Heli Väätäjä, Thomas Olsson, Virpi Roto & Paula Savioja (eds.)

UX Goals 2012 Workshop - How to Utilize User Experience Goals in Design?

TAMPEREEN TEKNILLINEN YLIOPISTO
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UX GOALS 2012 – HOW TO UTILIZE USER EXPERIENCE GOALS IN DESIGN?

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Introduction

This is the proceedings of the workshop UX Goals 2012 – "How to Utilize User Experience Goals in Design?" held on October 14th, 2012 in Copenhagen, Denmark in conjunction with NordiCHI2012 (http://www.nordichi2012.org/).

To design technology that is capable of enabling, promoting and/or demonstrating specific user experience it is important to set *experiential goals* for the design. Such *goal setting* approach is receiving increasing attention in design and development of interactive systems – not only in relation to everyday consumer technology but also in work related systems.

This full-day workshop brought together practitioners and academics to share knowledge and lessons learned on and to explore:

- How to identify, define, use and draw inspiration from user experience goals throughout the design and development process?

The questions driving the workshop included:

- What constitutes a good UX goal? What aspects affect the suitability and use of UX goals in different design cases and phases?
- How UX goals can be identified and framed? How to involve users or other stakeholders in defining the UX goals?
- How to make use of the UX goals in various design and development phases?
- What is the potential and what are the limitations of the UX goal setting approach?

The workshop included the following activities:

- presentations by participants based on position papers
- presentation on the responses to an online questionnaire that was conducted prior to the workshop
- group work on the workshop themes

List of presentations in the workshop

1. Segerståhl, K., Kolehmainen, A., Linkola, J.
   My Time and the Return on Investment: Business Improvement as a Goal for User Experience

2. Karvonen, H., Koskinen, H., Haggren, J.
   Defining User Experience Goals for Future Concepts. A Case Study

3. Roto, V., Ulbo, E., Vienamo, T.
   Experience design for forklift e-learning tool

4. Olsson, T., VVM, K., Saari, T., Arrasvuori, J., Lucero, A.
   Playful Experiences as Targets in Concept Design

5. Irene Gonzalez Fernandez
   Merging UX Goals and Personas.

6. Väätäjä, H., Pesonen, E.
   Please, Don't Drive Me Nuts! Experience Goals for Dogs

Presentations covered both work related systems (1-3) and as well as leisure (4-6). Business perspective was explicitly present in two of the presented cases (1, 5). The process and methods of using UX goals was in the focus in most of the papers, but to varying extent.

Pre-workshop questionnaire

Before the actual workshop, the authors of the accepted papers were instructed to complete a questionnaire dealing with the main themes of the workshop. The aim of the task was to prompt reflection process about user experience in the light of the research questions of the workshop. Another aim was for the organizers to see how much commonalities were in the opinions of the authors of the papers. In the questionnaire, the authors were asked to reflect on their personal experiences and conceptions concerning the topic, specifically on usefulness of user experience goals.

The questionnaire consisted of seven questions, as presented below.

Based on the case described in your paper, or thinking about some other case, please answer the following questions.

1. Describe the domain of the project briefly
2. Which were the most important UX goals utilised in the project
    a. UX goal 1: _____
    b. UX goal 2: _____
    c. UX goal 3: _____
3. How did you come up with those goals? Based on
    a. a user study
    b. given UX target (e.g. from a customer)
    c. brand
    d. literature
    e. theory
    f. standards
    g. common sense
    h. something else, what?
4. Did you consider any other goals during the project? Which ones?
5. With whom did you communicate about the UX goals?
6. Now looking back, how much did the UX goals affect the design solutions in the project?
    a. 5 very much
    b. 4
    c. 3
    d. 2
    e. 1 not at all
7. Based on you own experience concerning UX goals, please complete the following sentences:
    a. In my opinion a good UX goal is _____.
    b. I have found UX goals useful for _____.
    c. UX goals affect design by _____.

The link to the questionnaire was sent to each author of each accepted paper, thus the number of possible respondents was 16. Altogether 9 responses were received which yields in a response rate of 56%. The organizers of the workshop analyzed the answers to the questions prior to the workshop. A summary of the results was presented to the participants before the group work in the workshop.

The summary of the results contained the following information.

The domains in which the projects described in the position papers had been conducted included:

- workplace: remote operation of cranes, learning tool for forklift drivers, ERP system user interface development
- consumer applications: on-line bingo, interaction technology for dogs
- education: teaching experience-driven design for university students

The UX goals utilized in the projects were quite similar. Goals like feeling of safety and feeling of control had been utilized in more than one project. The collection of UX goals throughout the projects includes: *safety in operation, security, sense of control, feeling of presence, stimulation, competence, self-efficacy, reduced effort, reduced mistakes and errors, freedom from pain and distress, freedom to express natural behavior, comfort, various playful experiences: captivation, submission, fellowship, humour, good mood, amusement, relaxation*.

With regard to how the goals were defined, the most common way identified was a user study (Figure 1). However, all the other listed methods to identify and come up with UX goals were selected at least once, and also additional ways were mentioned (ethical guidelines and a benchmark study).

Figure 1. Responses to question number three in the questionnaire.

In answering question 4, most respondents acknowledged that UX goals had not been stable throughout the whole project. There had been developments: Either the goals had been made more precise, or some goals had been dropped along the way. Similarly new goals, e.g. business goals were identified in some case during the project.

During the projects the UX goals had been communicated widely in the participating organisations. Stakeholders mentioned in the responses included: customers, users (operators, drivers), domain experts, design team, the students (design team in this case), UX team, researchers, colleagues, product owner, management.

All the respondents claimed that the utilization of UX goals in the design process had actually had an effect on the design solutions created in the project (Figure 2). The most common response was level four.

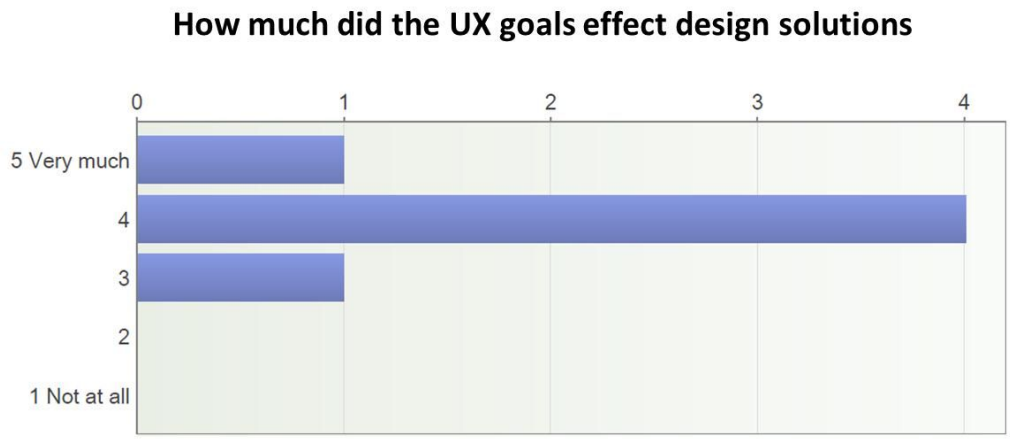

Figure 2. Response to question number five in the questionnaire

The responses to the sentence completion concerning a good UX goal are depicted below (Figure 3). In the free form statements the word *design* is mentioned five times. This means that a good UX goal is related to design. The word *measurable* is mentioned four times, which makes it an important quality characteristic of UX goal too. Also the fact that UX goals describe *positive* emotions was mentioned more than once in the statements.

Figure 3. Responses to the first complete the sentence question.

In the second sentence completion the respondents were asked to contemplate on the usefulness of UX goals or UX goal approach in design. The answers are depicted below (Figure 4). The categorization of the answers conducted by the organizers of the workshop is depicted in color. Basically, four different purposes for using UX goals were identified: They can be used to bring focus to design, to innovate and ideate, to communicate, and in evaluation.

In the third sentence completion the respondents were asked to state how the utilization of UX goals in the design process actually affects design solutions. The answers are depicted below (Figure 5). Similar categorization was made for the statements as in the previous question. The UX goals affect design by providing a vision, focus, guiding the design process, and helping in communication.

In conclusion, the organizers found the questionnaire to be a very useful way for gathering existing conceptions of UX goals. The responses of the authors contained many commonalities but also interesting diversity, and thus provided a good basis for the group work conducted in the workshop.

Figure 4. Responses to the second complete the sentence question.

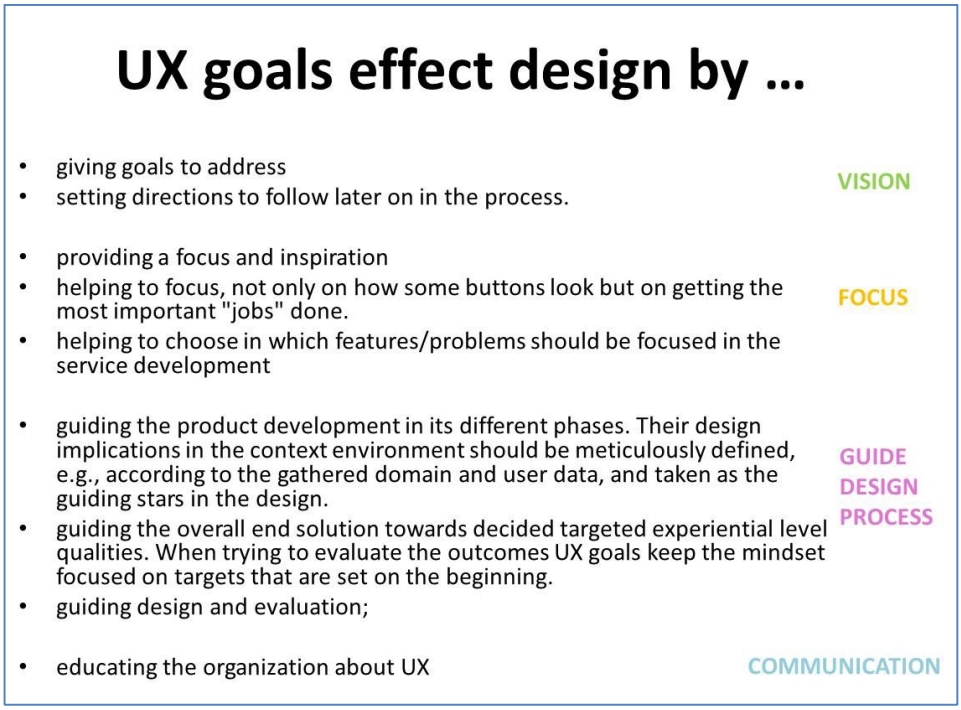

Figure 5. Responses to the third complete the sentence question.

Preliminary results from the workshop activity

This section outlines the main themes arisen in the workshop activity. The discussion and resulting ideas will be reported in more detail in a jointly written paper to be published in a suitable conference.

The questions for the three groups were the following:

1. How to identify and frame UX goals?
2. How to make use of UX goals in various design phases?
3. Agenda for the future: How to make UX goals as approach more appropriate and useful?

The following issues were brought up in regard to "How to identify and frame UX goals?": empirical studies, using existing material/knowledge, brainstorming, triangulating from different sources of information, creating a broad set of UX goals and choosing from this set the goals, defining the meaning of the goals for design and making sure UX goals are traceable.

"How to make use of UX goals in various design phases?" culminated in seven purposes for UX goals: to inspire, justify, scope, guide, evaluate, mediate other goals and to remember. In addition, commitment to goals was discussed as an 8th purpose.

Discussion on the agenda for the future included the following topics: making a business case from UX, management through a business case, design methods and processes, UX goal model, presentation of UX goals, UX patterns and re-usability, understanding UX goals especially how related to business case, and justifying UX by evidence from other cases.

Figure 6. Left: one of the resulting groupings of ideas. Right: Anna presenting their group work results.

Accepted Position Papers

The following original position papers were accepted to the workshop, based on blind peer review, and are appended in the following.

- Paper I: Karvonen, H., Koskinen, H., Haggren, J. *Defining User Experience Goals for Future Concepts. A Case Study.* 6 pages.
- Paper II: Olsson, T., Väänänen-Vainio-Mattila, K., Saari, T., Arrasvuori, J., Lucero, A. *Playful Experiences as Targets in Concept Design.* 6 pages.
- Paper III: Roto, V., Ulbo, E., Vienamo, T. *Experience design for forklift e-learning tool.* 5 pages.
- Paper IV: Segerståhl, K., Kolehmainen, A., Linkola, J. *My Time and the Return on Investment: Business Improvement as a Goal for User Experience.* 8 pages.
- Paper V: Väätäjä, H., Pesonen, E. *Please, Don't Drive Me Nuts! Experience Goals for Dogs.* 6 pages.

Paper I – Karvonen et al.

Defining User Experience Goals for Future Concepts: A Case Study

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How to Utilize User Experience Goals in Design workshop, in conjunction with NordiCHI'12 conference.
October 14, 2012, Copenhagen, Denmark.

Abstract
In this paper, we present a case study in which UX goals were identified as a part of the development of a new remote operation environment. We see that UX goals define the experiential qualities to which product design should aim at. In the paper, we describe a procedure that was utilized to identify UX goals in the concept design phase of our case. In addition, we discuss how we see UX goals as part of product design process. The chosen UX goals in our case study were safety in operation, sense of control, feeling of presence, and ease of co-operation. To elaborate what these goals mean for our case, we also present high-level design implications regarding each of these goals.

Author Keywords
User experience; concept design; remote operation.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
The aim of this paper is to present a case example on how we have defined and utilized user experience (UX) goals in the concept design phase of a container crane remote operation user interface (UI) development. In the case study, we conducted interviews and

observations in two different container crane-operating environments. The motivation for these field studies was to understand the different container crane operation experiences by analyzing the work demands in both conventional (i.e., cabin operation) and remote operation settings. For a detailed description regarding the conducted field studies, please see [4]. Based on e.g., these field studies and our theoretical background, we have identified UX goals for the design of a new remote operation station. We have also elaborated the design implications of these UX goals in this context.

UX Goals

From our viewpoint, UX goals define the experiential qualities to which product design should aim at. In detail, we see that UX goals describe what kind of positive experiences the product should evoke in the user. In experience-centered design, these goals and their design implications (that give the specific content for the goals in a certain context) should guide the product development in its different phases (e.g., domain and user data gathering, concept design, UI design, implementation, and iterative evaluation throughout the development process). However, the meaning of the goals is emphasized particularly in the early stage of design. In this phase, the goals and their design implications in the context environment should be meticulously defined, e.g., according to the gathered domain and user data, and taken as the guiding stars in the design. In later product development phases, the aim should be that each design solution implementation is traceable back to the originally defined UX goals. This link is inherently present when every user requirement and their corresponding design solution(s) are connected to the defined UX goals already in the beginning phases of product development.

Method

Although preliminary UX goals for a future product can be defined based on for example common knowledge about the domain or the development organization's business goals, we see that especially for work systems design, the final UX goals should be the result of a systemic analysis of the work domain environment and the users' work activity. When designing new systems for human work in safety-critical environments, we first gather domain and users' work activity data through a specific method called Core-Task Analysis (CTA) [5]. The method's theoretical background includes influences for example from cognitive engineering (see e.g., [6]) and activity-oriented approaches (see e.g., [1]). CTA has been applied in a variety of safety-critical work domains, e.g., in metro train driving [3].

CTA aims to identify the core task of a specific work. Core task is the main content of the work, which is characterized by the objectives and outcome-critical intrinsic constraints of activity that the actors should take into account in all situations when determining the relevance of situated goals and conditions for the attainment of aimed objectives [5]. As an end result of CTA, it is possible to describe the core-task demands of a particular work and its environment. The core-task demands are functional requirements that manifest themselves in specific forms in particular situations and set constraints and possibilities for tool-using interactions [5]. For a detailed description of the core-task demands regarding our case study, please see [4].

In Table 1, we present the steps on how the UX goal definition procedure should take place on a general level in our view. In the table, we also describe in detail how we implemented each step during our case study.

Step	Implementation in our case study
Step 1 Utilization of appropriate theoretical underpinnings	*1.1 Theoretical framework* The Systems Usability framework [7], which emphasizes user's experience of the development potential of tools during the design process, was utilized as a theoretical background. Especially the framework's measures of UX in relation to three tool functions (instrumental, psychological, and communicative) were taken as a basis in the development of a first set of general UX goals.
Step 2 Familiarization with the domain environment and the work activity in question	*2.1 Benchmarking study of other similar solutions from freely available online material* A benchmarking of crane suppliers and ports with a variety of remote operation solutions was conducted. This analysis supported the identification of relevant domain-specific UX goals. *2.2 Creating an initial and broad set of possible UX goals* Based on our theoretical framework and the benchmarking study's results, a brainstorming workshop was held on what could be the relevant UX goals in the design of the new remote operation station. As a result, a set of altogether 12 possible general-level UX goals was created. *2.3 Initial evaluation of UX goals with domain experts* The defined set of candidate UX goals and the theory behind Core-Task Analysis method [5] worked as a basis for the pilot interviews, in which two domain experts were interviewed.
Step 3 Carrying out field studies and collecting operating experiences of expert users	*3.1 Refining the UX goals based on the results from step 2* After the pilot interviews, the broad set of possible UX goals was refined according to the received results. The refined goal set and the CTA method worked as a basis for the development of the final interview script for our actual user studies. The final interview script included questions regarding particularly relevant UX goals, such as sense of control and ease of co-operation. *3.2 Evaluation of chosen UX goals with domain experts and analysis of work activity and domain* Interviews and observations in two international container terminals with altogether 12 human operators were conducted. In the first container terminal, the crane controlling operations were carried out on the spot with conventional cabin operation. In the second container terminal, a remote operation system was in use. For a detailed description of these studies, please see [4].
Step 4 Work domain and user data analysis and final UX goals' identification	*4.1 Analysis of the data from step 3 and choosing the final UX goals* A core-task analysis for both operational settings was conducted. The most relevant UX goals (altogether four) for the design of the remote operation user interface for container crane operation were chosen based on the analysis of the gathered user study data and CTA results. *4.2 Defining in detail what the chosen UX goals mean in the context of the product to be designed* Finally, based on all the analyzed results material, it was elaborated what the chosen four UX goals mean in the remote operation station's concept and user interface design in detail and defined what are the goals' high-level design implications in the context of our case study.

Table 1. The steps in UX goal definition and their implementation in the remote operation concept and user interface design case.

When the core-task demands and the UX goals had been defined, it was possible to start eliciting the concept level user requirements. Figure 1 illustrates on a general level what are the different elements in the concept design of future work systems and how these elements relate to each other in our view.

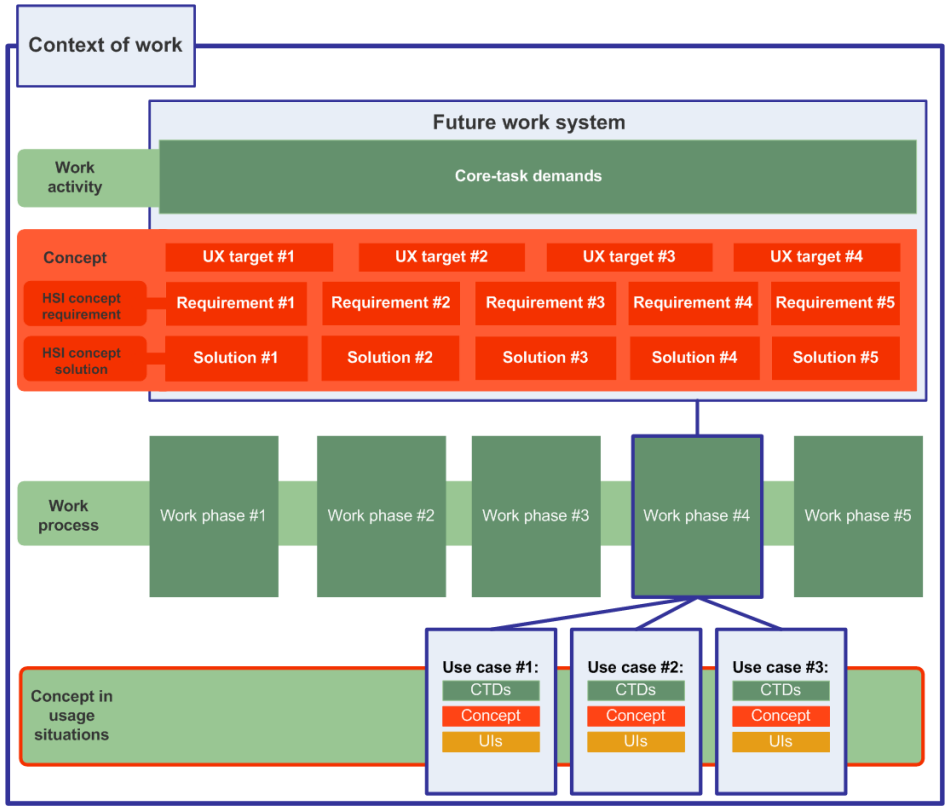

Figure 1. Elements to be taken into account in the concept design of future work systems.

HSI (Human-System Interface) concept requirements in Figure 1 are user requirements, which are derived from the gathered domain and user data and UX goals and their design implications. The data regarding each requirement includes for example a detailed description of the requirement, its priority, its background (from which data it was drawn), and the related UX goal(s) to which the requirement is expected to contribute to.

Regarding each requirement, the corresponding concept level solutions are created; one concept solution can also contribute to several requirements.

In addition, it is essential to understand the phase of the work process that the solution is meant to serve (see "Work process" level in Figure 1). Then, it is possible to describe how the concept solutions should

work in the actual usage situations. These realizations of the concept solutions are different use cases (see "Concept in usage situations" level in Figure 1), which should both take into account the previous levels of analysis (Work activity and Concept) and give guidance for the UI design. The format of these use cases can be e.g., textual scenario descriptions, cartoons, prototypes, or even animation videos. In this way, they also work as concrete descriptions for the potential users in the evaluation(s) of the concept, in which it is of utmost importance to get the proposed concept idea delivered to the users as understandably as possible.

In the later phases of development, the concrete product itself must also be evaluated with potential real users. In these evaluations, which are usually conducted with a (semi-)functional prototype, it should be validated whether the originally defined UX goals are realized in the implemented solution. These evaluations can usually be conducted only in the later phases of a product development project, because for example UX goals such as sense of control can be difficult to evaluate without an illustrative functional prototype system. For example, [2] suggests guidelines on how to evaluate the UX goals. For a systemic evaluation methodology meant especially for safety-critical work, we recommend the Systems Usability framework [7].

Results and Discussion

After a deliberate analysis process, the following UX goals were chosen for the design of the new remote operation station: 1) Safety in operation, which is especially important because in case of accidents, human lives can be at danger in container crane operation, 2) Sense of control, because the remote operator loses direct touch with the crane as it is operated from a distant location and all the information is mediated through technology, 3) Feeling of presence, because the operation is conducted remotely and the operator still has to perceive the prevailing conditions in the object environment vividly and on a sufficient level of realism, and 4) Ease of co-operation, as the container crane operation is – against our initial conceptions – a very social activity with lots of communication between different professionals.

These UX goals have several context-specific high-level design implications, which need to be addressed in different phases of development. For example, the following design implications regarding each UX goal are suggested for the new remote operation station:

1) Safety in operation

- A possibility to visually validate the state of the operating environment (e.g., with good quality live video feeds from the object environment)
- Sufficient and relevant data from the object environment (e.g., meaningful values)
- Support for the accurate perception of operation kinetics (e.g., speed of operation)

2) Sense of control

- A coherent and unrestricted operating view
- Support for the correct estimation and understanding of different relevant aspects of operation (e.g., actual weight of the load)
- Possibility to decide one's operating rhythm

3) Feeling of presence

- Quality of interaction (includes e.g., feeling in operation and clearness of the operating view)

- Support for the comprehension of the physical dimensions in the object environment
- Availability of rich data from the object environment without disturbing delays

4) Ease of co-operation

- Support for knowledge about the used domain-specific terminology, rules, and responsibilities
- Facilitation of collaborative social presence creation between the different professionals
- Making the fluency of communication certain

As can be noticed, the design implications remain on a very general level in the concept phase. In the later design phases, it needs to be meticulously explicated what these implications mean in detail regarding each selected solution. For further details about the design implications regarding particularly sense of control and feeling of presence in our case study, please see [4].

Conclusions

We have presented a case study example on how UX goals can be defined and utilized in the concept design phase of product development. For us, the early stages of defining UX goals is an interplay of suitable background theory and domain and user data gathered for example from user interviews and observations.

Methodologically, we have presented both a systematic procedure on how we identified the UX goals in our case study and our view on how UX goals relate to the different phases of concept design in general. After a careful process, we identified four particularly relevant UX goals for the new remote operation station. Furthermore, we elaborated the design implications of these UX goals in the context of our case study.

Acknowledgments

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Paper II – Olsson et al.

Playful Experiences as Targets in Concept Design

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How to Utilize User Experience Goals in Design? Workshop in conjunction with NordiCHI'12, October 14–17, 2012, Copenhagen, Denmark.

Abstract
User experience (UX) has been recognized as an important success factor of interactive products. However, concrete approaches of designing for certain types of experiences are scarce. This paper presents a study where categories of *playful experience* were utilized as design targets in a practical design assignment of a post-graduate seminar course. The students were given 3-4 PLEX Cards (with playful experience categories) to facilitate designing innovative product or service concepts for the design problem of "how to support moving and navigating during winter?" The seminar outcomes and learning experiences support the postulation that such general-level experience targets can serve well as design inspiration and guidance. The students experienced the PLEX-cards as fruitful starting points for brainstorming as well as constant reminders of the rationale of the design, i.e., serving as concrete targets for design.

Author Keywords
Experience-Driven Design; Playful Experiences; PLEX Cards; Concept Design; Post-Graduate Seminar.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

As markets become more saturated, user experience (UX) has become a central competitive quality of interactive products and services. UX as a concept has been addressed in a multitude of studies and conceptual frameworks (e.g., [4,8]). Furthermore, some design methods focusing on UX exist (e.g. probes, experience prototypes [1]). Still, concrete design approaches that enable or, rather, help in aiming at specific types of experiences are still scarce.

While the concept of designing for target experiences is appealing, there remain several gaps in research and practice. In the HCI field, these gaps are partly the result of the fact that design research and user experience evaluation research are not well integrated. Designers are able to create high-quality designs but explicit user experiences are often not used as bases of design nor is the impact of design on user experience thoroughly tested. In UX evaluation, various designs are tested in great resolution and design implications are offered but the carry-over effect to practical design is weak. For instance, the impact of a particular design (or elements of it) on a user experience (or a sub-element of it) is not well known.

Rather than trying to solve all challenges in integrating design and user experience research evenly together, we prioritized the perspective of designing with specific UX elements as starting points. As a part of our UX education at Tampere University of Technology, we organized a post-graduate level seminar on experience-driven design (EDD), where our aim was to teach – and experiment – how to use experiential targets as design guidance for concepts of interactive systems. The students were familiar with UX research and evaluation methods as well as user-centered design. The aim of this seminar was to introduce them to more "designerly" way of working on concept design, with the focus on specific types of *playful experiences*. This paper presents the study that we conducted while running the course: the design process was documented and students' experiences of the design assignment were gathered. We present the student groups' outcomes and the key lessons learned.

Related Work

In the beginning of our seminar, we defined that EDD:

- Takes (user) experience as a starting point; "valuing the whole person behind the 'user'" [9]
- Uses the targeted experience, and stories around them, as a central concept of the design vision [3]
- Focuses on the key design elements: context, interpretation, participation [9]

User experience has been taken as a driving design force in some earlier approaches. Wright and McCarthy [9] describe the developments of how HCI has moved towards experience: understanding context, interpretative approaches to research, and participatory design. Designers and users are co-creators of experience, and user values are central focus of the design. Hassenzahl [3] presents an approach where experiences which are related to the identified user needs are taken as target experiences. The functionality should be designed to support those needs to provide coherent user experiences with the product. Desmet and Schifferstein [2] describe a number of student design projects where experience has been taken as a starting point for product design. They argue that specific target experiences can be used as design

Figure 1. One of the 22 PLEX Cards (both sides illustrated). Each experience category is presented as a short textual summary illustrated with two descriptive images.

targets. They present central "ingredients" of experience-driven design projects, related to understanding user activities, envisioning target user experiences, and creating new concepts. The creation phase includes building scenarios and experiential models, and target experience evaluation.

In our seminar, we decided to focus on *playfulness* as a category of specific types of experiences. Playfulness can be observed in all areas of human activity as an attitude of making the activities more enjoyable [7]. Designing for playfulness is about creating objects that elicit a playful approach and provide enjoyable experiences in their users. A playful approach means taking on any subject matter or activity with the same attitude as in play: as something that is not serious and that does not have real-world consequences.

Korhonen et al. [6] have defined a playful experiences framework (PLEX) that currently consists of 22 playful experience categories. The PLEX categories cover a broad spectrum of experiences, some of which seem evident in play activities (e.g. 'Challenge', 'Competition' and 'Captivation'), while others may appear surprising in this context (e.g., 'Suffering' and 'Eroticism').

Based on the PLEX framework, Lucero and Arrasvuori [6] have created a set of cards to communicate the 22 playful experience categories and provide inspiration to designers while designing for playfulness. The design, iteration and evaluation of the PLEX Cards and its two idea generation techniques have been presented in [6]. The evaluation results suggest that the PLEX Cards are a valuable source of inspiration when designing for playfulness; however, in order for the PLEX Cards techniques to be effective as idea generation methods, it is important to frame the design problem by setting a clear task or context. These findings were considered when planning the design activities of the course.

Study Description

The seminar course consisted of (1) a practical assignment of experience-driven design and (2) three lectures containing an overall introduction to EDD, brainstorming methods, human emotions and experiences, the PLEX Cards and the dialogue-labs method [7]. The ultimate goal of the seminar was to increase students', as well as teachers', understanding of how to design with an experience-driven way. The following describes the practical assignment in detail with regard to the starting points for the design, the design problem and the student groups' outcomes.

Practical Assignment and the Design Problem

Five groups of 3-4 students were given the task to produce some kind of a tangible or well-visualized demonstration of a new product concept that produces or manifests specific type(s) of experience(s). The design problem was the same for all groups: "How to support moving and navigating in the Finnish winter?" The design outcomes would remain at concept level, being demonstrated with a video describing the use and experiences created of the new system in its target context.

Furthermore, the concept was expected to be appropriate in its intended context of use and target users, to involve interactivity, and to involve technical and/or interaction related novelties like tangible interfaces, context-awareness or mixed reality aspects. A small-scale informal end user evaluation was required, as well as an extensive design report.

Figure 2. Left: a mockup of the Snow Angel -smart jacket in a Wizard-of-Oz test. Right: early sketches of the concept.

Target Experiences

The PLEX Cards were grouped by the teachers to provide more design space and flexibility through several, semantically related types of experiences. The sets of PLEX Cards were as follows (excluding the category of 'Cruelty' because of its negative slant):

- *Adventure*: Discovery & Exploration & Captivation
- *Imagination*: Expression & Fantasy & Simulation
- *Excitement*: Thrill & Subversion & Humor
- *Excel oneself*: Suffering & Challenge & Completion
- *Physical*: Sensation & Relaxation & Eroticism
- *Caretaking*: Nurture & Sympathy & Control
- *Social*: Fellowship & Submission & Competition

From these seven sets, one theme was raffled for each group of students. With five groups, the two left-out sets were *Physical* and *Excel oneself*. In addition to giving the groups PLEX Cards, the experience categories were shortly explained on a lecture.

Design Process

The overall design process consisted of a teacher-facilitated co-design session (based on the Dialogue Labs method [7]) for idea creation and a free-form process to refine the ideas and produce them to videos. The co-design session consisted of five stages in which ideas were created and refined, and the each group visited the stages one by one, hence in slightly different sequences. The groups' PLEX Cards were carried along from stage to stage as reminders of the ultimate design goals. The five stages included different aspects and methods to consider and utilize. First, each stage focused on a specific subtopic under the overall design problem: keeping warm & equipment, change of landscape and routes, slipperiness and deep snow, finding interesting places in the winter wonderland, and lack of visibility. Second, each stage introduced different tasks and methods to facilitate brainstorming: watching illustrative videos about target contexts, visual sketching, creating collages of given pictures, VNA-cards (packs of verbs, nouns and adjectives), and utilizing other PLEX Cards than the groups' own with the PLEX Brainstorming technique [6]. Finally, after spending approx. 30 minutes in each of the stages, the groups gave short pitch talks in the end to present their 1-4 best ideas and get peer feedback.

Participating Students

Altogether 16 students attended the seminar. The groups for the assignment were selected by the teachers to balance the research and design experience between the groups (based on a background questionnaire). To give an overview, there were 8/8 males/females, ages varied from 27 to 44, 13 of 16 were doctoral students, and all had a background in computer science, interactive technology, usability or other HCI-related field. Design experience varied rather much, from no experience to several years of working as interaction designer, however most only having taken a few design-related courses before. On the other hand, methods of user research and evaluation, such as interviewing, prototyping and questionnaires, and the overall user-centric design process were familiar to all.

Resulted Concepts

Overall, the resulted concepts display a nice spectrum of *types of concepts*, varying from mobile applications and holistic services to novel interaction devices. The following briefly describes each of them.

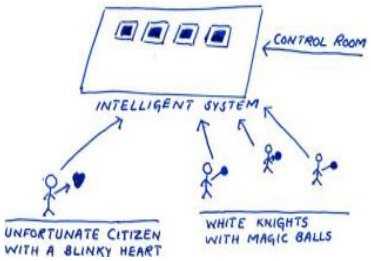

Figure 3. A short description of the Blinky hearts for users.

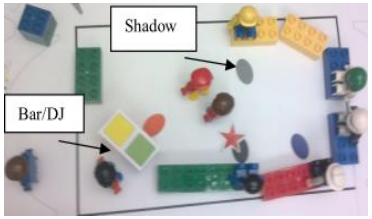

Figure 4. Result of brainstorming the Samba Tram concept with users.

Figure 5. SeekThrough prototype: a smart phone attached to a self-made glove.

1. *Snow Angels*: a smart jacket with tactile guidance of the user in the winter landscape, demonstrating the experiences of fantasy, expression and simulation. The jacket can proactively guide the user to nearby points of interest. Especially Fantasy and Simulation are expressed as someone or something is guiding the user. Expression is about gesture-based input from the user to the jacket.

2. *Blinky Hearts*: a collaborative caretaking system for helping out people in practical matters and small emergencies, demonstrating experiences of Nurture, Sympathy and Control. The concept consists of a Blinky Heart -device for triggering need for help and a Magic Ball –device that guides the helper to the person requesting help.

3. *Samba Tram*: a collective experience of avoiding misery during the long winter by bringing social media elements into more physical and local form in public transportation. This gives people a breakaway in the hectic work life and turns dull social norms in public transportation upside down, hence demonstrating Humor, Subversion and Thrill.

4. *SeekThrough*: a wearable interaction concept (a winter glove) for social augmented reality games, providing location cues for real-world locations called ‘stashes’ and other players. Gestures are used to interact (e.g., shaking hands, hugging). Considering target experiences, Competition, Fellowship and Submission are demonstrated.

5. *Story Cap*: a cap that encourages users to exercise outdoors by telling an audiobook-like interactive story, demonstrating Discovery, Exploration and Captivation. Captivation is concretized in being able to interact with the story and the user forgetting the surroundings. Exploration and Discovery are about the user experiencing something new and finding new interesting places or jogging routes.

Discussion and Lessons Learned

Overall, the course was experienced as edifying both by the students and the teachers. The following discussion consists of the teachers’ reflections on how the course and practical assignments worked out, as well as a few learning experiences from the students.

Several insights and sources of data suggest that EDD is indeed a sound starting point for designing novel concepts from the scratch and that general-level experience targets such as the ones in PLEX Cards can serve well as design inspiration and guidance. This is grounded on 1) the spectrum of different types of concepts designed around the same problem (as described in the previous section), 2) the students’ perceived usefulness of the PLEX Cards as tools for initiating and facilitating design activities, and 3) the teachers’ perceptions of the educational effectivity.

Regarding the second aspect, we gathered the students’ experiences by asking the groups to reflect on their lessons learned in the final report and running an online survey after the course to gather anonymous personal opinions about the course and EDD as an overall approach. This data shows that, for example, starting off with PLEX Cards was considered very useful (see the quotes in the margin of the next page) – rather than collages or sketching, for example. In the survey, we asked what were the most interesting or rewarding phases of the practical assignment. 10/15

"The PLEX Cards pushed and pushed us to do better and better; but in a natural way"

"Having the target experiences given to us was limiting, but it definitely forced us to actually design "experience-drivenly". If we would have been able to define the target experiences ourselves, it would most probably have lead to "obvious" or too easy target experiences. Thus, the design might not have actually been experience-driven but the experiences would have been picked to suit the problem or the solution, instead."

"[A moment of exceptional creativity was when] realizing that an [PLEX] experience can be used as an inspiration for design, and kind of also to set some criteria for the design."

selected "brainstorming the solutions to the problem", which could be interpreted partially as a result of using the PLEX Cards and the dialogue labs method. In contrast, only 1/15 selected it as the most challenging or difficult.

As for teachers' insights, there are a few aspects to point out. Considering students' backgrounds, such generic level target experiences seemed a good starting point for brainstorming even for mostly non-design-savvy engineering students. Furthermore, and more interestingly, the original design problem related to winter was present in some form in all the concepts but it seems that the experiential targets had extended the groups' design scope rather much: the playful experiential targets were often *more emphasized* in the outcome (e.g., the Samba Tram) than the pragmatic realities related to the original design problem. Lastly, we found it useful to group several target experiences in such open-ended design problem setting. On one hand, this allowed more variety in the early phases of the brainstorming and, on the other hand, seemed to force to think about more ways to address the design problem throughout the process.

All in all, we can say that the students' concept design processes were driven by the target experiences and elicited design outcomes that demonstrate a nice spectrum of concepts. Nevertheless, still a more solid process and methods for EDD would have been useful – considering the fact that the groups' processes varied rather much after the dialogue labs session. In our future research and education, we will continue exploring and defining further methods for EDD.

Acknowledgements

We thank all the students on the seminar course for active participation. The concept images are from the groups' reports.

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Paper III – Roto et al.

Experience design for forklift e-learning tool

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How to Utilize User Experience Goals in Design workshop, in conjunction with NordiCHI'12 conference, October 14, 2012, Copenhagen, Denmark.

Abstract
Experience-driven design is a product design approach that takes a specific experience as the basis for design. We used this approach on a 9-week master's level course where metal industry companies gave exercises for students of industrial design. In this paper, we report one of these exercises that focused on an e-learning tool for beginner forklift truck drivers. We describe the process of setting user experience targets, the features invented to address the targets, and the challenges faced in evaluating a paper prototype of the e-learning application against the user experience targets.

Author Keywords
Experience design, user experience, UX target, industrial context, e-learning, forklift truck

Introduction
According to Hekkert et al., experience design takes an intended user experience (UX) as the primary objective of a design process, focusing on the experiential rather than utilitarian aspects of the product or service being designed [4]. Experience design has recently raised interest [1],[2],[7], but examples of design cases in which an experience would have been taken as a starting point of design are still rare. In this paper, we describe a case study of applying experience-driven

design in designing an e-learning tool, Driver's Academy (DA), for those who need to learn driving a forklift truck.

Design approach

Experience-driven design involves at least two important challenges. According to Desmet and Schifferstein, the first is to determine what experience to aim for, and the second is to design something that is expected to evoke that experience [2]. We tackled these challenges in a 9-week student project, where teams of 2 to 3 industrial design master's students took a real-life design case from metal and engineering industry companies and aimed to produce a lo-fi prototype of the design concept, UX of which could be evaluated in the end. The task in the present case was to give a better and autonomous forklift driving education for the beginners and shorten their learning curve in becoming professional drivers. The e-learning tool would run on the smallish screen right in the forklift cabin, so the trainee could follow the training and actually operate the forklift at the same time. One team of two students (the 2nd and 3rd authors in this paper) took this challenge. The 1st author was in charge of the course.

Defining UX targets

As an inspiration to setting the UX targets for design we used the list of 10 psychological needs by Sheldon [6] since Hassenzahl et al. show that experiences with technology can be categorized by the primary need they fulfill [4]. After examining the literature and the current procedures on forklift driver training, the team chose Autonomy, Pleasure and Stimulation as the UX targets (or goals). Autonomy would mean that the system gives the trainee a feeling of independence in the learning process, since having a senior colleague as a teacher (often as an extra task in his daily work) might put too much pressure on them. Pleasure and stimulation would mean that trainees would be engaged by the training tool and keep on developing.

The first visit to a real environment, a warehouse operating with tens of forklifts, took place during the second week of the study. Interviews with two experienced drivers, who also teach the beginners at the company, revealed that safety is an important factor for the beginner drivers. It is very easy to cause an accident with serious consequences if the basics of safety are not learned. Another challenge in learning is that beginners don't know if they do the tasks correctly. This makes them feel insecure and the first weeks might be very stressful. Some might advance too quickly and they become over-confident, which might lead to further accidents. Based on these interviews, the UX targets were updated to Competence, Security and Stimulation.

According to Sheldon et al., Competence-effectance means feeling very capable and effective in one's actions rather than feeling incompetent or ineffective. Security-control is about feeling safe and in control of one's life rather than feeling uncertain and threatened by the circumstances. Pleasure-stimulation is defined as feeling that one gets plenty of enjoyment and pleasure rather than feeling bored and understimulated by life [6]. By stimulation, we emphasized the system's ability to *encourage or arouse user's interest or enthusiasm*[1] in learning more.

[1] http://oxforddictionaries.com/definition/english/stimulate

Addressing the UX targets in design

The team started the actual design of the Driver's Academy e-learning tool by using the UX targets as design drivers. For example, when thinking how to bring in stimulating effects, the team looked into different domains that provide stimulation, such as video games and sports. The UX targets served also as reminders of the focus and helped to make design decisions.

To address the Competence target, the team needed to balance the feeling of incompetence and the feeling of being more competent than one actually is. The team designed a self-evaluation system that gives the beginner driver the power to decide how successfully the task was completed. The system rewards the driver but also to informs what could have been done better.

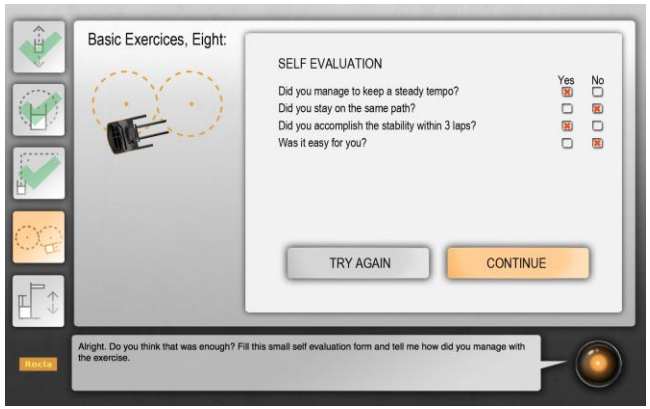

Figure 1. Self-evaluation addresses the Competence target.

The initial UX target Autonomy was replaced by Security, because the interviews revealed that the trainees often value human teacher because of security, as opposed to the autonomy that the e-learning tool provides. The design aimed at strengthening the feeling of being looked after even without a human teacher by providing a virtual eye that "follows" the driver while practicing and gives feedback with natural language (Fig. 1 and 2, bottom). Security was also addressed by preparing the steps in the e-learning tool so that the driver advances step by step (on the left of Fig. 1), letting the driver practice each step as long as needed to feel safe (Try again and Continue buttons of Fig. 1).

To address the Stimulation target, the team provided the driver new challenges along the way and structured the process so that each phase was a step towards the most difficult task. After completing a task the driver was given a grade showing how well he/she did, and a progress bar to communicate the advancement on the number of steps taken and left (Fig.2). One might choose to advance faster, or aim at a higher score by practicing the same steps again.

Figure 2. Feedback and progress indication addresses the Stimulation target.

The team felt that 3 UX targets was a good number of targets. As can be seen from the features, one feature often addresses multiple UX targets.

Evaluating the design against the UX targets

The proposed design was evaluated with 1 beginner driver, 3 experienced drivers, 1 manufacturer representative, and 5 students of industrial design (students had no prior experience with driving a forklift truck). The user interface (UI) designs for each step were shown on paper to the participants and participants' comments were collected while going through the design. After the UI walkthrough the participants filled in an evaluation questionnaire and were interviewed about the reasoning behind their questionnaire ratings.

The questionnaire consisted of 10 statements adjusted to fit the three UX targets in the domain area. Participants rated their agreement with each statement with a 7-point Likert scale.

SECURITY

- I feel that beginners could start the learning process safely from the beginning with the DA
- I would feel secure practicing with the DA
- I feel that I could trust the instructions of DA
- I feel that the structured division of the DA makes the learning process safe and understandable
- I feel that the DA could offer a safe and independent learning process for the beginner drivers in the smaller warehouses

COMPETENCE

- I feel that I could evaluate my skills honestly and not skip steps too fast
- I feel that I could work independently after the DA
- I feel that the DA could offer the drivers enough information to complete their tasks

STIMULATION

- I would want to learn with DA and find it engaging
- I feel that unlocking the goals and following your progress make the learning more rewarding

The participants gave mixed feedback regarding the concept. Inexperienced participants (the beginner driver and the students) seemed to be more stimulated and engaged with the DA than the 3 experienced participants. The experienced participants preferred the human teacher and did not think the security target could be reached with an e-learning tool. However, DA-aided learning was seen to provide better security than learning completely alone.

Challenged faced

The team faced the biggest challenges in the evaluation phase, this is why we cannot report detailed results from the final evaluation. On one hand, detailed UI designs provoked many detailed comments regarding the ease of use of the tool. On the other hand, because the UI design was not working on the display of a real forklift truck, it was hard for the participants to imagine how they would experience DA in real life. This suggests that when the concept is too immature to be used in real context, detailed UI designs might not be the best way to collect feedback on the experiential aspects.

Regarding the best format for evaluating experiential aspects of an early prototype, Buchenau and Fulton Suri discuss the means for Experience Prototyping and

UX evaluation [1]. They present several cases in which hardware designs were evaluated in real contexts of use. In our case, the design was for an intangible software application, and we did not have the time and resources to run a longer-term field study (there was only one week for planning, executing, and analyzing the UX evaluation study). We hope future research helps us in finding the best way to gather quick UX feedback for software concept ideas.

Conclusions

We described an experience-driven design case of an e-learning tool for beginner forklift drivers. We took UX targets as the starting point for the design, and tested if a prototype could address the UX targets set. The initial three UX targets were chosen from the list of 10 psychological needs [6], and updated after interviewing experienced drivers who also teach newcomers to drive a forklift.

UX targets helped in inventing experiential features to the given concept idea, but it turned out to be difficult to evaluate the UI design against the UX targets. We learned that a walkthrough of detailed UI designs brings up comments mostly on the ease of use and the correctness of the content rather than on the experience potential of the design. It is important, however, to test the design ideas before investing a lot of resources into implementation, so we are looking for better representations for describing early prototypes of experiential software applications to UX study participants.

Acknowledgments

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Paper IV – Segerståhl et al.

My Time and the Return on Investment: Business Improvement as a Goal for User Experience

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Abstract
User centered design (UCD) and user experience (UX) are essential to the success of information systems. Despite this, decision-makers are seldom equipped to invest in them. This controversy may be the result of a communicative gap: UX designers often focus on promoting their approaches and methods, while the decision makers' focus is on specific business impacts. This position paper describes a real-world case, in which UX goals were transformed into financial terms, how it worked and what came out of it. It is an example of 1) how investment on user experience can result in concrete measurable returns but also 2) how service designers have to learn to communicate their work through goals that are understood across the organization.

Author Keywords
Information Systems; User Experience; ERP; Usability; Cost-Benefit; Return on Investment

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Service designers work hard trying to propagate the importance of user experience (UX). However, the need for better design and UX may not be taken seriously when the business impact is not clear enough. There appears to be a communicative gap between how the UX community perceives and communicates the goals of their work, to how the decision makers reason within the business context.

This position paper describes the decision-making environment for the makeover of the Tieto ERP hour reporting user interface. The original user interface of the system caused daily frustration and errors overloading the service desk. There were plenty of ideas on how to improve the system and a user study was conducted up-front to inform the re-design. However, the project did not get financing or legitimation before the *monetary* impact of UX was clarified to the decision makers.

The purpose of UX goals can be to identify and structure what constitutes good UX —to guide the substance of design. However, UX goals can also refer to what can be achieved with good UX. Realizing the challenge that UX designers still face in many organizations, we emphasize the importance of the latter in legitimizing UX design within business contexts. What gets user experience its approval in corporations is focusing on financial goals that can be achieved *via* good user experience. [5,7]

User Experience has been a topic of vivid discussion since the mid 90s. Along the popularization of the web and information systems expanding to everyday contexts, usability and user experience have become de facto requirements in systems' and service design – *ideally*. Despite this shift, we still seem to dwell in a mid-state in which we are witnessing the following major controversies:

- Customers are demanding good user experience, but are not ready or able to invest in it due to insufficient rationale or conventional frame and competition agreements. [5]

- User experience is treated as an add-on to systems and services while it should be an integral and inseparable part of systems design and the end result. [5]

- Corporations are beginning to realize the deficiency of their legacy ERP and SAP systems but they are unable to make decisions based on limited understanding about the factual impacts of user experience improvements.

What is it, that's not working for UX in the decision-making chain? To whom and how do UX designers need to communicate UX and its goals in order to get their message through?

The need to communicate UX goals in business terms has been recognized early on in terms of cost-justifying usability [1,3,7]. However, this aspect of user experience and design work has received relatively little attention throughout the past two decades. The communicational gap between decision makers and UX professionals may very well be the single most critical bottle neck contributing to the controversial landscape of UX today.

There are organizations that have succeeded in leveling user experience with their business processes. Herman [4] reported about a procedure by which the eBay User Experience & Design group proposes design projects to get funding. They emphasize the importance of a clear business case, but also approaching the decision makers in an organized manner. The My Time project described in this paper proceeded along somewhat similar steps. While Herman [4] describes the process on a more general level, in this paper we will elaborate on the decision-making process that took place in this specific case and how contextual factors influenced the decision-making.

To inform the writing of this paper we interviewed three key stakeholders involved in the My Time project. The interviewees included the product owner, a UX designer and an end user, with experience of the system before and after the renewal.

This case is an example of 1) how investment on user experience can result in concrete measurable returns and 2) how service designers need to learn to communicate their work through goals that are understood and appreciated across the organization.

User Experience Goals and ERP

As Herman [4] emphasized, a key step in proposing user experience improvements is to "understand the financial levers that drive the business". Our case is essentially associated with the adoption of an enterprise resource planning (ERP) system dating back to 2006. Over the past couple of decades many organizations have invested significant amounts of money into ERP systems. In information systems research the problems concerning ERP adoption have been widely discussed, but the focus is often on social and managerial issues [6]. Besides organizational issues, a critical issue in many ERP systems lies in their complex and error-inflicting user interfaces [2]. The role of UCD principles has been examined as a success factor for ERP usability [8]. However, in typical ERP development projects these practices tend to take off slowly.

The return on investment of ERP systems is difficult to measure [6], but the lack of it may sometimes be quite salient. For instance, the purpose of an hour reporting system is to deliver 1) up-to-date information to the management about the weekly expenditure of man-hours on various operations and 2) input for invoicing. When this information is severely incomplete or inaccurate due to usability issues and end-user resistance, the system may quickly become useless. Poorly designed hour reporting interfaces are a demonstrative example of the double-edged sword of ERP investments.

The underlying questions of this position paper are:

- What kinds of goals and arguments were the ones that advanced decision-making in the My Time project?
- What other factors influenced the decision-making process in the organizational environment?

The next section describes the My Time case in more detail.

Case My Time

In 2006 a new ERP platform including the time and labor module had just been rolled out at Tieto. In the beginning there were approximately 3500 users. The user base was continuously expanding along with rollouts, towards global utilization.

At that time the operation was owned by the HR function and our interviewee's (product owner) role was to make sure the product works. Later on he became the official owner of the module. Describing where it all began: *"Back then we were set with the basic UI by the ERP provider which was quite tedious to use".* The system had been rolled out to barely half of the users and already the severity of problems and the amount of tickets was growing alarming. The product owner had been working in the organization for a year then and felt something had to be done in order to keep things from halting altogether. So he began to promote the project internally.

A Political Decision

Nothing like this had been done before in the organization. There was great hesitation and resistance to make the decision. The stakeholders had no prior experiences of what such a renewal could accomplish. They also had the mindset: *"We have just gotten this brand new ERP system —we can't just start renewing it right away"*. Another idea that was stuck tight in the beginning was: *"We have these standard modules and we will not go changing them"*. There was also a tendency to shove responsibility to the external service provider *"Why can't they offer a proper UI?"*. The service provider was asked, but discussions did not proceed.

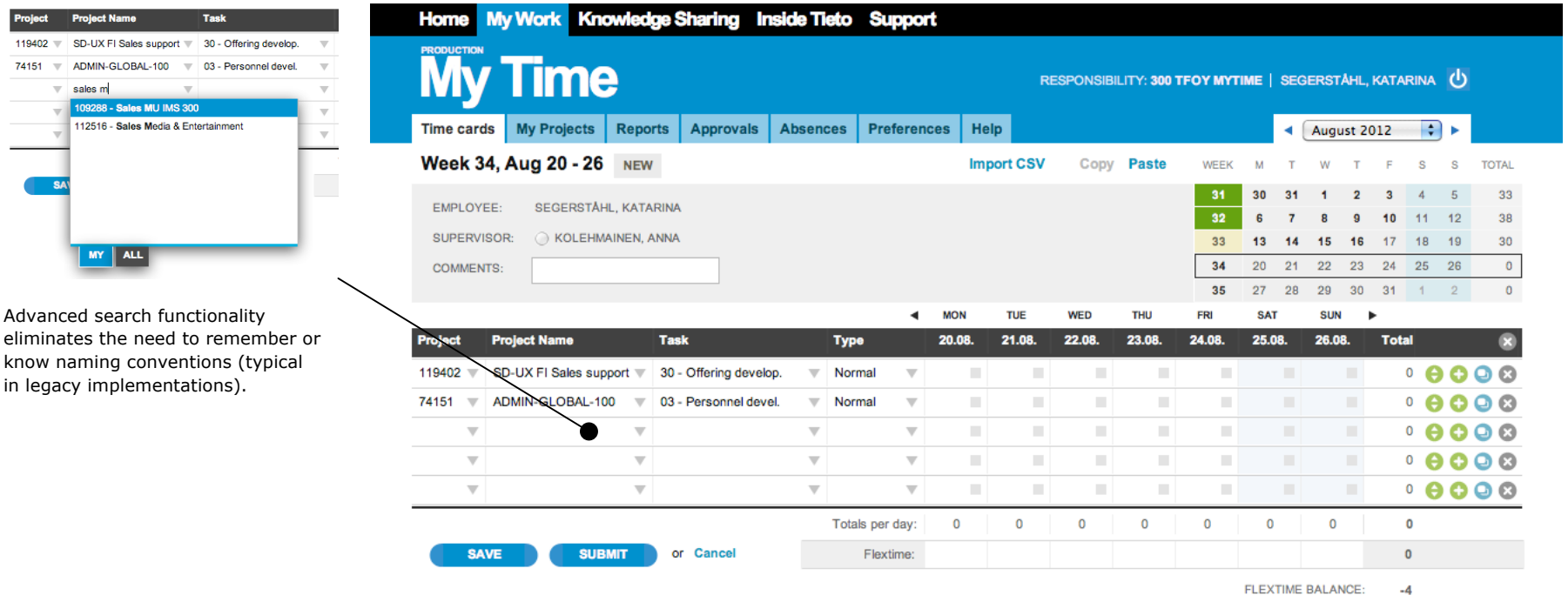
In 2007 the product owner carried out a feasibility study and an investment proposal that was finally robust enough to turn the heads of the decision makers.

The proposal included the following financial components: business requirements, payback calculations, time saving estimates, comparison of alternative solutions and business case analyses. The proposal was ready, but the organization was in turmoil and all internal development was put on hold. When things settled, and there was a chance to revisit the proposal, permission to proceed was granted instantly. The finance committee of Tieto's internal development finally made the decision. In six months the MyTime interface was created from scratch and rolled out as a pilot. Three months from the pilot the solution was in global use.

The Investment Proposal and the Business Case

Ultimately what mattered was an elaborate calculation of how much time was spent on hour reporting and what kinds of business impacts would result if this time could be reduced. As with eBay [4], user-centered design had little to do in the proposal phase. The project team is expected to use whatever means needed to achieve the results. However, user research was a crucial in forming the business case.

Benefits that were observed after implementation were the dramatic reduction of support requests, time spent on hour reporting cut down to less than half, and significant improvement in user satisfaction. (Before the renewal 70 out of 100 comments in surveying user satisfaction of corporate IT tools concerned hour reporting.)



Advanced search functionality eliminates the need to remember or know naming conventions (typical in legacy implementations).

Figure 3. The My Time interface was implemented as a presentation layer on top of the existing ERP system. Integration to back end was done without changing the actual ERP architecture. The new UI guides the user, hides complexity and prevents errors.

UX Expertise to Identify Relevant Goals

One of our interviewees works as a UX consultant at Tieto and was assigned to create the initial concept for My Time. For that, he conducted contextual interviews with the users, suggested user experience goals for the new service and designed the initial wireframes of the new UI that could support these goals. As UX goals (goals that were to be achieved *via* good UX) he suggested reducing user errors and the time spent on hour entry with the service.

These results were communicated to the product owner who started creating the business case for the investment proposal. The UX goals suggested by the

UX consultant were used in the investment proposal but he himself was not involved in writing the proposal. *"I think it would be very important for the UX consultants to participate in selecting and creating the business goals. They are the best people to select and communicate the UX goals that can help bring the customer the most business value."*.

The UX specialists work up-front with real users and in real business environments. They have hands-on experience and insight to identify *relevant* goals for different stakeholders. In the MyTime –case reduced time spent on hour reporting may have seemed quite plain, but it had a huge impact on employer *mood*. Every week in the company could now be ended more pleasantly: instead of struggling and getting frustrated with the old hour reporting system employers can now quickly get their reporting done, focus on the upcoming weekend and most importantly, get off work in time.

The End-User Perspective

One of our informants works as an analyst in Tieto. Typically he needs to mark hours to several different projects weekly. When the old time reporting UI was in use, he used to mark his hours daily to avoid having to do it all at once on the Friday afternoon —at the same time as all the other users do it. The system was frustratingly slow on Fridays, due to the large number of simultaneous users. Reporting also included several complicated task flows. Now the analyst marks his hours all at once in the end of the week. Before reporting hours took him one hour a week to get his hours in, now it's only 20 minutes*. "Before searching for projects was painful"*. Before, the analyst had to memorize or write down 5-6 digit project numbers but now he finds them easily with the intuitive search functionality*. "The new service is faster, more pleasant and clear. On a scale from 1-5, the old version gets a 1 and My Time gets a 4."*

Findings and Lessons Learned

After My Time the organizational framework for internal development has changed. There is now a bid governance council (much like in eBay's case) that handles proposals in a more organized manner. The risk that an individual decision maker has to make is more controlled.

Decision-makers need an organizational framework to support decision making, such as the kind that the bid governance council in this case forms. When such a framework is missing, individual decision makers are reluctant to take the risk. It is easier not to invest than to take the leap.

Money Talks

In the end it is all about the money. In corporate context, usability and user experience translate to time spared, reduced mistakes (and support requests). These create more opportunities for profitable work, increased efficiency, and result in fewer expenses.

Usability and user experience, in corporate context, are means to achieve business impacts. Increased user satisfaction, enjoyability, better working environment and other, immaterial qualities are welcomed byproducts. Unfortunately, these qualities are often communicated on such an abstract level that they rarely sell projects.

The Role of Service Design

The My Time project was a concrete lesson for Tieto's service designers not only about how to sell service design but also about the role of service and user-

centered design. Good user experience in itself has no significant value to most decision makers. User experience and design professionals have to 1) study the business environment and value chain of the customer and take the pain of the real decision makers seriously 2) bring added, monetized value with innovative good design and finally 3) be able to measure the added value.

This realization may not significantly reshape the design processes itself, but rather the goals for why design is being done. This leads to rephrasing the arguments when justifying user experience and design work. More importantly, realizing the business drivers attached to UX, directs the focus of design work and its outputs to solve the right problems.

For example the role of user studies is typically used as a method for describing the needs of the end users. However they should be used more often upfront, as means to reveal and identify critical hot spots within the business environment. These upfront studies are also crucial in identifying and establishing the real business cases and goals for which UX work is needed.

Discussion and Future Topics

It is rather easy to transform the function of time into money. However, monetizing trust, corporate image and the impact of user enjoyment or stress is more difficult. The goals set for the investment proposal, in this case resembled quite much traditional usability goals. However, goals such as enjoyable, fluent and rewarding user experience need to be set as drivers for service design itself. It is important to discuss different types of goals for UX work and the purposes that they can be set for. Conventional usability and productivity goals may well function as intermediary levers to obtain funding for UX work to begin with. Experiential goals, however, go hand in hand with these. Future research is needed to reveal measures that translate qualities such as enjoyment, trust and likeability into more effective arguments.

When considering goal setting for UX, service designers need to combine experiential objectives with business levers. However, customers could also reshape their requests into more specific business needs. Instead of just requesting for certain functionalities, customers should demand specific impacts. For instance: "We need a system that cuts down the number of specific types of service desk contacts by n %". This would draw the focus of bid management to quality instead of just delivering base line solutions.

Business objectives are important tools for scoping design work. It is essential to deliver solutions to the market and to real end users quickly. Breaking solutions into viable steps is key to agile development. For example, an entire web portal does not need to be mobilized at once. Providing just one specific feature on the mobile to complement the service can quickly generate measurable returns when targeted to real need. Each step should deliver an output that is ready to roll out and start returning the investment. Prioritizing business goals helps to scope design work and solve the right problems quickly and in order.

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Paper V – Väätäjä & Pesonen

Please, Don't Drive Me Nuts! Experience Goals for Dogs

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Abstract
The number of studies in HCI that deal with dog-technology interaction is increasing. However, the experience goals for the dogs are rarely considered neither in the research designs nor when the planning the use of technology. This paper aims to bring these issues into consideration and advance the dog related studies in HCI. We present the Five Freedoms as the guiding principles of design and research. We describe some causes of lowered welfare as well as behavior problems of dogs. Based on these we present implications for design and when carrying out research. We also exemplify how to assess animal's experience when designing and testing technology for dogs and other animals.

Author Keywords
Animals; dogs; welfare; five freedoms; ethics; technology; design; research; experience.

ACM Classification Keywords
H.5.m. Information interfaces and presentation: Miscellaneous.

General Terms
Design, Experimentation, Measurement, Reliability.

Introduction
In recent years studies involving animals have increased in HCI (Human-Computer Interaction). Most of the studies concentrate on dogs [1][6][19] [22][23][34] but also poultry [12] or hamsters [2], for example. For primates, such as bononos in zoos, mobile tablets are being studied

Freedom	How
1. Freedom from Hunger and Thirst	By ready access to fresh water and a diet to maintain full health and vigour.
2. Freedom from Discomfort	By providing an appropriate environment including shelter and a comfortable resting area.
3. Freedom from Pain, Injury or Disease	By prevention or rapid diagnosis and treatment.
4. Freedom to Express Normal Behaviour	By providing sufficient space, proper facilities and company of the animal's own kind.
5. Freedom from Fear and Distress	By ensuring conditions and treatment which avoid mental suffering.

Table 1. The Five Freedoms (source:FAWC)

and trialed as tools for enrichment, through gaming, media consumption, communication and learning [27].

As technology enables and supports remote interaction, tactile and auditory communication and so forth, these issues have found their way to HCI studies. The uses of technology in the studies cover remote training of dogs [22], tracking working [1] [23] and hunting [34] dogs, remote command of dogs [1][10], mediating touch to animals or movements of the animal to the owner [12], gaming with the animal [2][35], enriching the animal's life in captivity as well as to study their cognitive skills [27] and mediating communication over distance [6][10]. The motivations for development and use of the technology in these studies vary: some have purely utilitarian perspective such as in remote training, tracking and command of canines, whereas some studies aim to strengthen the bond between humans and animals or increase welfare of the animals through enrichment by providing activity and mental stimulation. However, only few of the studies truly consider the animal's viewpoint to experience and welfare from both physical and psychological side.

This paper aims to outline some basic needs and experience goals for dogs as well as exemplifies how we as humans can assess the experience and preference of an animal. We concentrate on dogs, as they are the most often studied pet in HCI. We present the Five Freedoms which outline the rights of animals under human control (FAWC). We discuss common behavior problems in dogs that we should avoid creating with technological solutions. We also discuss shortly the motivations and ethical issues in developing technology for dogs. In addition, we provide some examples from earlier research how animal's experience is approached and measured.

The Five Freedoms

According to FAWC (Farm Animal Welfare Committee) welfare of an animal includes its physical and mental state, i.e. fitness and a sense of well-being. The Five Freedoms[1] outline the ideal states of animal welfare and they are generilized to pets as well [17]. The Five Freedoms are presented in Table 1.

Neglecting any of the five freedoms increases stress and leads in long-term to lowered welfare (distress) of the animal. Welfare includes both a physical and psychological component. Any stimuli or event that causes a physiological or psychological reaction or change in an animal causes also stress. Stress reactions are normal to any environmental perturbation, and have been separated to eustress (form of positive or physiological stress) and to negative stress (overstress and distress) (Selye, 1974 as cited by [14]). NRC (National Research Council) states: "Distress occurs when stress is severe, prolonged or both." [3].

Regarding pet dogs, the most commonly denied freedoms in USA are freedom from fear and distress and freedom to express natural behaviors [8]. Usually pet dogs have adequate food and water and they are cared for diseases and in case of injury. However, many training methods, the physical abuse of dogs and training related technology like electric shock collars may cause pain for the dog and therefore fear (note: e.g. local laws and regulations govern these issues). On the other hand, freedom from discomfort in case of pet dogs becomes a philosophical and ethical question in itself when reaching beyond the physical context – how is discomfort defined, how to assess it and what affects it to a level that is relevant to the short- and/or long-term welfare of the pet dog.

1 http://www.defra.gov.uk/fawc/about/five-freedoms/

Fear of environmental stimuli in urban environments, such as vehicles and noises
Noise phobias
Separation anxiety, that can be defined as a state of fear
Too many, prolonged or too strong environmental stressors
Unpredictable and uncontrollable aversive or attractive events
Fear or aggression caused by the used training methods and/or mistreatment (such as physical punishment, note laws and regulations)
Fear caused by the use of technologies or tools that create aversive stimuli (e.g. ultrasonic, citronella & electric collars, note laws and regulations)
Confinement, such as crating dogs for long-periods of time (note laws and regulations)
Lacking environmental stimuli and possibility to express natural behaviors related to exercise, eating and social encounters with humans and conspecifics.
Leaving alone for long periods of time

Table 2. Reasons for lowered welfare in dogs.

The freedom to express natural behaviors is also often neglected in USA [8]. Natural behaviors include such as: 1) social intraspecies interaction as well as interaction with and presence of humans, 2) physical activity, 3) mental stimulation by problem solving and learning, 4) eating related species specific behaviors starting from the searching for the food (by using different senses: hearing, smell, vision) to actual eating behavior (chewing, tearing etc.), and 5) species or breed specific behaviors related to the original purpose of the dog as a working, companion or hunting dog, for example.

Severe or prolonged stress can be caused by several reasons, as exemplified in Table 2 (see [7], [8], [13] [21] [24]). Possible stressors and reasons for lowered welfare should therefore be acknowledged and understood in technology development.

The five freedoms can be used as the guiding principles and experience goals both in planning and conducting the studies and when developing technology for animals. In case of technology development and interventions when technology is tested and used, each of the freedoms should be carefully considered and thought of how technology or the studies or interventions may affect the animal welfare. This requires also understanding and knowledge on species related specific aspects, such as the species typical natural behaviors in addition to the perceptual, cognitive and motor skills. Furthermore, these issues are also related to ethics and humane treatment of animals and should therefore be taken into account [18].

Many dog owners are aware of at least some of the basic needs and described freedoms. Many owners feel guilty about leaving the dog alone for prolonged periods of time, for example. On the other hand, owners may long for their pets during long absences and would want to communicate with them in some ways. This guilt from the awareness or the longing for the pet by the owner seems to be one of the driving forces that directs towards building technology that supports remote interaction and communication between humans and animals or enables the owner to provide the animal with sufficient stimuli to fulfill a certain need, such as treadmills for dogs for exercising or remotely playing with the dogs. In addition, spending quality time or strengthening the bond with the pet has been one of the mentioned motivations for developing games for dogs . But, do these designs and developments enhance the welfare of the dog or animal? Or are they designed based on human needs and desires without truly understanding the animal?

Behavior problems in dogs

To take another point of view to dog welfare we outline next some common behavior problems in dogs. By understanding the common behavior problems, it is possible to understand what should NOT be the effect and outcome of the technology intervention on the dog's welfare and behavior. On the other hand, the common behavior problems provide appropriate goals to tackle for enhancing the dog's welfare and prevent their forming.

It should also be noted, that there are individual differences in the personalities of dogs, as well as differences between breeding lines and breeds [13][21][25][29][30][31][32]. The reactions to stressors, such as external stimuli and events, may therefore vary considerably. This should be taken into account in the research designs of the studies that use animals as participants as well as in the design and development of the technology.

Examples of typical behavior problems or disorders in dogs [7][8][13][14] [24][26] are presented in Table 3. Many

Destructive chewing
Chasing (cats, cars, balls…)
Barking or other hypervocalization
Hyperactivity
Over-grooming (some part of the body)
Digging
Phobias, fears
Aggression (towards humans and/or dogs)
Stereotypies or repetitive behaviors (such as tail-chasing in adult dogs)
Increased passiveness

Table 3. Typical behavior problems.

behaviors are natural for the species originally. However, the capability to cope with stressors is affected by the dog's personality [13][25][30]. Behavior problems can be caused by the owner or handler, by the circumstances that the dog lives in ([7], [24], see also previous chapter) or even by single fear- or pain related experience [7]. In all cases the listed problem behaviors are clear and strong signs of poor welfare of the dog. Recently, the chasing behavior received attention when Fox News published an article of dogs chasing laserbeams and winding them up, eventually leading to poor welfare when chasing is done repeatedly and the stress levels stay high constantly [36].

When designing for dogs, we therefore should take avoid creating behavior problems, and strive for preventing them and increasing welfare. How to do it?

- **Provide a possibility for learning, problem solving, co-operation, and other natural behaviors in reasonable amounts.** "Reasonable" amount depends on the dog breed and personality, for example. The role and feasibility of technology in this needs careful consideration.
- **Avoid types of stressors that wind the dog up or make them fearful or anxious.** Keeping the dog in a calm state of mind enhances learning and potentially prevents further problems, such as hyperactivity, phobias, excessive fears, anxiety and aggression.
- **Give the animal control over the environment**, so that unexpected things do not happen that scare or make the dog anxious or overexcited.
- **Do not enable and offer overly attractive activity that is in itself too rewarding** such as chasing objects, as this excites the dog and increases stress levels negatively in long-term use.
- **Respect that dogs (animals) have different personalities and individual reactions differ to stimuli.** Take it into account in research designs and design of technology for dogs.

Testing and assessment of experience with animals

In this section we present some methods that can be used in the studies with animals to assess their experience and effects on welfare.

Since we cannot ask the dog or animal for their impression and experience verbally or to fill in a questionnaire, we need to use other types of assessments and measurements of dog's reactions, emotions (affect) and possible behavioral changes in short and long term to be able to see effects on welfare. Available methods include questionnaires for dog owners or handlers on dog behavior and signs of stress [9][13][14][24], observation of dog's reactions, activity levels and behavior ([21], see e.g. [14] for a list of signs of stress), measurement of physiological signals, such as heart rate or blood cortisol ([21], note: these may rather be indicators of arousal in general [16]), measures for learning, preference or point of interest by eye-tracking [28], assessment of dog's affective state by cognitive measures, such as cognitive affective bias [16] or preference for using the developed solution over not using it [2] [12].

Mentioned technology related experience goals for animals in the HCI include the following: for wearables, the animal is able to move and act naturally [15]; creating a natural sensation of stroking [12] and enrichment by providing possibility for natural behaviors [2].

Discussion and Conclusions

Studies in HCI that deal with animals concentrate mainly on the human perspective, such as the needs and requirements for the technology. Very few studies mention the experience goals from the viewpoint of the animals or assess the short and/or long term physiological or psychological effects.

When designing and developing technology for dogs or other animals, of primary importance is and should be the animals' welfare and the effect of the technology on it. Since we cannot ask our canine companions for their experience goals or experience directly, we need to utilize the most recent research results and appropriate experimental designs and assessment of experience to take into account animal welfare and behavior to inform our design goals, designing of evaluation as well as methods for assessment of experience. Prior research jointly with common sense and ethical consideration[33], including using the animal's rights in form of for example the Five Freedoms as the guiding principles for experience goals, form a solid start to designing and developing technology that is humane and supports the welfare of the dogs and appropriate experiential goals. At best, HCI 1) supports and enhances dog's welfare, 2) prevents behavior problems, 3) increases the dog owner's, trainer's or handler's understanding of the dog and its behavior, needs and learning and 4) strengthens the bond and relationship between the human and the dog. Technology provides various new interaction and communication possibilities. These combined with a solid understanding of animal behavior and welfare and innovative ideas for new types of design concepts, open up a whole new world to explore and cherish in human-dog relationships. The main experience goal is shortly in Fido's words: "Don't drive me nuts, instead, let me use my brain and be a dog!"

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