idea that HCI is a systems development/supplier issue is deeply rooted in both practice and research. Therefore, much work lies ahead.

² The discussion started after Nicholas Carr, a business writer whose work centers on strategy, innovation, and technology, wrote a book titled “Does IT Matter? Information Technology and the Corrosion of Competitive Advantage”. He argues that IT's strategic value has diminished steadily as its presence and power have grown. Carr's ideas have sparked a widespread debate on the role and value of information technology in business and have been featured in articles in the New York Times, the Washington Post, the Financial Times, The Economist, Newsweek, Business Week, USA Today, Fortune, and Forbes, among many other publications. See, for example, <http://www.nytimes.com/2003/05/04/business/yourmoney/04TECH.html> and <http://www.nicholasgarr.com/articles/matter.html>

Given the focus in this thesis I would be particularly interested in further developments of the approach I put forward, in particular longer studies with the Interaction Architect that follow a project from procurement to development and into use. Will the deliverables from the UCD process make it easier for acquiring organizations to control the development process and the final result?

I have raised some ideas about how different approaches may vary in applicability in different development contexts. That is, some approaches may be more successful in some development contexts than in others (see section 4.6 Applicability). For example, I have argued that the approach that I argue for in this thesis is best suited for contract development, but that it may also work for in-house development. However, the argumentation about applicability is mostly an outcome of my previous experiences as a consultant and the results of this thesis. Academic work on similar issues seldom relates the approaches to contract development. A comparison or review of different approaches in different development contexts would, therefore, be interesting to pursue further research on, both from academic and a practical perspective.

Related to this is also the question of the relevance and applicability of the approach with the Interaction Architect put forward in this thesis. How would such a role function in an in-house development organisation? Are there any advantages of using an Interaction Architect that is employed from a freestanding firm versus one that is employed by the supplying or acquiring organisation?

In a larger perspective, we also need to learn much more about current procurement practices and obstacles. To fuel the debate of whether or not this is an interesting approach we also need more surveys of actual HCI penetration in industry. How many procurement organization think they deal with HCI issues and how many are actually using established methods and competencies? How many development organizations care about HCI? How often is the one responsible for the HCI work actually trained in HCI and not

only a technician with an interest? How often do usability professionals get to do a full-fledged UCD process that also integrates with and affects the requirements and the product? With more facts on the table I believe the discussion will get more serious. Until then, mind the gap.

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Procuring Usable Systems - An Analysis of a Commercial Procurement Project

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Abstract

This article presents a case study of how usability was dealt with in a procurement process of a content management system. The results indicate that the procurers found it difficult to define usability requirements, probably because they lacked tools and experience to do so. Difficulties also arose because the tools that they used were based on idealized models of how users worked. It is argued that proper usability activities at an early stage could have facilitated the procurement process and the discussion with suppliers, as well as integrated usability into the development process. A brief outline of how such an integration could be made is described.

Background

Methods for usability and user-centred design have mostly addressed suppliers' production models. Accordingly, positions as usability

professionals have primarily been found in supplier organisations. Procurers, on the other hand, have relied on suppliers to create usable systems and have not focused explicitly on usability issues in their procurements (Holmlid & Artman, this volume). Unfortunately, although it might seem obvious to expect that the system you purchase should be usable and useful this is seldom the case. An important reason is that usability issues have not been dealt with consciously in organisations or projects and have been separated in development processes (Carlshamre, 2001). Usability professionals have, if at all, been involved in projects too late to have any impact on issues such as interaction design and utility. The separation has also brought with it a rather narrow view of the concept of usability. Usability is seldom discussed in relation to organisational change or business strategies, but rather as an isolated concept or as a property of the product or interface. The implicit assumption that suppliers should be responsible for usability may stem from this narrow view of usability - it is the responsibility of the supplier to develop the system.

In contract development (see Grudin, 1991 for a discussion of different development contexts) the development project and the work of the usability professional is often considered to start when the supplier signs the contract with the procurer. Although much work has often already been done in the procurement process this is not perceived of as usability activities. Nevertheless, the goal of the procurement is similar to the goal of the usability activities: to get from business goals to system requirements, while assuring that the system gets useful and usable. Thus, another reason why usability activities are often omitted in contract development is that the activities do not seem to add much to what has already been done in the procurement, even though this work may not have focused on actual use at all (Balic, Berndtsson, Ottersten, & Aldman, 2002).

This paper describes and analyses how a group of procurers attempt to define the requirements for a new content management system, and how requirements concerning usability were dealt with.

The Case Study

The study was carried out in a department within a large Swedish bank. The business goal of the department was to produce economical analyses. One of the key ideas behind the procurement project was to automate and streamline the analysis production process in order to cut costs and gain competitive edge. A project group consisting of three to four persons was put together to work with the procurement. Although the project leader was educated as a system analyst, none of the procurers had any formal training in either requirements engineering or user-centred design.

The bank had its own development process that should be used when purchasing and integrating products. Unlike many development processes found in the software engineering or HCI literature this one also included procurement. The first milestone, the Request for Information (RFI), is a tender that is sent out in order to find out which suppliers to involve in the forthcoming procurement process. It states the purpose of the new system and specifies important functions and business needs. The research project started after the RFI, when the work on the Request for Proposal (RFP) should begin. The RFP is the final requirement specification in the procurement process and is used to select a supplier to continue working with in a pre-study before the implementation project starts.

Method

Data was collected for six months, from March to September 2002, through participatory field studies including participatory observation, interviews, video and audio recordings. Data was also collected as documentation resulting from the ongoing work such as draft reports, mails, and meeting notes. The data was analysed qualitatively from an activity-theoretical perspective. Although the researcher role was seldom discussed my presence as a peripheral

member of the team made it possible to participate in meetings and discussions. My role was at the outset to analyze usability issues in the procurement process but it soon changed to become more of a discussion partner or mentor for working with the requirements from a usability perspective. Thus, although I did not participate much in the activities, my presence had an effect on the RFP with respect to usability.

Results

When initiating the RFP project the motivation for procuring a usable system was high. Despite this interest in usability, it soon became apparent that the procurers found it difficult to define requirements. There was a frustration about not being able to get it right and they often exclaimed things like *“This [specifying requirements] is so hard”* or *“This is the most difficult thing that I have ever done”*. Their goal was to define the requirements for a system that would not only fulfil the overall business requirements, but that would also fit the needs of the users.

At one meeting, there was a discussion about system requirements. The discussion was not grounded in knowledge about actual usage but more in on-the-fly inventions about what might constitute user requirements. For example, requirements and models gained bottom-up from the analysis of some users’ work were applied top-down, without much consideration, to the work of some other users that had quite different duties. Incidents like this confused the participants and prevented progress. After a while, due to some interventions by me, the discussion in the meeting turned more towards actual usage and the user research results. This had immediate effect and moved issues forward. When finishing the meeting one of the procurers said *“Wow, what a relief! Now we really start with actual needs... this feels so good!”*

Thus, it appears that the procurers, with little experience of requirements engineering and user-centred design, could not find the right tools to reach their goal of defining requirements based on usage. Instead, they had to invent their own tools as they moved along. In a meeting with an internal expert on procurement and the bank’s development process, the procurers complained about this: *“You know we have RFP templates, guidelines for managing the relation to the suppliers, supplier evaluation matrixes etc. but we don’t have any support, internal course, or tools that guide you into how to define the system requirements.”*

Understanding User Requirements

As is common (Rouncefield, Viller, Hughes, & Rodden, 1995) the procurers often based their reasoning on idealized models of work and use, influenced by a rational or technical perspective. This conflicted with their stated goal of actually understanding and starting from the actual use model. The following passage is taken from an early user interview and concerns whether the system should be structured according to a global standard (GIX) or a locally developed structure.

Analyst	... and now we have a common folder on a shared server where all our models are located (...) So it is not at all structured according to the GIX standard but more in a way that is practical for us so we know where each company belong.
Researcher	mmm... do you see any problem in using GROW [application using the GIX standard] together with this or do you know where to...
Procurer	... to have the same structure on both your analysis and your shared folders and on your GROW data? I mean, that’s what it’s about, to structure information accordingly ... and structured...
Analyst	Well, I don’t know if that’ll pose any problems. I mean the GIX standard is a global standard and it is... well it’s hard to apply to... certain sectors naturally. (...)
Procurer	And then... well, I think it feels natural to structure your data using the same structure as the data the companies are structured by.
Analyst	... well (doubting)? If it wont cause any, any problems then...?
Procurer	It will be so messy otherwise because then you have one structure in one place and then you find the companies in another place... (...) But all

work documents... all information folders... all INFORMATION should be structured in the same way...?

Analyst well, well I, I don't know.. but yes or I mean I don't know if it's so damn important cause then you could say that... if all information should be incorporated in all structure, I mean, the information that I keep in my head – that is not located in any structure at all. But it is still used and expressed in my written analysis sooner or later (...) maybe it doesn't matter how my own folder is structured, just as it doesn't matter how my brain is structured and the fact that I don't write everything down?

In the passage above the procurer reasons about usage and tries to interpret and understand it from an idealized model of work. The user (analyst), on the other hand, bases his understanding on the actual use model. Since the procurer has little experiences of assessing use through activities with users, uses a different model for the user's work and has different objective than the user (to create a consistent requirement specification), she assumes that high quality must mean consistent structuring of information. The user, on the other hand, knows that they have defined their specific structure because the global GIX structure was too coarse and made work less effective. Although the aim of the interview is to get a better understanding of the use model and user requirements the operative procurer thinks more of the future setting and what would logically be most sound for the business, and tries to convince the user of this model.

What and How

Somewhat simplified, the user-centred design process can be seen as divided into two stages. The first stage, the “what” stage, aims at defining what kind of system and functionality that will solve identified user needs. The second stage, the “how” stage, addresses how the interaction with the identified functionality should be designed. Since activities with users in this project were not initiated until the start of the work on the RFP, there was only time to do a quick and dirty needs analysis, that is, completing the “what” part. Therefore, everyone had their own thoughts about the solution, which

often confused discussions. Moreover, it made the choice of a supplier more difficult. Since the suppliers had only received “what” requirements their responses were also of this kind: “Yes, it is possible in our solution”. All of the suppliers also said that they could fulfil more or less all of the requested requirements (although to vastly different prices). The decisive factor was therefore not if, but how the requirements would be solved. But since the group had different views of what would constitute a good system design and the suppliers had not been given any how-questions this was difficult to discuss. Consequently, the important discussion about choosing a supplier was largely based on the impressions of the supplier demonstrations.

Discussion and Conclusions

This article reports a case study where the responsible procurers worked with requirements specification and usability aspects already in the procurement process. The findings are interesting since it has often been taken for granted that usability is something that is dealt with only by suppliers, after a completed procurement. Even in the HCI community there has been a strong focus on suppliers and an absence of reports from procurements (Artman, 2002; Holmlid & Artman, this volume).

The case study presented here is based on the position that a user-centered methodology fits well into the procurement process; it would provide a way to bridge business and system requirements while still focusing on actual usage. It could also make it possible to integrate a user-centered perspective from the very beginning of a development project through the RFP - as requirements or wishes for the future system. However, in the procurement process that was studied this approach was not all successful and posed several problems. The conclusion is that most of these problems arose due to a lack of competence in user-centered design. The procurers involved were not trained in either requirements engineering or user-centered design.

Lacking tools and experiences of working with usability, the procurers had difficulties accessing actual user needs. Moreover, the tools that were used often mediated an idealized view on usage. Internal discussions and communication with suppliers were hindered since the team did not penetrate interaction design issues, for example through an iterative prototype and evaluation process.

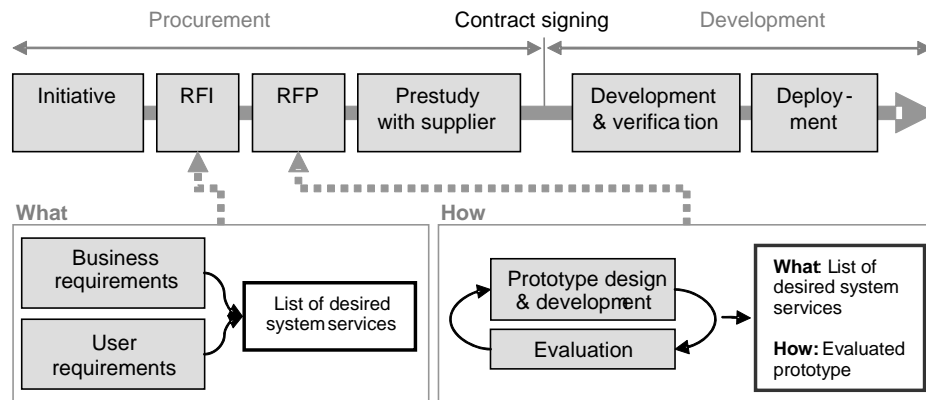


Figure 12: Integrating user-centered design in the development process.

Given this, it would be interesting to study a procurement where a trained usability professional would be responsible for writing user requirements in the RFP. Figure 1 describes how this could be realized in practice with the particular development process of the bank. Exploration of user needs and the definition of system services could be done in the RFI process. This initial “what”-requirement specification would form the basis for the first selection of suppliers. In the RFP process these requirements could be detailed into an information architecture and interaction design. When completed, the results could be presented both as textual requirements and as an evaluated prototype describing both which system services that are needed and how the interaction with these services should work.

Together they could serve as a vision for the procurement and as a basis for concrete discussions with suppliers.

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Procuring a Usable System Using Unemployed Personas

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Abstract

This case study examines a procurement project where the Swedish National Labor Market Administration (AMV) hired usability consultants in order to redesign their website for employment exchange. The user centered design process was part of a larger project to define how the website could be reorganized to better support new organizational goals. The project was managed by a procurement group that had already defined the organizational requirements for the website. They hired the usability consultants to learn about user requirements and to specify an information architecture and design. The usability company suggested a process with a user research phase and an iterative design phase. The primary deliverables would be personas and an evaluated prototype. The results demonstrate how the user centered design process can effectively be used by active procuring organizations as a bridge between abstract organizational requirements and concrete systems requirements. Tools such as personas and prototypes helped the procurers to understand and prioritize among requirements, as well as to communicate their work to the organization. These tools will be used in the continued work to specify and develop the system.

Author Keywords

Procure, Acquire, Procurement, Procurer, Usability, Interaction Architect, Personas, Requirements, Integration, Design, Business.

ACM Classification Keywords

H.5.2 Information Interfaces and Presentation: User Interfaces – theory and methods, user-centred design. K.6.1 Management of Computing and Information Systems: Project and People Management – life cycle, strategic information systems planning, systems analysis and design, systems development. K.6.3 Management of Computing and Information Systems: Software Management – software development, software process, software selection. D.2.9 Software Engineering: Management – life cycle, software process models.

Introduction

One central problem that HCI practitioners face is that they are seldom allowed to do their job properly. Late involvement and lack of influence on the requirements specifications are more rule than exception [11]. The origin of the problem is twofold.

On the one hand suppliers, who have been the main proponents of usability as well as employers of usability practitioners, have failed to incorporate the Usage-Centred Design (UCD) process into their development. In spite of the growing interest in usability in the industry few success stories have been reported [5,9]. On the other hand, procuring organisations seldom require UCD activities to the extent they should, or could.

One reason that suppliers have taken the initiative when it comes to usability issues is because the UCD activities are often understood as being a part of the systems development process, rather than an aspect

of defining the organizational activities and operational goals. This is especially evident when examining the literature on HCI and systems design.

In this paper we want to argue that it is more fruitful to view UCD as part of an organizational development process. Whether it is a business to consumer, business to business or an internal system that is procured the aim is to realise some organizational goals. But as pointed out by Balic, Berndtsson, Ottersten, and Aldman [2] an interactive system can never realise such goals by itself - someone has got to use it:

“What often seems to be forgotten is that the generated business value corresponds to the level of usage (number of users who actually use the product) and the product’s quality-in-use (effectiveness, efficiency and user satisfaction when the product is used). In other words, business value is generated through product usage.”

Thus, whether it is a consumer that purchases something at a website or an employee who registers a transaction the actual *usage* is central in realising the desired organizational goals. Consequently, understanding usage should be a central task in procuring any interactive system. In order to be able to specify what to procure a procurer needs to understand the requirements of both the current and the future usage of the system being procured. This, as it happens, is exactly what UCD is about.

We propose that procurers would benefit from becoming more active when it comes to usability issues, and that the UCD process is well suited to bridge organizational goals and systems requirements. To regard usability as an attribute of organizational activities rather than as an attribute of human-computer interaction, is making usability and interaction design a much more general and desirable aspect for many organisations since it is the operational goals that should be fulfilled efficiently rather than the interaction with the computer.

In this paper we present a case study where the Swedish National Labor Market Administration (AMV) hired a usability firm to perform the UCD process in order to help the organization specify the requirements for a new website.

The Procurement Competence Research Project

For almost three decades usability and UCD have been researched and shown to have great merits for systems design. Yet, many usability professionals, at least in Sweden, feel that they have to preach its value in order to take place in the design process [11]. All too often their work is constrained. The UCD community has partly got itself to blame for this failure. The preaching of usability with its own processes, competence groups and vocabulary has strengthened the separation of HCI. Some (e.g. [4]) have therefore said that our field is mature enough to dismiss the usability as a term – stop talking about it and just do it.

Since 2001 we have researched on how procurers of system design think and reason about usability and UCD. We have found that most organisations value usability and think it is of high importance. Some organisations think it is so important that they do the usability activities on their own [17], others require it in the general requirement specification [19]. In the former situation the organisation is doing the best they can to make the systems design usable – usability becomes defined by the competence of the procurer organisation. In the latter case the procurer seldom specify it concretely enough in the contract. Consequently, usability becomes defined by the developing organisation and their willingness to do usability work. Procurer and supplier process negotiations is a third form of organisation of usability design, where the degrees of usability are defined ad hoc and on the fly by the procurer and the supplier [1].

In this study we examine a fourth form of organisation of UCD where the procurer organisation contracted a third party to perform the UCD activities and to make the requirements concrete through an evaluated prototype. The general aim of our project is to examine

what usability and interaction design can accomplish in these very early stages of systems design, and further dig into how procurer organisations reason about usability. We also investigate how personas can be used as a tool for procuring organisations to reach consensus and merge organizational and usage goals.

Personas

Personas [7,8] is a method/tool that has become increasingly popular among usability practitioners. A Persona is a character representing a group of users with similar usage patterns and goals. It is based on thorough research of actual usage. The tool is used to understand and focus on user requirements and to communicate these requirements among different stakeholders in a project.

Personas as a methodology has not been thoroughly researched. In addition it has been rejected by some since it replaces some actual user participation [10]. Others argue that this is its strength since actual user involvement in the design work can be perceived as a hinder rather than a help [7,8,10,13]. This may be particularly true when designing systems for large audiences, such as an internet services.

Personas is usually described as a mediating tool between usability practitioners and developers. In this study we are especially interested in examining how a procurer experienced the use of personas and, as a consequence, how they understood the merits of interaction design in relation to the overall goal of procuring a large implementation project.

Method

The case study was conducted as a participatory observation field study where the first author participated as a usability consultant from the usability company throughout the user research and design phase of the overall project. Therefore, this phase is described mainly

based on the first author's experiences of participating in the project. This is complemented with reflections of the process by other project members, both before and after this phase. The interviews were conducted both with the project leader from the usability company and with members of the procurement project group (hereafter called PPG). The interviews were conducted by both authors in a project room at the interviewee's workplace. The second author was lead interviewer. All interviews were recorded.

We have analysed the project as it uncovered chronologically. We have triangulated the observations with documentation and with opinions and reflections from the interviews.

Results

This case study describes a pre study that was conducted to gather requirements for a new version of the Swedish National Labor Market Administration's website. The goal of the pre study was to gather information for making a management decision of whether to invest in a new website. In large the project consisted of three phases, as described in Figure 13.

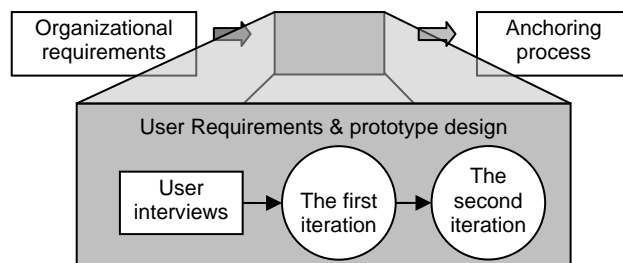


Figure 13. The project as it was planned in relation to the previous and following internal activities.

The first author participated as a usability consultant during the gathering of user requirements. Before that the agency had gathered organizational requirements and they continued to prepare the decision material and anchor the results in the agency after the user research and design phase was finished.

Project Background

The Swedish National Labor Market Administration (AMV) is a very important government agency in Sweden. It's role is to monitor the employment market and decrease unemployment. When Internet became widespread in the late nineties the agency was one of the first to use the new medium to offer services to the citizens. The website has since grown with more services and information. Although successful, it has with time become difficult to use. One reason is that the organic growth of the site has created an information structure that is not developed from a usage perspective. One of the procurers conclude that:

We have not been able to design with the users interest in mind but everyone sees to their department and their own interests

There are three major user groups of the website: employers, unemployed and various users that seek information about the work of the agency. Since they all have to share the same top navigation much important information has today been pushed downwards in the structure, which make services and information difficult to find. Furthermore the website is in general heavy on information which also adds to the difficulties. Figure 14 gives a snapshot of the current website. It has six main sections that are directed to different user groups.

The agency's mission is to match employers and unemployed. This has traditionally been handled by assistants in the local offices around the country. The website has, until now, mostly been seen as separate from the local offices, and it has been managed and developed by a

specific department within the organisation with much authority of its own. During the last year, with up to 700.000 visitors every month, the management wanted to create a new organisation in which the website would have a more central role. In the new organisation the website would be the main channel for the matching process and employers and unemployed would handle the process themselves. A new call centre and the local offices would mainly deal with those that need more support and that can not get by on their own. In this way it was envisioned that the organisation's resources could be used more effectively.



Figure 14. The website as it is presented today

To accomplish this, the general director ordered a pre study to define the business and user requirements for a new version of the website. This project had been initiated once before but had crashed due to internal disagreements:

There had been a project like this earlier to define a new information structure for the website but it collapsed since there were internal disagreements and conflicts about which perspective one should use and how the user groups looked like and so on.

The new project leader employed two major strategies to succeed with the project. One was to make the website a management issue rather than a department issue. Hence the project group was put together to represent all major departments and was organised in direct contact with the management. The first months of the project were spent gathering organizational requirements from various documents and statements from the Director General. This work resulted in some central summarizing directives. Since these were based on speeches by the Director General and general documents they were quite abstract, such as:

“The tools on the website shall above all be an effective support for the visitors’ own matching activities”, “The website shall communicate our mission and clarify our assignment” and “The website shall be developed from a usage perspective and adapt to the citizens and companies needs and conditions.”

The second strategy was to “disarm” the question of the users’ perspective. There had not been any research done about the users’ needs in the previous project. This had been one reason for its crash since everyone had claimed that they knew what the users actually needed, as a support for their own ideas.

“Everyone claimed to have the user’s perspective and I claimed that no one could have it. The only way to get it was to work very systematically with the users”

Hence, when the PPG had nailed down the business requirements as detailed as they could they decided to conduct a study with the users to define the user requirements. They explained this to the usability

consultants that they had a framework agreement with and they had got to respond with a proposal of how they would like to run the project. After a selection process the PPG chose a small usability firm, mainly because of their methodology:

“What was attractive was that it was not this kind of “we are the experts on the user’s opinions” but a methodological base to stand on that was very clear.”

The usability company provided two consultants, one responsible project leader and the first author, as assisting consultant. We suggested a process with contextual interviews to create personas and scenarios, followed by an iterative design and evaluation phase to create a prototype. Since the scope of the project was to define a new information structure the interviews would not be used so much to gather new functional requirements as to understand current usage and the segmentation of the user population. An abstract representation of the work process is provided in Figure 13.

The project group had worked for five months nailing down the organizational requirements and their time was running out. They planned to prepare and anchor the results of the project in the organisation through a review process before the end of the year. Therefore the UCD process could not take more than eight weeks. At the same time they wanted two iterations and a thorough interview phase. Hence, the schedule for the UCD process was very tight. However, the project was important and prestigious for the usability company and it was judged that we would be able to deliver on time by working with two consultants on top speed.

User Requirements and Prototype Design – a Usability Consultant’s Perspective

The user research and design project was initiated with a workshop in which the PPG presented what they had done so far in gathering the business requirements. All relevant documents were also handed over to the usability company. Apart from going through the

organizational requirements a *persona hypothesis* [8] was formulated. Several contextual interviews [3] were planned for each user group in the hypothesis. The hypothesis was based on the agency’s existing information and knowledge about the segmentation of the users of the website.

We provided the project group with a list of the planned interviews and asked them to participate in as many as possible to gain a first hand insight into the results, as well as of the process. The members of the PPG were very engaged and interested and one of them participated on almost all of the 21 interviews that were conducted. In order to not interfere too much with the actual interviews only one member of the PPG was allowed to attend on each interview session. When the interviews were completed we analysed them qualitatively and transformed the data into personas covering the different user groups, their goals and needs. Although the scope was on an information architecture level the needs analysis resulted in several usage scenarios for the new website with new functionality to support the discovered and as yet unmet needs.

This was all completed in about nine days, Even though this was evidently a very fast tempo we felt that we were in control of the work. Although they were active and engaged, the members of the PPG, on the other hand, only participated occasionally in the hands-on work, such as on an interview or in a design session and then got the results presented to them in a weekly workshop. Thus, they did not get the same insight into the details of the results as we got. Although this was not discussed it seemed to make them uncomfortable. In the following interviews one of them comments this as:

“Things happened very fast. And I don’t think we were prepared on that. (...) So we felt that we were maybe not really involved in all the details of the work, which we may have wanted to be. But at the same time we had decided to follow this time plan to be able to do all the things we needed to gather the user requirements. But when you look back at it we should have spent more time in the project and been more involved.”

When the personas were discussed the PPG noticed that two categories of users seemed to be missing. The selection of respondents had not included these user groups. Therefore, one of the members of the PPG complemented the personas with two more, based on discussions with assistants in the local offices.

After the personas were completed and presented for the PPG we moved on to work with the design and the information architecture of the first prototype. Card-sorting exercises were planned with the two most important user groups, but only one could be performed. Again, only one member of the PPG was allowed to attend in order not to disturb the exercise, but the information architecture was worked through with the whole group in a workshop shortly after this. Alongside with the information architecture we created a first draft prototype. A graphical designer added a first idea of form and visual design to it. The prototype and the fundamental design ideas were presented and discussed with the PPG. Since the members had varying experiences of working with design the discussion was not always smooth and concepts such as navigation levels had got to be explained.

After the workshop the prototype was made “testable” by making it possible to interact with it. While the prototype was evaluated with users and by experts on accessibility the graphical designer conducted a mood board workshop with the PPG to uncover their ideas about the visual design. Hence, when we presented the results of the evaluations to the project group the visual designer could start

working on the visual design that would be used in the second iteration.

Altogether, the general directives of organizational requirements, the personas and user requirements, the results from the usability and accessibility evaluations, and a new form provided the basis for a second high fidelity design. However, a few days into the second iteration the procurement project leader called us to announce that the project needed to make a halt. The PPG had not been able to follow and understand all the decisions that had been taken during the design process. Therefore they were also not sure about the connection between their abstract organizational goals and the now concrete design. We were assigned to lead a series of full-day workshops with the PPG to backtrack what had been done and work through both the organizational and user requirements again.

After three intense workshops spread out over about eight days most questions had been answered and the PPG felt much more comfortable with the work that had been done. We updated the prototype with all the design decisions that had been taken during this period and a second round of usability test was planned. In the meantime the graphical designer negotiated with the PPG about the requirements for the final form. As in the first iteration the prototype was also sent for evaluation by experts on accessibility. There had been many changes in the design, both concerning interaction and form issues since the first iteration, and the usability evaluations indicated some areas that needed reconsideration. This was discussed in a final workshop with the PPG. Design decisions were agreed upon and the final changes were made to the prototype.

In the new design (Figure 15) each primary persona gets their own version, or mode, of the website. This means that the whole top navigation can be used for each target group which gives better overview and a more shallow information architecture. The design is also more action-oriented than before and more coherent in the sense

that related parts are now integrated rather than spread out in the structure.



Figure 15. The design of the final prototype.

Our last responsibility was to write the final project report that described the work process, the personas and basic ideas about the final design. This was handed over together with the prototype and the final graphical design. Although this was the end of our involvement the PPG had much remaining work. They had to continue and intensify the work of anchoring the results of the whole project in the organisation, mainly through a thorough predefined process in which the prototype would be sent out for review to various departments.

The halt – an Analysis

From a UCD perspective the project had progressed smoothly. In spite of a tough time plan we were on time. Therefore, the halt came as a surprise to us since time had been absolute top priority and a halt would inevitably cause a delay. But suddenly the priorities had

changed. Instead of time understanding became essential. When the project was discussed in retrospect the PPG leader gave two major reasons for the halt:

“The usability company had delivered entirely accordingly to the expectations but the project group did not have full insight and understanding (...) of the results, which made them feel uncertain. And then they would not be able to perform the extremely important work to become ambassadors. So I was forced to halt the project so they would be able to understand the results that had been produced by the usability company.

We identified the organizational requirements first and they did not reach the same level of concretization as the users’ requirements. (...) And the usability company was in charge of developing the prototype and we got to review it in this kind of dialogue... but then... the usability company got to strong somehow. The usability company was much more professional in some way - they had their methodology and they knew where to go and so forth. But we, who sat with the organizational requirements, in which the usability company did not have any competence, we were not as good at steering, so to speak.”

We were aware that the PPG was unsure about how the abstract organizational requirements should be translated into the design and had asked them shortly after the user interviews to try to detail their requirements to be able to discuss them in relation to the design. This was not done, however, and in order to be able to deliver on time we felt that we had to move on. Furthermore, since we had read the report from their previous work and had designed the prototype based on user requirements, but in the overall framework of the organizational goals, we were less worried. Of course, there were still questions that were unanswered and even some contradictions in the documents on organizational requirements, but we expected these to be resolved during the second iteration.

In retrospect it becomes clear that the halt was necessary not only for the PPG to understand the user requirements, but also to specify and secure the organizational requirements. The PPG had not been able to detail these to the level that the user requirements were specified. Since these were also “owned” primarily by the usability consultants the PPG experienced that the user requirements grew “too strong”. Considering that the previous attempt to specify the requirements had failed the motivation to actually *understand* was very high. However, lacking a thorough understanding of the user requirements and with diffuse and contradicting organizational requirements it is not easy to participate in an argumentation about design decisions, especially in the fast pace that the project was moving.

The halt is interesting from a research point of view since it manifests the importance of working with a dual perspective of business and user requirements, as discussed later on. It is, however, important to emphasize that it was a completely internal project decision and the members of the PPG did not consider it as a big thing in the following interviews but merely as a response to a too tight time plan.

Understanding Through Cooperation

When asked how they would plan the next project based on these experiences the PPG members agree that they were satisfied with the overall process of identifying the organizational requirements first and then the user requirements, and the decision to involve usability competence:

“I don’t believe in this type of methodology where you take in users and let them design their own system. I believe in the meeting (...) between those that are (...) specialists on designing systems and the new technologies etc., and the users’ needs. It is in this meeting that you get the absolutely best solutions.”

If they would change anything the most recurrent comment is rather that they themselves should have been more involved in the project

from the start, and spent time on their own with the requirements, without the usability company. Even though they would let an outside company be responsible for the UCD process they comment that they should have participated more in the activities and that all work should have been done in their offices, instead of having the usability consultants work in their own office.

“Looking back we should have planned to be more involved in the project.”

Although we who were responsible for the design felt that we had captured the essential organizational requirements in the prototype the PPG needed to work through the design decisions themselves to gain the same understanding.

“It might not have been that different [had we not had the halt] - but it was mostly a feeling that you got time to think through a lot of issues (...) Things were more clear to me [after the halt]. I could take a discussion with others better than when it was highway all the time.”

Thus, although the design did not change drastically during the halt it was needed in order to get the PPG up to speed in the design discussions. Nevertheless, the project, although following the project plan with respect to the activities with the users, turned out to be a different project than expected from the PPG’s perspective (Figure 16).

Anchoring the Results in the Organisation

Since the end of the design project the PPG has continued to anchor their results in the organisation. The prototype was sent out for review to different departments with an opportunity to comment on the results. The responses were summarized and the PPG decided to make several changes in the prototype based on the comments. Since this process both required the project group to continue to work with

the requirements and also explain it to others in presentations it further increased their feeling of confidence:

“Now we have done this and we stand up for it - we know it. I believe this is very important for the credibility - that it's not only something that a consultant has said since it's much easier then to say “well that's only a consultant who's done it. We'll change it”.”

Although many comments were handed over in the review process the PPG agree that the results in general have been very well received. Both the final result and the structured work process they used to reach it were appreciated. The management has now made a decision that the prototype represents the vision of the future website and has decided to continue to specify a cost and resource estimate for a development of the new website based on the prototype.

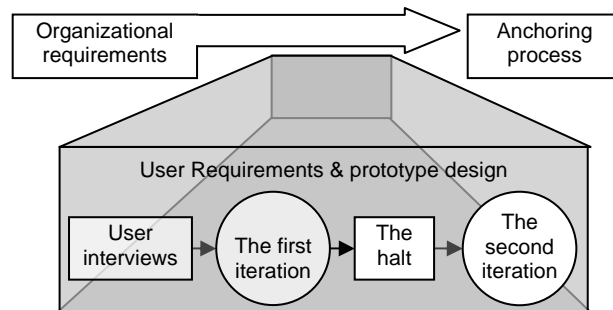


Figure 16. The process as it actually turned out with a continuous dialogue between organizational and user requirements

Organizational and User Requirements

The PPG comment in the interviews that the UCD process, with the halt, helped them to better understand their own organizational requirements, apart from specifying the user requirements. Although the original organizational goals were not changed their understanding of them and the requirements did:

“The organizational requirements have become more concrete (...). The policy documents are written on a fairly high level of abstraction. It's easier now to run in the staircase of abstractions (...) I can go from a detailed level, for example a database table. I can take this with me and run up to the policy document.”

By working in a structured way with both organizational and user requirements they seem to have built a very solid platform from which to continue the procurement project. In particular the halt and their own work with the material after the design phase seem to have helped them to understand how user and organizational requirements are interrelated and represented in the design. Here is a concrete example of how the personas and the design work aided in this integration and prioritization of the requirements:

One organizational requirement was that the website should communicate what the agency do and how well they do it. From a usage perspective this was in line with the goals of the information seeking persona (i.e. journalists and researchers) since a large part of their job is about writing about the employment market. However, the employer and unemployed personas did not share this interest. Their primary goal was to find employers or a new job. This was also in line with the main organizational goal of the website – to support the matching process between unemployed and employers. Therefore we decided to emphasize information about the agency in the website for information seekers but minimize it in the website for other personas. The organizational requirement of informing about the agency could not come in conflict with their primary goals of matchmaking, which in turn would realize the overall organizational goals.

One of the members of the PPG also describe how they now present the personas and the organizational goals together through an integrated concept where it becomes clear how different personas will use their services differently and in different channels in order to realize the organizational goals.

The members of the PPG agree that this project was successful in that it followed a structured method from abstract organizational goals to detailed systems requirements, and that it took both organizational and user requirements under consideration and integrated the two. If possible, they would use the same work model again if they got involved in a similar project, also because they do not have any method or process for this today.

Working With Personas

The PPG got interested in the tool personas already when the usability company presented it in their project proposal.

“One thing that caught our interest was to work with personas (...) to get something more concrete to work from”

The fascination with the tool grew during and even after the project as it proved its effectiveness. For example, although the results of the interviews were much in line with the persona hypothesis there were also some important differences. One such deviance was that the hypothesis divided users based on the agency’s internal categorisation of short-time unemployed and long time unemployed users. In the analysis, however, it turned out that a categorisation based on how long a person had searched for a job, rather than how long he had been unemployed, was more interesting. But the greatest strength of personas was not as an analysis tool but rather as design tool and as a way of communicating requirements:

“Its not only that it becomes very concrete and tangible when you work, like a really good tool when we should design the prototype. We talked about them as friends in the project group. How will Linda handle this? And then everyone knew. Linda was a whole concept that stand for a lot of things instead of having to recount all the details. So it becomes a very, very smooth tool to work with.”

More interestingly the use of personas did not end with the end of the design project but they have lived on during the internal preparations for a development decision:

“The second thing that struck me was what an enormous response we have had on these personas when we have been out in the organization talking about the project. Suddenly it has become tangible even for people who do not have a clue about web development. “Right, the users.” And the users are not a grey mass but they want different things!”

The PPG even report that they have found new uses for the personas in many other projects and completely other settings, such as in education. For example, when discussing with the assistants in the local offices who shall teach unemployed to use the website the personas have helped them understand how different users may need different services and may use the website differently.

“Suddenly our website gets differentiated in relation to the users... that is really incredible.”

Discussion

As pointed out in the introduction business goals can seldom become realised through technology alone. The technology has got to be used by someone for the goals to be fulfilled. Therefore an analysis of current usage and a prediction of future usage through prototypes and evaluations is a crucial step to take in any development project to come to grip with what kind of system and services that are suitable. By performing these activities already in the procurement project we anticipated several benefits. Mistakes and questions can be solved at an early stage at a low cost. The procurement itself can become more concrete which facilitates communication with suppliers [1]. Most importantly though, from a UCD perspective, usability issues can be

integrated, or embodied, into the request for proposal without the need to actually speak about usability.

These benefits were experienced by the PPG in the current case study. The usability process became a bridge between the PPG's original abstract business goals and the more concrete systems requirements. Judging by the comments of the PPG and our earlier experiences [e.g. 1,17] it would have been more difficult to go directly from the abstract documents to a detailed systems requirements specification. Furthermore, if the UCD process had not been incorporated already in the procurement usability activities would still have had to be done later in the development phase. An integration of the two would most likely have been more complicated at that stage since there would be a contract based on abstract business requirements regulating what should be done. In this case study the PPG instead let the user and business requirements grow in parallel towards a final design, solving contradictions between requirements as they came along.

The idea that the usability process should be used to bridge organizational goals and systems requirements in the procurement presupposes a separation between "external" and "internal" design [16, p. 94]:

"Software development informed by recent work in design methodology should aim at separating external design from internal design and construction. (...) This has implications for how we view the designer's role, as well as for the structure and management of software development projects. A problem which remains to be addressed is how to deal with constructional aspects affecting the use of the final product. Response time, reliability, maintenance, etc., all affect the users' experience of the product (see Gould, 1988, for a discussion). Yet they cannot be adequately addressed in the design work since they are determined by the final construction.

A tentative answer is that the designer - much like the architect - is responsible for coordinating the construction work in such a way that it satisfies the design vision to the greatest extent possible."

As Löwgren points out the backside of a separation of internal and external qualities is that those that are determined by the final construction cannot be specified alongside other external qualities. It is therefore tempting to argue against such a separation and propose that one and the same supplier can have both usability and technical competence and both design and implement a usable system. We would certainly like this to be the case, but in reality it does not seem to work. As mentioned in the introduction suppliers in contract development fail over and over again to integrate UCD activities in their development processes. Furthermore, even though we may one day see suppliers that have succeeded with this integration, we believe that usability activities will often be involved too late if they come after a contract for the technical development is in place.

The Interaction Architect

Other case studies that we have done [1,17] highlight that it is not enough to only perform the UCD activities in the procurement process, but the procurer must also possess UCD competence to do it (the same point is raised by Scown [18] but he argues that the procurers should actually learn HCI). This does not necessarily mean that all procurers of interactive systems should employ usability practitioners. A strategy that was used by the agency in this case was instead to hire competence temporarily. Since usability played a key role in this case study it is interesting to analyze this strategy further. We will refer to the role that the usability professionals had as the *Interaction Architect*.

The idea of the Interaction Architect, using the metaphor of the construction architect, is to provide UCD competence when needed, without having any interest in also implementing the specified system [17]. The comparison of the usability professional to the construction

architect is quite common in the UCD literature (e.g. [6,14,16,20]). For example, Kapor [15, p. 4] write:

“Architects, not construction engineers, are the professionals who have overall responsibility for creating buildings. Architecture and engineering are, as disciplines, peers to each other, but in the actual process of designing and implementing the building, the engineers take direction from the architect. When you go to design a house you talk to an architect first, not an engineer. Why is this? Because the criteria for what makes a good building fall substantially outside the domain of what engineering deals with.”

As emphasized by Kapor you don't go to an architect when you have already built the shell of the building, or when the construction is nearly finished. Neither do you involve an architect after you have chosen what to build in detail, and who should build it. Rather, you use the competence of the architect to understand what it is you need, and to define this in a format that is understandable by contractors.

Consequently, we want to use the metaphor of the architect to stress the *point in time* in which this role is involved. The responsibility of the Interaction Architect is to secure issues of quality in use *before* a contract with a technical supplier is signed, as well as to monitor the progress during the systems development. The results from this case study, as well as another that we have performed, are very promising. The UCD process was valued by the procurers. The results from the work of the Interaction Architect – a design, grounded in usage and business goals, will be used as a high level requirement specification by the procurers in the continued specification and development work. Whether or not this will result in a usable system is, however, too early to say since neither development project has started yet. However, the results have in this case persuaded the management to use it as a vision which they will try to reach.

We believe that we will see more of this, or similar, roles in the future. Perhaps a scenario as described by Winograd [20, p. 11]:

“As software design continues to mature, perhaps we will see a similar evolution: from the individual artisan-programmer (far from an extinct species today); to a master architect builder, as described by Fredrick Brooks (1995); to a commercial environment that includes software architectural firms that vie for awards for originality and elegance of their designs, but that are not responsible for construction (implementation).”

Or maybe we will even find, in a not to distant future, a situation where usage requirements are fully taken into account not only in the procurement stage, but also all along the development and implementation stages.

Integrating User and Business Requirements

The results of the case study indicate that viewing the usability activities primarily as a process of organizational development or procurement, rather than as part of a systems development, facilitates an integration of the UCD activities. The procurement organisation saw these steps as necessary to be able to specify what they needed. Usability professionals often have to beg to get involved early in the process, and then “early” is often defined as the start of the supplier's engagement. In this case the usability professionals were involved even before that and their results were appreciated by the organisation and have been used extensively.

However, it is clear that the successful integration of usability did not come automatically by involving usability professionals. Rather, it demanded a lot of work and effort from the procurement project group (PPG). In retrospect the participants seem very pleased that they paused the project since they got a chance not only to listen to the results being presented but also to work their way through the proposals themselves. This suggests that when planning a project with an Interaction Architect, regardless of whether he/she is hired or employed by the procurer, it is also necessary to include time for working through and re-evaluating the business requirements, and to link these to the needs of the users. One method for this integrated

approach is suggested by Balic et al [2]. We are not sure, however, that the work needs to be that formalised. It might be enough to establish this two-edged focus early on in the project, to plan it accordingly and, most importantly, to have time not only for practical activities but also for reflection. One difference could, for example, be to not only plan evaluations with presumptive users, but also with the procurers.

Apart from the benefit of including the organizational requirements more explicitly, the time for reflection also gives the procurers possibilities to get more familiar with the results, which is necessary if they will use them by themselves later on. There exists today no established method or process for procurers to manage their work, but a method inspired by UCD seems to be a promising candidate. In this case study the UCD process was appreciated and effective for the procurers as a method of transforming their abstract goals into detailed requirements, through involving users and designing for them.

Hence, although the UCD process was originally intended to understand the user requirements it also helped the PPG to understand and deal with their own organizational requirements. With a prototype available it became easier to become concrete regarding the organizational requirements, or to notice that they were not yet embodied in the prototype.

The Active Procurer

Holmlid [12] emphasises “the active procurer”. This case study confirms that a successful procurement and involvement of usability requires an active procurer. The members of the procurement project group were active in many ways:

- ★ They worked intensively together to specify the organization’s goals and requirements for the new website

- ★ They were involved in the UCD process in order to really understand the results
- ★ They worked closely to the organization during the requirements phase to continuously communicate and gain approval for their work
- ★ They planned a thorough review and approval process after their work with the prototype was completed, in order to anchor their results in the organisation

Although the involvement of an Interaction Architect and the UCD activities were successful in themselves the result of the whole project would most likely not have been as successful if the procurer had not worked actively and taken responsibility from the very start. Even though the requirements did not change drastically during the halt the PPG got an opportunity to work with the material themselves, which they had not had before. This, together with their continued work with the requirements after the design project, increased their credibility in their internal anchoring process.

Thus, although the UCD process helped the PPG to detail and evaluate organizational and user requirements this was merely one piece in the overall process. An equally important piece was their engagement in the project, as well as a thorough planning for internal marketing and anchoring.

Personas & Prototypes

One of the worst fears of the PPG was that they would not have an adequate understanding of the results since they had outsourced the UCD process. The usability company introduced a new work process and possessed design and analytical skills that the PPG did not have. In retrospect the fears were unfounded. As mentioned before the PPG’s engagement in the process is identified as one reason for their ability to embrace the results. Another reason is probably the tools that were chosen.

Both the personas and the prototype have been used extensively by the PPG after the design project ended. They have even made changes in the prototype by themselves. The choice of these concrete and communicative tools for the deliverables was likely important for this to happen. Had the usability company instead delivered a large report and a requirement specification in UML the PPG would likely not have used them as much and the process of anchoring the results would have been more difficult.

Both the prototype and the personas were appreciated by the PPG for their communicative power and simplicity. The personas represent the users and communicate their goals. The prototype represents the system and communicates the requirements. Both of these tools are non-technical and easy to use in presentations and discussions.

On the other hand, their power and simplicity may also be a danger since they may start to live a life of their own and be used in areas and for argumentations that they were not designed for. Although this is a pleasant problem compared to not having any focus on the users at all it is one which a procurer-oriented perspective on usability must deal with.

Conclusions

This case study emphasises that the user centred design process, which is commonly perceived as a systems development issue, may as well be used in organizational development or systems procurement. Procuring organisations today lack methods or processes to transform their often abstract organizational requirements to a systems specification for procurement. This case study demonstrates how the usability activities may be used in this phase to bridge organizational and systems requirements through an emphasis on usage. The result of such a process is a requirement specification that is based on both

organizational and user goals and that can be used to procure a systems development project.

Furthermore, the case study highlights how tools such as personas and prototypes can aid not only in the design process, but can also be used by procurers with no formal training in usability in their endeavour to communicate and anchor the results of their work. The results indicate that success factors include having access to competence in UCD and an active procurer who is engaged and want to participate in and understand the work of specifying the requirements in order to become confident and secure in one's own abilities to know what to procure.

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Crossing the border: Redefining Early in User-Centred Design

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Abstract

One of the most common problems we face as usability professionals today is that of not being involved early enough, or not having the desired impact on the systems development. In this paper we propose that one reason for this may be that we in client-supplier relations in contract- and in-house development unconsciously only seek solutions from a supplier perspective, where “early involvement” marks the beginning of the supplier’s engagement.

In this paper we propose that usage-centered design may instead be viewed as a tool for clients to define what system to purchase, and what requirements that are appropriate for both the business as a whole, and for the individual users. We present a model how to work with User-Centered Design (UCD) in procurement and describe two case studies that followed this work model.

The results from the case studies suggest that this approach effectively deals with issues of early involvement and integration of user requirements in systems development. The clients in the case studies valued the UCD work and based their forthcoming systems development on it. Apart from integrating a UCD perspective before a contract for the development was signed, a number of other benefits were accomplished, including an integration of business and user

requirements and a facilitated communication among stakeholders. We discuss some of the preconditions for this approach to be successful, based on experiences from the two case studies.

This approach requires us to reconsider the role of UCD in systems development. We believe a change will come, but slowly, since it challenges established conceptions in UCD.

Key words: Procurer, Procurement, User-Centered Design, Politics of usability, Cost-benefit, Interaction design, Contract Development, In-house Development, Personas.

Introduction

As usability consultants we have often experienced that we have to explain what we do and why it is important, even to those in our own companies. This occurred even when we worked in companies that value usability. In our experience, most companies and system development projects do not even consider involving a usability professional. We believe that this is one of the greatest problems that we face today as practitioners – not being involved at all, or being involved too late to have any serious impact on the requirements and the end product or service [7,8].

The origin of this problem is seldom discussed, but the body of cost-benefit and “Politics of usability” literature indicate that it exists [e.g. 4,5,17,28,29]. In this paper we will address this problem from a new approach and describe how it worked out in two case studies. Before we do this, however, we need to define the context we are talking about. In the case studies presented here a procuring client organization specifies and acquires a systems development project from an external supplier organization. In Grudin’s [14] account of different development contexts this would correspond to *contract development* or software acquisition.

In contract development the client and supplier organization are not the same, and a contract is used to regulate the relation between the two. As we will describe later on we believe the challenges for integrating usability in systems development is greater here than in other development contexts, such as in-house or product development, where one and the same organization owns the whole process from acquisition to delivery. This might seem strange, since the users are often known from the outset in contract development, even before the developers. Furthermore, as highlighted by Grudin [14], the procuring organization has the power of authoring the contract and can, hence, require user involvement. However, even though over a decade has passed since Grudin published his paper, this is still not done other than in a very general manner, such as “the system should be user-friendly”. Most other obstacles that Grudin list also remain; there is little incentive for supplier organizations to add usability activities since contract compliance is based on conformity to the written specification and any deviation from the specification is to be avoided [e.g. 30]. This is particularly true in government contracting where there is usually a fixed price and the contractor cannot charge for usability activities if they were not requested in the contract [14,35].

Background

In both theory and practice the work of the usability professional is commonly perceived of as activities that should be incorporated into a system development process [12,16,31,32]. In client–supplier relations it is therefore often the supplier that has access to usability competence, if any. In contract development this is usually an IT-consultant company that delivers tailored systems to clients. In in-house development it is often the IS/IT department. Since User-

Centered Design (UCD)³ is associated with development, the concept of “early involvement” in UCD is also interpreted from a supplier and system development perspective. “Early” is commonly understood as the beginning of a supplier’s engagement, after a contract with a procuring organization has been signed⁴.

What often seems to be forgotten in these discussions is that a lot of work has already been done when a contract is in place. In order to acquire a new system the procuring organization *must* to some extent define the business goals of purchasing it, and specify what they are looking for. Although this is not perceived of as system development activities it constitutes the first requirements specification work. Particularly in contract development (and in larger and more formal in-house development projects), the contract, which is based on this work, regulates what can and cannot be done during the systems development project.

Unfortunately the clients’ efforts to define what to acquire seldom involve a usage perspective, but focus on business processes and/or technology [25,30]. In Figure 17: How development projects are commonly acquired and run today. Procuring organizations try to go directly from business objectives to technical requirements. The users’ perspective is not included professionally in either procurement or

³ With UCD we refer to the general process of achieving high usability through 1) understanding who the users are and what they need, 2) designing appropriate solutions and 3) evaluating these with users in an iterative design process. This can be done practically through a number of methods that may differ depending on traditions and practical needs. See [13,24] for an overview of different traditions and [3,11,27,34] for example of different practical approaches.

⁴ The term procurer is used frequently in this document. With “*procuring*” or “*client*” organization we refer to the acquiring and purchasing part in the client – supplier relation. Within this organization the person or team that is responsible for working with the procurement is often not the same as the one who pays for it. Therefore, when we refer to “*the procurers*” we mean those who were actually involved in the hands-on work.

development. we try to illustrate a common scenario: A client goes to a technical supplier with some idea of a how a technical solution could enhance business, but without involving a usability perspective. The supplier then specifies and implements the system, also without involving usability professionals. In this way the users are, in the worst case, left out both in the acquisition and the development process⁵. Unfortunately the worst case is rather common.

From this perspective we would like to argue that “early” is not enough. No matter how well a supplier manages to integrate UCD in their development processes they will often have to agree to contracts where the client organization has already decided what they need. But when these decisions are made without a professional investigation into actual usage needs and focus more on a business process or economical level, there is still a need for the supplier to involve usability competence. The problem that suppliers with a UCD focus encounter in these situations is that their usability initiatives partly collide with what the client organization think they have already done. After all, the UCD process is mainly a requirements process. The goal is to define what system, functionality and interaction is most appropriate to the usage requirements. In many ways this is also the goals of the procurement process – to define what system best suits the business’s needs. But while procuring organizations today often focus on a more abstract business process level, usability professionals focus on an activity level of what people actually do and need (see also Figure 8). In this paper we argue that both perspectives are equally important for a successful investment in new technology.

⁵ Note that we are describing the absence of *professional* usability competence. If asked, both procurers and suppliers would likely say that they value usability, and probably even that they work with it. However, our earlier case studies of procurement projects [1,25] indicate that usability is often considered as something that only requires an interest, rather than a professional competence. We do not believe that an interest is enough to create usable systems.

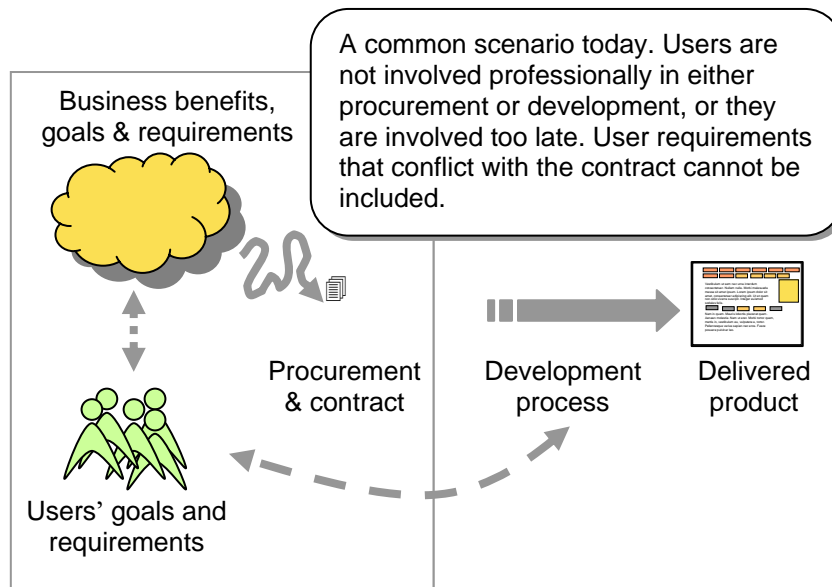


Figure 17: How development projects are commonly acquired and run today. Procuring organizations try to go directly from business objectives to technical requirements. The users' perspective is not included professionally in either procurement or development.

Given the common goals of UCD and systems acquisition we propose that UCD has some important contributions to procurement processes. There are today no methods for requirements elicitation that are developed specifically for procuring organizations. Instead they often have to use methods such as the Rational Unified Process (RUP) that have a technical focus and that were developed mainly for suppliers. Procuring organizations must today invent their own methods for how to make the leap from abstract business goals to concrete system requirements. Without an effort to focus on actual everyday usage the procurement will run the risk of being based on abstract and idealized models of usage, and/or have a technical focus

[25]. As argued above, both of these directions may hinder possible future activities that focus on usability.

The missing link

In Figure 8 we try to present the different levels that we believe are necessary to analyze, in order to be able to define the requirements when acquiring a system. First of all the customer has to be clear of why the business as a whole need the new system. When a bank decides to go online the motivation for this can, for example, be decreased costs, better knowledge of customer patterns or increased customer satisfaction. These are business benefits that may motivate the acquisition of a new system. A business case may show that the cost of developing the system is lower than what it gains in decreased costs or increased productivity.

Business level 	<ul style="list-style-type: none"> - Business processes - Business case/motives - Business requirements
Activity level 	<ul style="list-style-type: none"> - Individual or group activities - Personal motives - User requirements
Interaction level 	<ul style="list-style-type: none"> - Individual computer actions - Design requirements

Technical level 	<ul style="list-style-type: none"> - System architecture/infrastructure - Technical requirements

Figure 18: Levels of system requirements

On the next level, the Activity Level, user requirements are identified that correspond to user goals. This results in proposed system functionality. In the online bank example a user goal may be to keep track of the interest rate on one's loans and a proposed system function may be a text messaging service that notifies the user when the interest rate changes. Furthermore, the interaction with this feature may be designed and evaluated in an effort to establish the requirements for the system. Finally, by knowing what functionality is sought for it is possible to specify technical requirements that support the desired functionality. The decision to develop this functionality is, of course, still a business decision. The technical solution it requires may, for example, be too expensive, but in uncovering user needs and goals it is possible to establish a link between a) what the business wants to achieve, b) what features that may realize this in actual usage and, finally, c) the cost of developing it in relation to what it would gain.

Today, many procuring organizations only analyze their needs on a business level and then go on to acquire a system. It is assumed that the purchased technology automatically will realize the business objectives. Some technical requirements may also be included but requirements based on users' needs are seldom incorporated. In short, the activity and interaction level are often skipped, or at least not defined with professional usability and interaction design competence, as depicted in Figure 7. Given this, we would like to argue that there is a missing link in current procurement processes. This missing link is that between abstract and idealized business goals and requirements that a procurement project starts from, and concrete technical requirements that a procurement project aims at specifying.

In this paper we argue that user requirements and interface design (UCD) may serve as a bridge to this gap. The reason is that user and business goals are interrelated - business value is generated through product usage. Whether it is a business to consumer, business to business or an internal system that is procured, the aim is to realise some business goals. But as pointed out by Balic, Berndtsson,

Ottersten, and Aldman [2, p.1] an interactive system can never realise such goals by itself - someone has got to use it.

What often seems to be forgotten is that the generated business value corresponds to the level of usage (number of users who actually use the product) and the product's quality-in-use (effectiveness, efficiency and user satisfaction when the product is used). In other words, business value is generated through product usage.

Whether it is a consumer that purchases something over a website or an employee who registers a transaction the actual *usage* is central in realizing the desired business goals of e.g. increased sales or increased productivity. Consequently, understanding usage should be a central task in procuring any interactive system. In order to be able to specify what to acquire a client organization needs to understand the requirements of both the current and the future usage of the system being procured. This may seem obvious but is surprisingly often forgotten.

The key here is to analyze the investment of using the future system rather than simply analyzing the cost of the particular project. Even though such investments analyses are made today, they are often made on a business process level rather than on an activity, or usage level (Figure 8); but in the end it is on the activity level that the business goals are realized.

The responsibility for ensuring that the system helps in realizing the desired business goals is not possible to delegate to a supplier organization –procuring organizations must see to this themselves. In theory this implies that HCI and requirements engineering should approach organizational and business development, rather than only system development, which has been the focus until today. Practically this means that the UCD process may act as a bridge between business goals and systems requirements in procurement projects.

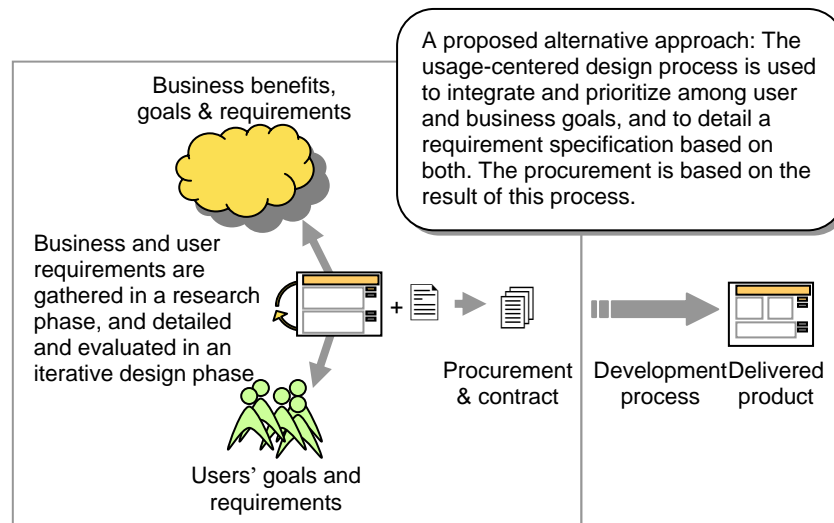


Figure 19: A proposed alternative model: user requirements and UCD are used as a bridge between business objectives and technical requirements in the procurement.

Thus, as illustrated in Figure 19: A proposed alternative model: user requirements and UCD are used as a bridge between business objectives and technical requirements in the procurement., we propose that the UCD should cross the border from development to procurement. By understanding current usage through user research and predicting and evaluating requirements on future usage through methods and tools such as scenarios, prototypes and evaluations, procuring organizations will be better equipped to order a usable system that meets overall business goals. With a UCD approach to procurement business and user requirements can advantageously influence each other when specified in parallel, rather than being specified sequentially with a contract separating the two [26].

Relevant development contexts

A direct link between the usage of a developed system and the overall business goals requires that the system is somehow connected to business processes. This is often the case for systems developed in contract- and in-house development. The actual usage of e.g. an online bank or an internal system is directly connected to the performance of the organization. In product development, on the other hand, there is often only an indirect link between the usage of a particular end customer and the profit of the product development company, in that usable systems *may* lead to higher satisfaction and increased sales. For this reason, our main focus in this paper is not on product development contexts.

As mentioned in the introduction one reason that we have focused on contract development contexts is that the organizational barriers are more evident there than in the other development contexts. We do, however believe that the problems and solutions we describe in this paper are often equally applicable to both contract and in-house development since internal organizational barriers between a procuring and developing department may often be as strong as those between two separate organizations [5,14]

To summarize, we believe that UCD, which is commonly perceived of as a development activity, could play an important role in the acquisition, or procurement, of interactive systems. When UCD activities are part of the development many clients perceive it as an additional cost to the actual developing. This is particularly so when UCD has got it's own terms, teams and methods in the supplier organisation rather than being integrated as a quality perspective on the requirements elicitation [7]. By crossing the border to procurement we believe that usability may be viewed as an asset rather than a cost - a tool for making better procurements and cost-benefit analyses *before* deciding whether to plunge into a development project. This requires however, which we will soon describe, that the UCD process is shifted from the supplier to the client organization.

Although it is a bold statement we argue that usability issues will always come in too late in the process if they are involved in the implementation stages after procurement, since usability is really about defining what to develop rather than about how to build it. Given that we tend to perceive usability as a system development process it is hard to switch perspective and see it as a business development process, or as part of systems procurement. However, as we try to present in this paper there are several benefits in switching perspectives and crossing the border to procurement.

A tentative model

Before presenting our case studies and the main conclusions from these we will describe our general model for how to *acquire* or *procure* usable systems in practice. As mentioned before we suggest that the UCD process should be done as part of the procurement to find out about user needs and to specify what to procure based on both user and organizational goals and requirements. A way of doing this is presented in Figure 20.

Our intention with the model is not to prescribe any particular method or tool to use, but rather to illustrate some general characteristics of the UCD process with user research and iterative design. It is up to each usability professional to decide which methods or tools suit the particular project and circumstances. There are, however, some general characteristics of the model we have studied that can be worth mentioning.

We have found it useful to separate the process in two major phases: “what” and “how”. In the first phase the aim is to understand needs and goals and what system services are appropriate. In the second phase these services are specified further. Prototypes are designed and evaluated with users.

As illustrated in Figure 20 the process takes both user and business requirements into account and helps in prioritizing and integrating the two into a more concrete specification. In the evaluations the

prototype (i.e. the requirements) is not only evaluated with users but also with the procuring organization. Business goals direct the overall work but certain user requirements may be more highly prioritized than certain business requirements, if they help reaching the overall business goals.

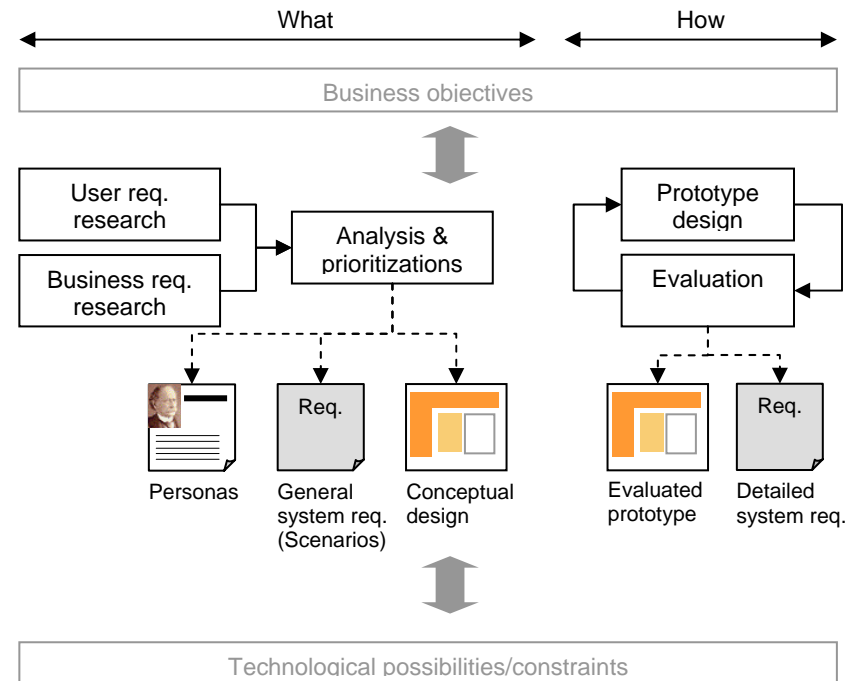


Figure 20: An overview of the UCD activities that were used in the case studies.

Although we do not prescribe any methods the deliverables in Figure 20 include personas (see [10,11,15,20] for more information). We included these since the tool was used in both our case studies and played a central role both in the projects and for the procuring organizations [26].

The final requirements are represented both textually in a report and visually in an interactive prototype.

User requirements drive the definition process but are continuously synchronized against overall business objectives and requirements, as well as technical constraints and possibilities.

What, then, does this demand from the procuring organization? First of all, it requires procuring organizations to divide the systems development project into (at least) two parts – one for defining what to procure and one for developing the system. Today procuring organizations often decide on a budget and then let a supplier define, implement and evaluate the system. Sometimes it is even the supplier that defines the budget as well. We propose that the procurement organization should instead themselves define the systems requirements using user centered design (UCD) and let the result of this process guide the contracting and budgeting of the development project (Figure 9).

Secondly, procuring organizations need access to professional usability competence. We want to emphasize that it is not enough to only perform the UCD activities but it is necessary that this is done professionally by trained usability practitioners. If not the result is often of poor quality and may not support in the way that it could have done [25,1]. For large procurement organizations this only requires a shift in competence. They often use a team of procurers/purchasers today but they are seldom trained as usability professionals. For smaller organizations it is hardly cost efficient to employ a full-time usability professional. Small organizations maybe only procure one large system per decennium. For these we propose a role that we refer to as *the Interaction Architect*.

The idea of the Interaction Architect, using the metaphor of the construction architect, is to provide UCD competence when needed, without having any interest in also implementing the specified system. The comparison of the usability professional to the construction

architect is quite common in the UCD literature (e.g. [9,21,23,35]). For example, Kapor [22, p. 4] write:

Architects, not construction engineers, are the professionals who have overall responsibility for creating buildings. Architecture and engineering are, as disciplines, peers to each other, but in the actual process of designing and implementing the building, the engineers take direction from the architect. When you go to design a house you talk to an architect first, not an engineer. Why is this? Because the criteria for what makes a good building fall substantially outside the domain of what engineering deals with.

There are many similar comparisons with other lines of business, such as product development and filmmaking (e.g. [6]). Of course, there are many differences as well, but in using it as a metaphor we would like to stress the *point in time* in which this role is involved. The responsibility of the Interaction Architect, as we see it, is to secure quality issues of interacting with the system *before* a contract with a technical supplier is signed, as well as to monitor the progress during the systems development.

Apart from the architect metaphor we have chosen this term over others, such as “Usability Architect” to emphasize that we do not want to focus on usability in isolation from other issues, as is often the case. Rather, we want to focus on use-qualities of the interaction in connection to overall business goals.

Although things are changing it is still very rare in Sweden, where we are based, that procurement departments employ usability professionals. Therefore both case studies are based on projects where the client organization hired an Interaction Architect through one and the same usability company. We will present the case studies briefly, and then describe what we have learnt from them, as well as some general conclusions about the feasibility of integrating UCD as part of the procurement rather than the development of an interactive system.

Case studies

The work with the Interaction Architect followed the process as described in Figure 20 in both case studies. We will begin with accounting for some general similarities in the work process, whereby we will also discuss some important differences.

The goal of the project in the first case study was to define the requirements for a new intranet. An internal analysis had revealed that many employers did not have time to use the internal information and that it was hard to get an overview of the information flow. To deal with this they ordered a pre study to gather usage requirements and suggest an information structure and interaction design that would support these requirements. The strategy was to use the prototype and requirement specification that the Interaction Architect delivered to procure the actual development project of the new intranet.

In the second case study the goal was to specify a new information architecture for a large website for employment exchange. When Internet usage got widespread the organization started to develop employment exchange services on the website. This had traditionally been handled by assistants in the local offices around the country. The website had, until recently, mostly been seen as separate from the local offices, and it had been managed and developed by a specific department within the organization with much authority of its own. During the last year, with up to 700,000 visitors every month (approximately 8% of the Swedish population), the management wanted to create a new organization in which the website would be the main channel for the matching process, and employers and unemployed would handle the process themselves. A new call centre and the local offices would mainly deal with those that needed more support and that could not get by on their own. In this way it was envisioned that the organization's resources could be used more effectively.

A procurement group representing all major departments was put together with direct contact to the management. Before the procurement group decided to involve an Interaction Architect they worked intensively by themselves gathering business requirements for the new website. This project had been initiated once before but had crashed, due to internal disagreements about solutions, so the procurement group was heavily motivated to succeed. A more detailed account of the second case study can be found in [26].

The work process

In both case studies the Interaction Architect proposed a process as described in Figure 20 with an initial phase to define personas, scenarios and a conceptual design, followed by a detailing phase with prototyping and evaluation activities.

In the first phase 20 contextual interviews were conducted with current users. These were analyzed by the Interaction Architect and transformed to personas describing different user groups and scenarios that described their needs. In the intranet case study the respondents were chosen to represent the different roles in the organization. In the website case study a persona hypothesis was put together in an initial workshop with the procurement group, and users were selected based on this hypothesis. The procurers were very engaged in the process in both case studies and attended on almost each interview to get an insight into the results. The scenarios and personas were used to create a draft requirements specification that described general system functionality that corresponded to business and user needs, as well as a conceptual design representing the initial design ideas.

In the next phase a prototype was designed and evaluated in two iterations based on a card-sorting exercise with users. In the first iteration a low fidelity prototype was created but a more inclusive version was done for the second iteration. Both evaluations were done with users. The procurers continued to be engaged in the process. Although they let the Interaction Architect design the prototype and

analyze the results of the evaluations they participated as observers on the evaluations and had recurrent meetings with the Interaction Architect during the design activities.

After the second iteration the Interaction Architect updated the prototype and wrote the final requirement specification. Since the procurers had participated in the activities they were already familiar with the requirements and could start the review process immediately.

What happened?

When the intranet project finished, the idea was that the results would be presented to the General Director as basis for a decision of whether to start a development project or not. Unfortunately a decision could never be taken due to organizational changes that started to occur shortly after the project. The General Director decided to change jobs, and there was no new person available for the position immediately. When a new General Director was appointed she only lasted for a few months until the position was changed again. In the meantime a downsizing program was initiated in the organization due to cuts in the appropriations. This, in turn, forced the procurement group to lower their ambition for the new intranet and only make minor changes to the interface, rather than redesigning it completely according to the prototype. Today not even the minor changes have been implemented. The most recent General Director has informed the procurement group that they may get a budget to develop a new intranet if they can argue that the investment will pay off. However, the goal with the UCD process was to design a prototype that embodied and supported user and business requirements, not to cost-justify the development project. Since the procurers are unsure about how to predict cost/benefits of the decision for development is postponed.

In the website case, the procurement group had worked a lot with anchoring the results in the organization. Both during the UCD process, but in particular afterwards, they had meetings with their respective departments to report the progress and explain the design.

This seemed to be a successful strategy since the review process ended with a positive decision by the General Director that the prototype shall represent the vision for the new website and the requirements will now be investigated further.

Even though only one of the projects actually continued into development both were successful from a UCD perspective. User-Centered activities were the driving force in the procurement process, but they were subordinated overall business objectives. Even in the first case that did not continue UCD played a vital role. By working so thoroughly with requirements of actual usage in the procurement the procurers were quite conscious about what they decided *not* to develop, which might be as good a decision as a green lightning.

Differences between the case studies

Although the work process was generally the same in the two case studies they also differ in some respects.

In the intranet case study the procuring organization had formulated the project to be divided into one “What” phase where the users’ needs and corresponding system functionality was specified, and a “how” phase where the requirements were detailed and evaluated. If they wanted they could stop the project after the first phase, or continue with another company, and they also had an option to use the Interaction Architect in an eventual implementation phase after a systems procurement.

After the first “what” phase the requirements specification and prototype was sent for review in the procuring organization and opinions were collected from different departments. Furthermore, the project was planned to begin with the UCD process but to synchronize the results with technical and legal requirements later on. The procurers consciously made this decision to define what they wanted, or needed, first, and then start a discussion what would be technically feasible. In this way they expected to not be constrained by technical details too early in the process. However, even though they

had planned activities for integrating user and business requirements by the end of the intranet project, this was not their only possibility to do this. Their engagement in the process and the possibility to reflect on the requirements between the phases also made it possible for them to evaluate to what extent their business requirements were incorporated in the design.

These strategies, as well as the procurers' engagement in the work process, also made it possible for them to understand the results and the decisions that were taken. The review process between the two phases brought with it time for reflection, a possibility to explain to the organization about their progress, and get support for their results.

In the internet case study there was a very tight schedule and there was no time for a review phase in the middle of the project. Since the focus was not on defining new functionality but on reorganizing an existing information architecture there were no clear phases of "what" and "how" as in the first case study either, but the project was planned as one continuous sequence of activities.

Partly due to the fast tempo, and because there was no planned pause for reflection, the procurement project leader announced that the project would halt temporarily shortly into the second iteration. The procurement project group had not been able to understand all user requirements and was also unsure about the connections between their abstract business requirements and the now concrete design. To remedy this, several workshops were planned where previous steps and decisions were explained and discussed. The business requirements were also discussed more than they had been before until they too reached the same level of concretization as the user requirements. In this process the procurers got more initiated in the results and important discussion about the relations between and prioritizations among user and business requirements were taken. In this way the design and information architecture was evaluated not

only with the users but also with the procurers from a business perspective.

The work during this "halt", as well as their general engagement in the activities of the project, ensured that they felt secure with and could understand the design decisions that had been taken. This was necessary for them to be able to act as promoters for the project and its results to the organization. Apart from keeping a continuous dialogue with the organization during the UCD process they had also planned a thorough review process after the project were the prototype and project report was sent for review in the organization. Based on the results from this review they updated the prototype themselves and presented everything for the General Director for a decision about the development.

Reflections

This section is divided into two parts. In the first section we discuss what is required by a client organization to be successful in procuring a usable system. This discussion is based both on the case studies reported here and our earlier research in the field. In the second part we describe some experienced advantages with a procurement approach to usability.

The idea that procuring organizations should actually perform the UCD activities themselves strikes many people as odd – is this not what they pay suppliers to do today? Well, both yes and no. Few suppliers in contract and in-house development bother about usability today, and often it does not get attended to professionally in either the procurement or the development process. If it does, however, it is most often by a usability professional in the supplier organization, but frequently they get involved too late in the process.

By crossing the border to procurement it seems easier for UCD to take on the role it should, since it fits as a bridge between business objectives and technical requirements. As concluded in earlier case studies [1,25,26] the UCD process is, however, by no means sufficient by itself for a successful system acquisition. It is necessary for those responsible for the procurement to be active in the UCD work in order to be able to embrace and understand the results. This is likely particularly important if an external Interaction Architect is used, since it is the responsibility of the procuring organizations to continue work with the results by gaining acceptance for it in their own organization, as well as using it to procure a technical development project.

At the same time the UCD process and its deliverables helped the procuring organizations in these case studies to be active and act competently. It would have been difficult to act as competent and secure without the help of the UCD methods and tools, since they functioned as an important bridge between business and system requirements.

The active procurer

What, then, is characteristic of a competent procuring organization? We have earlier [18,19] defined high procurement competence as the ability to:

- ★ *Plan* a systems development project
- ★ *Communicate* needs and requirements
- ★ *Monitor/manage* the process
- ★ *Evaluate* the progress and the results

The case studies summarized here are good examples of competent procuring organizations in many respects:

Plan

The procuring organizations in the reviewed cases planned for involving a usability perspective from the very start. Even though usability issues are valued by procuring organizations in general they seldom plan to deal with it professionally, but may try to do their best without help [1,25]. In these case studies, however, the procuring organizations not only valued usability issues but realized that they themselves did not have the necessary competence to deal with it, and hired an Interaction Architect.

By planning for and using the UCD process to procure usable systems, the gained knowledge from user research and the iterative refinement of the prototypes let procuring organizations become more precise in their acquisition. The more we know of what we want, the easier it will be to decide how to get it, and how much it is worth. Or, as Buxton [6, p. 13] puts it:

The higher the fidelity of the final design prototypes, the more we know on the what side of the equation. And, if you don't have a very clear idea of what you are building, how can anyone responsibly say if it can be built, how it can be built, when it can be built, or how much it will cost to do so?

By performing a pre study with UCD the procurers in the case studies could define a clear vision of where they wanted to go. The UCD process supported them in their overall decision process to purchase a new system, and to plan future stages and activities.

The procurement groups also planned their own engagement in the procurement process, even during the UCD phase when they could have handed over all the responsibility to the Interaction Architect. This engagement is identified as one success factor for their ability to use the result of the UCD process.

Lastly, the procuring organizations planned a thorough review process to get support for the result of their work in the organization.

Rather than isolating themselves as a workgroup they continuously reported back to the organization both during and after the UCD process. This was likely important for getting a green light for the development project in at least one of the case studies.

Communicate

In both case studies the UCD process enhanced communication in several ways. Firstly, the project groups could agree and work towards a common goal since they could ground their discussions in concrete things such as personas and a prototype. Hence, their own discussions about requirements among themselves, and with the Interaction Architect, became easier. Secondly, the tools that were used also facilitated communication with their respective organizations. Both groups conducted an effort to gain support for their results in the organization and the prototype and the personas were used extensively in this work.

Hopefully the results will also aid in communication with suppliers. Since none of the projects have continued into the development phase yet we cannot know if this is the case, but we have studied a case where the opposite occurred [25]. In that case study the procuring organization did not work professionally with UCD. They made some attempts to interview users in a “What” phase (Figure 20), but mostly imposed their own ideal model of work on the users, rather than listening to actual user requirements. More importantly, though, they did not start the “how” phase at all. Since they had not got a firm grounding in user needs (a shaky what phase) they had different perceptions of what it was they were procuring. Furthermore, since they all had different perceptions of how the system would look like and behave (no how phase), they had a hard time selecting a supplier. All suppliers answered that their solutions would provide all the functionality that the responsible procurers had asked for. However, the solutions differed vastly in how they would look like and behave. Since the members of the procurement group had not worked through these issues themselves their judgment of the suppliers’ presentations

was ad-hoc and subjective, rather than uniformed and based on actual user and business requirements.

Thus, we believe that the UCD process can help procuring organizations become more sensitive to what they really need, both from a user and business perspective. Moreover, it can aid in communicating what they need both within their own organizations, and with supplier organizations.

Monitor/Manage

The case studies also demonstrate a competent management and monitoring of the UCD projects that were conducted. Both procuring groups were engaged in the process and aided the Interaction Architects completing their work, for instance by helping recruiting users for participative activities. Not only did the responsible procurers plan to be involved in the projects but they were actually involved continuously even in detailed design discussions.

On a process level the procuring organizations in the two case studies employed different strategies to monitor and manage the process. In the intranet case the project plan included a point for reflection and discussions with the organization in between the “what” and the “how” phase (see Figure 20 for details). This opportunity was used to gather comments on the emerging requirements and design concepts. In the Internet case study there was no such period in between phases. This resulted in the end in that the project leader from the procuring organization had to halt the project to get the project group back on track and ensure that everyone understood and could argue for the requirements.

Evaluate

Through their participation and engagement in the process the procurers could continuously evaluate the progress. For example to assess that the design not only supported user requirements but also business requirements. The UCD process itself also ensured that the emergent requirements were continuously evaluated. During the

contextual interviews the initial ideas based on business requirements were re-evaluated in the light of the emerging user requirements. The first concepts of an information architecture was evaluated against the results from the card-sorting workshops. In both projects more formal think-aloud evaluations with users were also made in two iterations.

Benefits for User-Centered Development

From this discussion it seems that it is a successful strategy for procuring organizations to use UCD as a requirements specification process in their procurement. But what is in it for usability professionals? Well, as we mentioned in the beginning of this paper we believe that this approach may help to solve some of our most common problems as practitioners in contract and in-house development.

Integration

As mentioned in the introduction, integrating their work into that of others is one of the most recurring problems for usability professionals. What is interesting about the case studies reported here is that even though an outside usability consultant was used to perform specific usability activities the resulting requirement specification was not perceived of as only focusing on usability issues. Instead, by performing the UCD process as part of the procurement the evaluated prototype and the accompanying requirement specification is *the* artifacts that will be used by the procuring organization to communicate what they need. Rather than having a separate document or deliverable for the UCD process and other activities the deliverables from this process are the ones that will be used to procure the technical development.

Moreover, although the UCD process was originally intended to gather user requirements it also helped to prioritize these against business requirements, as well as to detail both into a systems design. The “how” phase was used to transform both the abstract business requirements, and the user requirements, into an integrated specification representing both.

Early involvement

Both cases demonstrate an early involvement of usability competence. As mentioned in the introduction usability professionals often have to fight to be involved early in systems development, and then early is still considered to occur after the system is procured. By viewing the UCD process as one of business development instead of system development it fit naturally as part of the specification process before the system is procured.

Early involvement is, of course, not only an interest of the usability professional, but also for the client organization, even though this will involve an additional cost. As summarized by Buxton [5, p. 9]:

The primary assumption in advocating this [an insertion of a design process in the front end of the product development] is that the cost and time lost due to this additional stage will be significantly less than the cost and time lost due to the poor planning and over-runs that will inevitably result if it is not included (...) The process must reflect that we don't know and acknowledge that the sooner we make errors and detect and fix them, the less (not more) the cost.

One effect of introducing the usability activities at this stage was that a focus on actual usage was established in the procurement process. This will hopefully continue further into the development process. In any case the contract that is written for the development will be based on the evaluated requirements of user and business needs. In this way the chances that the overall process results in a usable system will likely increase, even if the supplier do not have access to usability competence of its own.

Independence

Since neither project has continued into procurement yet we cannot know whether the two procuring organizations will become more independent in relation to the supplier than they have been in previous projects. Our qualified guess is, however, that they will. We believe that their use of the UCD process to link business objectives to

systems requirements through a focus on usage, the use of a prototype to define and communicate their vision, and their in-depth knowledge and understanding of the requirements will strengthen their position in relation to suppliers.

By using an Interaction Architect that did not have any interest in also developing the system their independence in relation to suppliers can also be strengthened. In the intranet case study this was even one of the reasons mentioned for involving an Interaction Architect in the first place. The procurement group wanted to focus on usability issues but decided that the supplier of the requirements phase could not also be allowed to implement the system. The reason was that they wanted to avoid being dependent on a single supplier that specified the requirements, decided how they should be evaluated, implemented and evaluated the system.

This is one important benefit of working with an Interaction Architect that does not have any interest in also developing the system, as was the situation in these case studies. The backside of this is the separation of external and internal qualities, as highlighted by Löwgren [23, p. 94]:

Software development informed by recent work in design methodology should aim at separating external design from internal design and construction. (...) This has implications for how we view the designer's role, as well as for the structure and management of software development projects. A problem which remains to be addressed is how to deal with constructional aspects affecting the use of the final product. Response time, reliability, maintenance, etc., all affect the users' experience of the product (see Gould, 1988, for a discussion). Yet they cannot be adequately addressed in the design work since they are determined by the final construction. A tentative answer is that the designer - much like the architect - is responsible for coordinating the construction work in such a way that it satisfies the design vision to the greatest extent possible.

Löwgren's conclusion of how to handle this is much in line with our ideas about the Interaction Architect, and it is something that we will continue to study in future case studies.

Other benefits

Apart from the benefits we raise in this paper there are some fundamental reasons why this approach should be appealing to procuring organizations. At least in Sweden, it is the procuring organization that is responsible by law to involve users in changes in the workplace and ensure that these changes are in line with workplace environment regulations. Furthermore it is also the procuring organization that is responsible to see that the investment actually pays off. Neither of these responsibilities is possible to delegate to a supplier.

General cost-benefit arguments also deserves mentioning, although they often tend to be superficial. Nevertheless it is the client organization and not the supplier that benefit from reduced development time, reduced cost for training and increased productivity. These are benefits that are often associated with projects that incorporate a UCD perspective.

Conclusions and Future work

We have argued that the common practice of usability professionals typically being involved in the development phase results in UCD activities being started too late. In order to be involved early we need to redefine what we mean with "early". We claim that there is today often a gap between procuring organizations' business goals of initiating a procurement project and their objective to define what to procure. In response to this we claim that UCD must be involved even earlier than what is the general norm today, to bridge this gap.

By crossing the border to procurement we have suggested that the UCD process might instead be viewed as a part of business development. In doing this, we have tried to show how traditional problems, such as late involvement and integration of UCD activities, can be solved. In two case studies we have demonstrated how these and a number of other benefits were accomplished, including an integration of business and user requirements and a facilitated communication among stakeholders.

In particular, we account for how a particular strategy, inspired by the role of the construction architect, was employed in these case studies and how it worked out. Although none of the case studies have yet continued into development we can at least conclude that the strategy of the Interaction Architect was successful in establishing a user focus already in the procurement, and equipped the procurers with a more solid platform from which to acquire a usable system. An important condition for this strategy to work is that the procuring organization act competently by planning, communicating, monitoring/managing and evaluating the progress. They need to be active and engaged in the UCD work, even if they have outsourced parts of the process to an Interaction Architect.

The approach we advocate may seem like common sense – the earlier and more specific you define what you need the better your chances are for getting it. However, as highlighted in [6], consider how much it contrast with current practice where systems are purchased and products and projects are green lighted before we know what they should be for, without any design and a plan for evaluation. It is important to not forget that we get what we measure and reward, so it is critical that these criteria is in line with our objectives.

An adoption of this strategy and approach requires a shift in mindset for us as usability practitioners. We must recognize that the UCD process does not necessarily have to be viewed as a systems development process, but can also be perceived as a grounded business development process. Or, more to the point, an approach to

systems acquisition that links business objectives and systems requirements while strengthening procurers' ability to order a usable and appropriate system. This shift in perspectives is not easy, but in our experience very rewarding. It can help us to become involved earlier in a more appreciative context in where our results are actually used. In a longer perspective we believe that this shift also should affect HCI educations to be more focused on organizational and management issues and theories.

Future work

Until today we have in our research focused primarily on understanding how procuring organizations think about and work with usability issues, and, to some extent, how a procurement-driven UCD process could be accomplished with the work model and roles presented in this paper. However, there is very little work done in this area, at least from a usability perspective, and we know that we have just started to investigate into this new approach of the role of HCI. In future research we will continue to study procurement projects, as well as follow up on the case studies reported here, once they get into the development phases.

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