Slutrapport
Öppen anslagsomgång

Diarienummer

180250

Grunduppgifter

Projektledare

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Titel

Professor

Projekttitel

Systemutvecklingsmetoder för digital arbetsmiljö (STRIA)

Projektstart

2019-05-01

Projektslut

2023-04-30

Klassificeringar

Forskningsområde

Arbetsmiljö

Ämnesområde

Digital arbetsmiljö

Målgrupper

Arbetare i privat sektor
Tjänstemän i privat sektor
Anställda inom kommun och region

Nyckelord

Metoder, verktyg och utrustning
Artificiell intelligens, automatisering och robotisering

Populärvetenskaplig sammanfattning

Bakgrund

I takt med att digitaliseringens sveper in över arbetsplatser världen över, står vi inför en paradox. IT-system, utformade för att förenkla och effektivisera, bidrar istället till utmaningar i arbetsmiljön. En utbredd brist på stöd från dagens system resulterar i arbetsmiljöer som inte alltid gagnar de anställdas välbefinnande. Forskning har upprepade gånger belyst denna problematik, och pekat på en kritisk lucka i utveckling av mjukvara: arbetsmiljöperspektivet lämnas ofta utanför fokus.

Syfte

Med ett syfte att förbättra den digitala arbetsmiljön för IT-användare, sökte forskargruppen utveckla nya metoder som inkluderar användarnas perspektiv och arbetsmiljö under systemutvecklingsprocessen. Genom en kombination av studier och praktiska metoder ville projektet ta sig an utmaningen att bygga broar mellan teknikens möjligheter och människans behov.

Genomförande

Forskargruppen belyste vikten av att förstå hur IT-system påverkar arbetsmiljön ur användarnas perspektiv. Vårt arbete syftade till att skapa metoder som möjliggör en djupare förståelse för denna dynamik, och därmed leda till mer hållbara och användbara IT-lösningar. Med ett spektrum av delprojekt – från kartläggning av befintliga utmaningar till utveckling och utvärdering av nya metoder – har projektet lagt grunden för en framtida arbetsmiljö där tekniken står i människans tjänst.

Resultat

Projektet har både adresserat behov inom IT- och systemutvecklingsbranschen, och bidragit till det vetenskapliga samtalet kring digital arbetsmiljö. Med innovationer som "Contextual Persona"- och "Think-Aloud"-metoderna, har forskarna tagit steg mot att integrera arbetsmiljöaspekter i systemutvecklingen. Resultaten erbjuder nya insikter och verktyg för både akademiker och praktiker, med potential för hur vi utvecklar IT-system som främjar en hälsosam arbetsmiljö.

Nyttiggörande

Genom samarbete med studenter testades och förfinades dessa metoder, vilket ledde till betydande kunskapsspridning genom publikationer och konferenser. Webbplatsen (www.ucdsprint.com) spelade en nyckelroll i att göra metoderna tillgängliga för IT-professionella, vilket breddade projektets påverkan. Initiativ för utbildning och medvetenhetsspridning om den digitala arbetsmiljöns vikt riktades mot både akademiker och praktiker.

Projektbeskrivning

Inledning och bakgrund

Many of today's IT systems fail to effectively support workers, contributing to unhealthy digital work environments (Bondanini et al., 2020, Natsjuk et al, 2023). This inadequacy is partly due to current system and software development processes prioritizing functionality over incorporating aspects of the digital work environment, as highlighted by research (Peters et al., 2018). Extending this concern, Hassenzahl et al. (2010) emphasize the importance of fulfilling universal psychological needs, such as competence, relatedness, and autonomy, through technology interactions to generate positive experiences, suggesting a broader conceptualization of user satisfaction. The digital work environment, defined by Sandblad et al. as a multifaceted terrain shaped by the digitalization of work support systems, encompasses physical, organizational, social, and cognitive aspects (Sandblad et al., 2018). IT systems, including AI-based ones, can indeed be implemented and designed to support either "Taylorism on steroids" or "enabling autonomy" (Noponen et al, 2023). In parallel to this, IT practitioners face myriad challenges, including high costs, time constraints, limited resources, and insufficient senior management support, which further complicates the development process (Vredenburg et al., 2002; Bak et al., 2008; Inal et al., 2020; Larusdottir et al., 2023a). The dynamic, heterogeneous, and unpredictable nature of today's digital work contexts, in stark contrast to the static environments of the past, underscores the need for a profound understanding of these settings during software development (Cajander & Grunloh, 2019; Daniels et al., 2015; Eshet & Bouwman, 2017). This scenario reveals a critical gap and a need for useful and practical software development methods that exceed functionality and usability to integrate perspectives of the digital work environment throughout the software development lifecycle. By embedding these perspectives during the analysis, design, and evaluation phases, IT professionals can craft software that not only fulfills technical requirements but also bolsters the well-being and productivity of users, effectively addressing the complexities of their digital work contexts (Larusdottir et al., 2012; Wang et al., 2021; Cajander et al., 2021).

Syfte och frågeställningar

The overall project goal was to improve the digital work environment of IT system users. To do that, we aimed to develop new useful methods that practitioners can use in software development to incorporate aspects of the digital work environment and the users' perspective into their work practices.

First, we wanted to understand the underlying problems from the users' perspective on how new IT systems affect their work environment by mapping the research problem and current challenges. Second, we aimed to develop new software development methods for including digital work environments. Third, we aimed to evaluate further and develop new methods in educational settings. Fourth, we aimed to produce training materials about how university students and practitioners can use these methods easily. We disseminated our findings to the academic community and practitioners.

We defined the following research questions based on the project aim:
RQ1. What digital work environment problems do personnel in care and administration experience?
RQ2. Which heuristics can be used to evaluate and map the digital work environment with a heuristic evaluation?
RQ3. How can personas and think-aloud be developed to describe the digital work environment?
RQ4. How can the self-flipped classroom teaching method be used to teach the new systems development methods with a work environment focus?
RQ5. How well do those methods work for today's IT developers?

The project had five work packages, that should support the overall goal of the project as illustrated in Figure 1.

Figure 1. The overall goal of the project and the work packages.

Short descriptions of the activities conducted in the work packages are given below.

WP1 - Mapping of the research problem and current challenges
In this work package, we focused on the users' perspective and carried out three studies to gain some answers to

research question 1.

WP2 - Development of new software development methods
In this work package, we worked on answering research questions 2 and 3.

WP3 - Evaluation of the new methods used in educational settings
In this work package, we focused on evaluating two new methods for gaining answers to research question 4.

WP4 - Development of teaching material for the new methods
In this work package, we have gathered some answers to research question 5.

WP5 - Dissemination
The results of work packages 1 to 4 were disseminated in academic peer-reviewed papers, peer-reviewed book chapters, reports, MS theses, Webbinarium, Seminarier, Key Notes and Presentations.

Projektets genomförande

3.1 WP1 - Mapping of the research project and current challenges
To investigate the digital work environment challenges experienced by personnel in care and administration, our methodology consisted of the following key components:
3.1.1 Literature Study
A scoping review was conducted to investigate the influence of AI and robotics on the work environment of healthcare professionals, considering physical, social, and organisational aspects (SP1). The search was conducted on PubMed for peer-reviewed original research articles published between 2017 and 2022. Search terms encompassed 'AI, robotics, and automation' (i), 'healthcare professionals' (ii), and 'work environment' (iii). Qualitative content analysis using an inductive approach was employed to identify main themes, with results reported following PRISMA guidelines. Eighty-two research documents were included out of 510 database hits.
3.1.2 Administrative Work Study
This study centred on the introduction of Robotic Process Automation (RPA) within the financial support division of Uppsala municipality, specifically focusing on its implications for caseworkers (SP6). The investigation relied on interviews, observations, and surveys. The data collection process unfolded in two key phases: 1) Initial Data Collection: The primary objective of this phase was to establish a foundational understanding of the RPA implementation. This entailed interviewing various stakeholders, including caseworkers, line managers, and project leaders. In total, 14 individuals participated in these interviews. Furthermore, on-site observations were conducted over two days to gain a deeper insight into the work environment and practices. 2) Additionally, a survey was administered to caseworkers within the division, garnering participation from approximately 150 individuals, with a response rate of approximately 60%. The planned follow-up study was cancelled due to Covid-19.
3.1.3 Patient Services Study
In 2019, Uppsala initiated a digital system to improve citizen-healthcare provider interactions, starting with asynchronous chat between citizens and 1177 nurses (SP2). The IT system requires patients to complete a predefined questionnaire based on their specific complaints. Nurses and physicians use the answers to interact with patients via asynchronous written chat.

We employed a multi-stage data collection approach to comprehensively understand the participants' work in this qualitative research study. The study commenced with contextual inquiries, involving interactions with five informants. During these inquiries, the researcher posed questions to elicit insights into their work processes and diligently recorded observations. The primary purpose of these contextual inquiries was to provide a contextual backdrop for the subsequent study phases.

Following the contextual inquiries, we conducted a series of 17 semi-structured interviews. These interviews involved participants from both nursing (n=9) and physician (n=8) backgrounds. Before their participation, all individuals involved in contextual inquiries and interviews were duly informed about the study and requested to provide written informed consent.
3.2 WP2 Development of new digital work environment methods and WP3 Evaluation of the new methods used in educational settings
Our study encompasses the development of two novel methodologies: the Contextual Persona method and the Contextual Think-Aloud method. Additionally, we have undertaken an evaluation of the original Heuristic Evaluation method and conducted a comprehensive analysis of experiential data related to the utilization of the

Vision Seminar method within practical projects. In this section, we delve into the methodologies and approaches that underpin these research endeavors.

3.2.1 Developed the new Contextual Persona method and new Contextual Think-Aloud method.

Over the years 2019 to 2022, we embarked on an iterative journey of method development and refinement, guided by the principles of multi-grounded theory building. During this time, we focused on enhancing two novel digital work environment methods: the Contextual Personas and the Contextual Think-Aloud methods:

First Iteration (2019-2020): We developed the Contextual Persona and Contextual Think-Aloud methods based on a literature review. These methods were first introduced in a course tailored for 60 undergraduate Computer Science students at Reykjavik University in the spring of 2020. Teaching materials were created to facilitate the students' understanding and application of these methods.

Second Iteration (2021): Building on the insights gained from the initial teaching experience, we refined and further developed the Contextual Persona and Contextual Think-Aloud methods. The second version of these methods was introduced in the spring of 2021, with modifications made to the teaching materials based on the students' feedback and reflections from the previous year.

Third Iteration (2023): In 2023, we continued our iterative process by revisiting and redefining the instructions for implementing these methods. As part of this iteration, we made the revised instructions accessible online through the www.ucdsprint.com website, ensuring wider dissemination and usability. This iterative approach allowed us to continually improve and refine the Contextual Persona and Contextual Think-Aloud methods, incorporating student feedback and adapting them to evolving needs.

3.2.2 Evaluated the Contextual Heuristic Evaluation Method

We decided not to explore the heuristic evaluation method further than the first iteration of the method's development. The decision not to explore the Heuristic Evaluation method in our research was primarily grounded in two significant reasons. Firstly, our evaluation led us to discern that the Heuristic Evaluation method resembled the work environment rounds method used in several areas of society in the last 15 years (Gulliksen, 2021)and that this method had recently garnered attention and exploration from another research group (Gulliksen, 2021). It was deemed redundant to duplicate efforts in our research. Secondly, the initial iteration of the Contextual Heuristic Evaluation method at Reykjavik University provided valuable insights. It became evident during this phase that the method posed significant challenges. Consequently, we focused our research efforts on evaluating another method for including work environment aspects in software engineering, the Vision Seminars method (SP3).

3.2.3 Evaluated the Vision Seminar Method

Our research group has a well-established tradition of conducting Vision Seminars as an integral part of our action research projects. This innovative approach, primarily spearheaded by Hardenborg and Sandblad (2007), has significantly influenced our approach to technology and work systems design. Despite the longevity of this tradition, it remained largely unexamined and no evaluation of the effects of using the method has been done. Recognising the value and relevance of the Vision Seminar method within the context of our project's goals, we chose to subject it to a comprehensive evaluation. To accomplish this, we analysed previously collected data about Vision Seminars, specifically focusing on their impact on the work environment. The findings of this analysis were subsequently published in a relevant publication (SP3).

3.4 WP4 - Development of teaching material for the new methods

3.4.1 Studying how new methods should be constructed to fit practitioners

This study employed a qualitative research approach to investigate the practices and perspectives of IT professionals operating within Agile development environments. The primary aim was to gain insights into how these professionals continually learn about methods and the considerations that influence their selection of these methods. A purposive sampling strategy was utilised to select a cohort of 13 participants, seven females and six ma

Forskningsresultat

4.1 Digital work environment problems

In the study regarding the automatisation of patient services, we compared the stress levels of staff using a chat function partially automated, to the stress level of staff answering patient requests on the phone. We saw that the staff using the chat became less stressed because they did not talk on the phone with the patients but chatted in writing. However, they found it stressful to have many patients in parallel in the chat, and they commented that the conversations became asynchronous and not synchronous. It can also take time for patients to respond in the chat, which is perceived as very stressful. During the observations, we noted that they needed to jump between three different systems to carry out their daily tasks and the systems they had to use were not integrated. For

more info, see the technical report below (SP1, SP2, R1, M2).

Furthermore, our results indicate that digitisation affects the decision-making space for the staff at patient services. The balance between organisational control which the IT systems provide means that the autonomy to base one's decisions on professional competence decreases. The staff who chatted with patients feel that they do not get as much knowledge about the patient's well-being as they did via physical examination or telephone conversations. The results show that the asynchronous chat for medical advice risks reducing doctors' and nurses' opportunities to best convey their professional knowledge and validity in decision-making. The system's design increased uncertainty about medical judgments and decision-making, threatening professionalism (SP1, SP2, R1, M2).

In the studies at the Social Services, we saw that the short-term goal of the Robot Process Automation (RPA) project is to reduce administrative work and to give customers faster answers to applications. Staff were positive about the RPA solution (87% believed that RPA would make their work more efficient. Having more time to work with clients was seen as positive, but respondents also warned that increased digitisation could make some clients more vulnerable and that insight into their client's situation may be reduced as more of the process is automated.In summary, there appears to be potential to improve work through RPA and several challenges, ranging from user engagement to the more subtle aspects of algorithmic decision-making (SP6).

4.2 Development of Contextual Persona Method and Contextual Think-Aloud Method

The system development methods Contextual Personas and Contextual Think-Aloud were suggested and evaluated among students at Reykjavík University on two occasions in 2020 and 2021 (BC2, SP5, SP9, R2). Most students think the Contextual Persona method will be valuable in the future and should be used at the beginning of the development. Moreover, some respondents mentioned that the method should be used throughout the design process. Almost all students described that the Contextual Persona method helps deepen their understanding of the users' needs and work environment (SP5). Some respondents also reported that the Contextual Persona method is easy to use, and the layout of the Contextual Persona is easy to navigate.

Some improvements were suggested. First, Contextual Persona might encourage us to use stereotypes and make us focus on one type of user but ignore other types of users which prevents a diverse work environment, and accessibility. For example, some respondents reflect that Contextual Persona might give us a stereotypical representation of elderly and non-tech-savvy people (SP5, R2). Second, although some respondents made multiple Contextual Personas, they reflected that their Personas were too similar and, thus, lacked diversity. However, they did not explain in the report how they made those Personas, and thus we cannot infer why they end up having Contextual Personas that look very much alike. Third, Contextual Personas are fictional and influenced by designers' Personal biases, affecting the system design and development work. Regarding this point, one respondent made such reflections: "Because the Persona is technically made up and fictional, when creating the Persona, we can become biased on how the Persona should be like which can greatly affect the outcome of the system if we were to base it on the Persona." (SP8).

The positive experiences highlighted the Think-Aloud method's ability to involve users in the design process, gain insights into their thoughts, and establish a personal connection between users and developers to understand the digital work environment better. The continuous feedback provided valuable insights for improving the design of the software and ensuring it aligns with users' needs and their work environments. However, the study also identified challenges associated with the Contextual Think Aloud method. Users sometimes struggled to think aloud and articulate their thoughts, which affected the comprehensiveness of the feedback, so the students were unsure how to interpret the results (SP8, SP9).

The students felt that the Contextual Persona and the Contextual Think-Aloud methods were useful and increased their understanding of how the system they designed in the course could affect the users' work environment.

4.3 Experiences from learning and using new methods in systems development

One of our studies investigated lifelong learning processes focusing on how professionals choose and use system development methods while identifying barriers and enablers in their application. IT professionals acquire new skills through colleagues, experts, formal training, and leisure time experimentation (SP4, M1). Motivations for learning include adapting to evolving work environments and personal development goals. Method selection depends on factors like adaptability, ease of use, and compatibility their practices, with customer-centric approaches common in smaller companies (SP4, M1). Frequently used methods include prototyping, user testing, user journeys, and workshops. Barriers to method usage include time constraints, abstractness, and challenges in demonstrating UX's value, while enablers encompass collaborative tools and simplified recruitment processes. Remote work presents specific challenges, affecting method feasibility and necessitating adaptations to organizational (SP4, M1).

Our results show that the Contextual Personas and the Contextual Think-Aloud method are useful tools for teaching students how to design and develop systems for a good digital work environment. Potential weaknesses

with the method from a student perspective are related to the validity of the users' digital work environment and needs. The results show that the students could reinforce stereotypes while using the Contextual Personas method. Additionally, we have seen that interpreting Contextual Personas is partly subjective and that the interaction with real users decreases. Another concern was related to the design process itself, that it is relatively time-consuming and that it is difficult to adjust the Contextual Persona afterwards.

The participants and stakeholders engaged in the Vision Seminar process reported that it was a rigorous endeavor, but one that was ultimately worthwhile. This collaborative effort resulted in the formulation of feasible and desirable visions for the future utilization of IT systems. By participating in Vision Seminars, individuals gained a more comprehensive perspective on their work, enabling them to uncover novel possibilities for improving their respective activities. This holistic view contributed to a more profound understanding of their roles within the project. The research findings underscore the effectiveness of the Vision Seminar process in facilitating a shared understanding among participants. It also highlights its ability to visualize future work processes, making it particularly suitable for application in large and complex organizations (SP3).

Diskussion

The project undertaken in this report sought to address the pressing issues related to the digital work environment, with a particular focus on developing and implementing software development methods that prioritize work environment considerations. In this discussion section, we delve into the feasibility of the project, summarize the results achieved, highlight the new knowledge generated, acknowledge scientific limitations, and propose avenues for future studies.
Feasibility of the Project
The feasibility of the project was evident throughout its execution. The project's structure, including its well-defined research questions and work packages, provided a clear roadmap for achieving its objectives. Collaboration among the research team members, their expertise, and access to relevant resources contributed to the project's feasibility.
Results
New Software Development Methods: One of the project's key achievements was the development of innovative software development methods, namely the Contextual Persona and Contextual Think-Aloud methods. These methods were designed to incorporate digital work environment perspectives into the software development lifecycle. The feasibility and effectiveness of these methods were demonstrated through their successful implementation and integration into educational settings.

Evaluation of Existing Methods: The project's evaluation of existing methods, such as the Heuristic Evaluation and Vision Seminars, shed light on their applicability and limitations within the context of the digital work environment. This evaluation provided valuable insights into the practicality of these methods and their impact on the work environment.

Dissemination of Findings: The project's commitment to knowledge dissemination was evident through the publication of academic papers, conference papers, book chapters, technical reports, webinars, and podcasts. The creation of an online resource (www.ucdsprint.com) further facilitated the accessibility and utilization of the developed methods, ensuring their practical application in IT contexts.
New Knowledge
The project has contributed significantly to the generation of new knowledge in several areas:

Work Environment Integration: The development of the Contextual Persona and Contextual Think-Aloud methods represents a novel approach to integrating work environment considerations into software development. These methods provide a practical framework for software developers to address digital work environment challenges effectively.

Method Evaluation: The evaluation of existing methods, especially the Vision Seminar method, has added depth to our understanding of their impact on the work environment. This knowledge is crucial for refining and optimizing software development practices.

Accessibility and Dissemination: The creation of an online resource for IT professionals (www.ucdsprint.com) fills a critical gap by providing accessible and user-friendly access to work environment-focused software development methods. This resource ensures the practical applicability of these methods in real-world IT settings.
Scientific Limitations

While the project has yielded valuable insights and innovations, it is essential to acknowledge its limitations:

Context Specificity: The project primarily focused on the Swedish context, which may limit the generalizability of findings to other regions or cultural contexts. Future research should explore the applicability of these methods in diverse settings.

Resource Constraints: The project operated within resource constraints that influenced the scope and scale of research activities. Expanding the project's resources could enable broader investigations and implementations. Future Studies

Building on the foundations laid by this project, several avenues for future research emerge:

Cross-Cultural Adaptation: Investigate the adaptability of the developed software development methods to different cultural and organizational contexts to enhance their versatility.

Long-Term Impact: Conduct longitudinal studies to assess the long-term impact of these methods on the digital work environment and employee well-being.

Integration into Industry Practices: Explore strategies for integrating these methods into industry software development practices and assess their real-world effectiveness.

Continuous Improvement: Continuously refine and update the developed methods based on user feedback and evolving digital work environment challenges.

In conclusion, this project has made significant strides in addressing digital work environment challenges by developing innovative methods, method evaluation, and knowledge dissemination. While it has provided valuable insights and tools, further research and refinement are necessary to realize the potential of work environment-focused software development practices fully.

Nyttiggörande

The project "System Development Methods for the Digital Work Environment" has undertaken various efforts to ensure the practical application of its research findings. One of the key initiatives involved developing and adapting existing system development methods, such as the think-aloud method, heuristic evaluation, and personas method, with a new focus on work environment aspects. These methods were further refined to better address the specific needs of the digital work environment.

The project engaged students at Reykjavik University to test and validate these methods. This interaction proved pivotal in fine-tuning the methods and ensuring their practical applicability. Student positive and negative feedback was instrumental in making necessary improvements to the methods.

Dissemination of research results and knowledge has been a central aspect of our work in the project. We have made concerted efforts to reach a wide audience through various channels and formats, resulting in extensive and effective dissemination of our findings and methods. Significant contributions have included technical reports and academic papers, offering detailed insights into the project's progress and outcomes. Additionally, student theses have provided valuable perspectives on applying UX methods and the impact of digital patient contact on healthcare professionals. For details see section four.

The project has also contributed to academic books used in teaching, such as the chapter on "Digital Work Environment in Healthcare" in the textbook "Medical Informatics." We have also authored a book chapter in a human-computer interaction textbook titled "User-Centered Design Approaches and Software Development Processes," focusing on incorporating user needs into system development. These publications have been crucial in sharing our research with a broader academic audience.

Presentations and lectures have played a vital role in our dissemination strategy, with project members participating as keynote speakers and presenters at various conferences and seminars. These discussions have covered topics such as work environment and digitalization, user-centred development, and the challenges of integrating new technologies into the work environment.

Furthermore, the project has made substantial efforts to reach the general public and professionals through media channels. Blogs, social media, and press releases have been utilized to disseminate our research. For instance, our research on the 1177 chat function generated significant media attention, sparking a broader discussion on the impact of digitalization on the work environment.

Education initiatives have also been a significant focus, including the development of training materials on system development methods for a healthy digital work environment, designed for external organizations (www.ucdsprint.com website). We have used the project results in several courses at the University of Reykjavik, four tutorials at international courses, and a NIVA education course (for details, see section four in the reports C1-C6). These educational efforts are crucial in increasing understanding and utilization of the developed methods across various organizations and sectors.

Due to unforeseen circumstances, the original main plan for disseminating our newly developed methods through Prevent underwent a significant transformation. The collaborative arrangement with Prevent evolved in response to changing dynamics, resulting in a shift in our dissemination strategy. As a consequence of this shift, our efforts transitioned towards a series of interviews, podcasts, and webinars conducted in collaboration with Prevent, as outlined in the detailed list provided under publications.

During this period, a critical realisation emerged regarding the target audience for the methods developed within the STRIA project. Evidently, these methods' end-users differed from those typically addressed by Prevent in their educational initiatives. While Prevent primarily engages with work environment experts, union representatives, and human resources personnel, our newly developed methods were most pertinent to IT professionals. To cater to this change in focus, we embarked on a comprehensive study exploring how IT professionals acquire knowledge and skills, as detailed in Section 3.4.1. This research served as a foundational step in aligning our methods with the needs and preferences of IT professionals.

Our dissemination efforts extended to educational activities, including facilitating User-Centered Design sprint courses on four occasions and educational sessions at Reykjavik University. These initiatives were instrumental in introducing our methods to the intended audience and fostering their adoption within the IT community.

Recognising the need for accessibility, we created a dedicated webpage where IT professionals can readily access and utilise our methods (www.ucdprint.com). This online resour

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Ekonomi

Lönekostnader	Summa (kr)
Budgeterat	0
Utfall	2 417 000
Avvikelse mot budget	-2 417 000

Indirekta kostnader	Summa (kr)
Budgeterat	0
Utfall	846 000
Avvikelse mot budget	-846 000

Material och utrustning	Summa (kr)
Budgeterat	0
Utfall	25 000
Avvikelse mot budget	-25 000

Resekostnader	Summa (kr)
Budgeterat	0
Utfall	240 000
Avvikelse mot budget	-240 000

Kostnader för spridning av resultatet	Summa (kr)
Budgeterat	0
Utfall	0
Avvikelse mot budget	0

Övriga kostnader	Summa (kr)
Budgeterat	0
Utfall	150 000
Avvikelse mot budget	-150 000

Sammanställning kostnader	Summa (kr)
Budget för hela projektet	0
Totalt utfall för hela projektet	3 678 000
Kvarstående medel	-3 678 000

Motivering

Åsa Cajander har arbetat i projektet under hela perioden. Post doktorn Magdalena Stadin arbetade i projektet under ett år, och var sedan föräldraledig i två gånger, vilket löstes genom att Marta Larusdottir arbetade i projektet. Vi har presenterat projektet vid många olika tillfällen både för forskare och praktiker vilket motiverar resekostnaden.

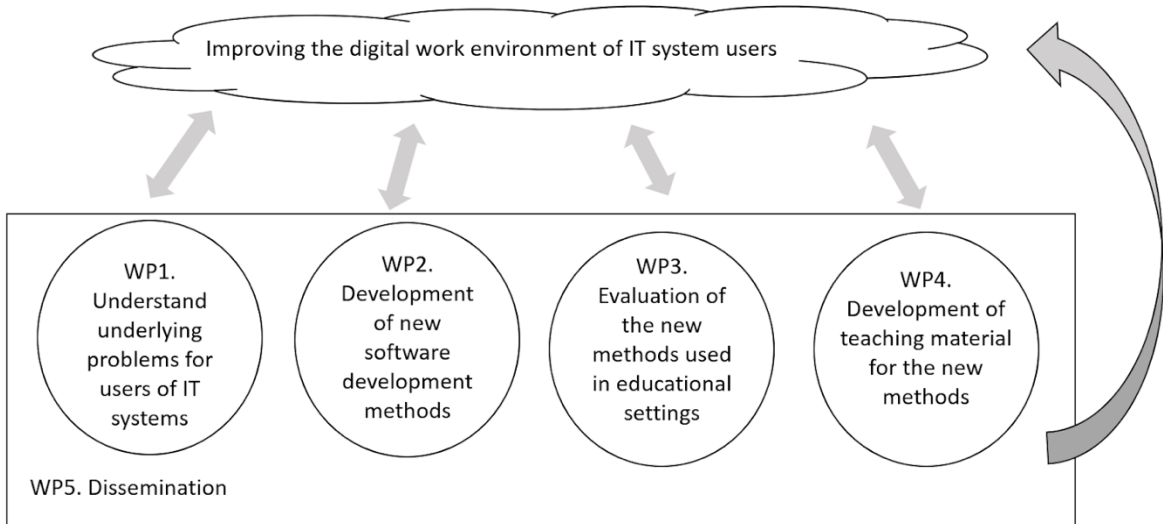## Sammanställning projektkostnader per år

Kostnadsspecifikation	År 1	År 2	År 3	År 4	Summa (kr)
Lönekostnader	0	0	0	2 417 000	2 417 000
Indirekta kostnader	0	0	0	846 000	846 000
Material och utrustning	0	0	0	25 000	25 000
Resekostnader	0	0	0	240 000	240 000
Kostnader för spridning av resultatet	0	0	0	0	0
Övriga kostnader	0	0	0	150 000	150 000
Totalt	0	0	0	3 678 000	3 678 000

Bilagor

Följande bilagor har laddats upp i ansökan

Figure 1. The overall goal of the project and the work packages. - Figure .pdf

Publikationer och spridning av resultat - Publications.pdf

Improving the digital work environment of IT system users

WP1.
Understand underlying problems for users of IT systems

WP2.
Development of new software development methods

WP3.
Evaluation of the new methods used in educational settings

WP4.
Development of teaching material for the new methods

WP5. Dissemination

Publications, presentations and other dissemination within the project

Scientific publications with peer review

In the field of human-computer interaction, conference publications are valued as highly as journal articles and conference publications can be included in dissertations. The conferences in the field have traditional peer review and only 25-30% are accepted when submitted. A paper published at a conference cannot later be used in a journal.

SP1. Cajander, Å., Larusdottir, M., Hedström, G. (2020). The Effects of Automation of a Patient-Centric Service in Primary Care on the Work Engagement and Exhaustion of Nurses. Quality and User Experience.

SP2. Cajander, Å., Hedström, G., Leijon, S., & Larusdottir, M. (2021). Professional decision making with digitalisation of patient contacts in a medical advice setting: a qualitative study of a pilot project with a chat programme in Sweden. BMJ open, 11(12), e054103.

SP3. Cajander, Å., Larusdottir, M., Lind, T., & Stadin, M. (2023). Experiences of Extensive User Involvement through Vision Seminars in a Large IT Project. Interacting with Computers.

SP4. Geiser, J., Cajander, Å., Larusdottir, M. (2022): UX Professionals' Learning and Usage of UX Methods in Agile, Journal of Systems and Software.

SP5. Lárusdóttir, M., Wang, R., & Cajander, Å. (2022). Describing Digital Work Environment Through Contextual Personas. Bookchapter in Ardito, C., et al. (Eds.): Sense, Feel, Design: INTERACT 2021 IFIP TC 13 Workshops, Bari, Italy, August 30–September 3, 2021, Revised Selected Papers (Vol. 13198). Springer Nature.

SP6. Nauwerck, G., Cajander, Å. (2019). Automatic for the people. Robotic Process Automation in Social Work - Challenges and Benefits. European Conference of Computer Supported Cooperative Work 2019.

SP7. Stadin, M., Cajander, Å., Hedtström, G. (2022). A Scoping Review about Robotics, Artificial Intelligence and Occupational Health in Healthcare Professionals' – What is Known and What is Unknown (In progress, will be submitted in 2024)

SP8. Wang, R., Larusdottir, M., & Cajander, Å. (2021). Describing Digital Work Environment Through Contextual Personas. In WG13.2 Workshop proceedings INTERACT 2021.

SP9. Larusdottir, M., Cajander, Å., Wang, R. (2024). Contextual Think Aloud: A Method for Understanding Users and Their Digital Work Environment - Short/Workshop paper. NordiCHI 2024. (In progress, will be submitted in 2024)

SP10. Larusdottir, M., Cajander, Å. (2024). Evolving User-Centered Design Methods by Addressing the Digital Work Environment. Interacting with Computers. (Abstract accepted, full paper will be submitted in May 2024)

Book Chapters with peer review

BC1. Larusdottir, M., Cajander, Å, Roto, V. (2022) Development processes for engineering Interactive Systems. Bookchapter in Handbook of Human Computer Interaction.

BC2. Larusdottir, M., Cajander, Å., Ruochen, W. (2023). Digitalisation and the Work Environment: Insights from Evaluating the Contextual Think-Aloud Method, Bookchapter in Bramwell-Dicks, A., et al. (Eds.): Design for Equality and Justice: INTERACT 2023 IFIP Workshops Selected Papers, York, UK, August 28–September 1, 2023. Springer Nature.

BC3. Salminen Karlsson, M. Golay, D., Cajander, Å. (2020). Den digitala arbetsmiljön inom hälso- och sjukvården. Book chapter in a text book: Medicinsk informatik. Liber.

Reports

R1. Cajander, Å., Larusdottir, M. och Hedström G. (2020) Digital arbetsmiljö och projektet Nära vård online. Teknisk rapport nr 2020-001. http://www.it.uu.se/research/publications/reports/2020-001/

R2. Wang, Ruochen (2020): Principles and Guidelines for Using Contextual Persona Method and Contextual Think-Aloud Method, Report concluding MDI Advanced Level Internship project (15 ECTS), Uppsala University

Master theses

M1. Geiser, J. (2020). How do UX Professionals Apply UX Methods and Practice Lifelong Learning? Master thesis. https://bit.ly/3xuNygA

M2. Leijon, S. (2020). Digital patientkontakt: - hur påverkas sjukvårdspersonal avseende bedömningar, beslut och yrkesmässigt omdöme?. Master thesis. https://bit.ly/3dWLjLq

M3. Wang, Ruochen (2021): Empirical Evaluation of Using Contextual Methods to Describe Digital Work Environment: Survey Study at Reykjavik University, Master thesis. http://uu.diva-portal.org/smash/record.jsf?pid=diva2:1573520

Webinars, Seminars, Keynotes, and Presentations

1.   The www.ucdsprint.com website contains descriptions of the methods of Contextual Personas and Contextual Think Aloud.

2.   Åsa Cajander was a keynote speaker at a conference organized by the City of Stockholm on November 22, 2019. The presentation focused on workplace environment and digitization. https://om.events/kompetensforsorjning-22-nov/

3.   Marta Larusdottir presented for the "Women in Design - Reykjavik" group on November 28, 2019. The presentation focused on users in the Google Design Sprint process. https://www.facebook.com/events/518141762105217/.

4.   Åsa Cajander presented the study on patient services and staff's working environment at a conference with Region Uppsala on February 14, 2020. Approximately 60-80 people attended the conference.

5.   Marta Larusdottir presented at the "Women in Data Science" conference organized by Reykjavik University on March 2, 2020. The presentation was about user-centered development. https://www.ru.is/haskolinn/vidburdir-hr/lidnir-vidburdir/konur-i-upplysingataekni

6.   We presented at Vitalis 2020 and will present the study on 1177 under the title: "Digital Workplace Environment in Healthcare." The conference was moved to August 2020 due to Covid-19. https://vitalis.nu/hem/konferens/konferensteman-vitalis/

7.   Åsa Cajander was supposed to be a keynote speaker at the Uppsala Public Management Seminar. The presentation was about workplace environment and digitization on March 18, 2020. It was canceled due to Covid-19. https://www.uppdragsutbildning.uu.se/digitalAssets/841/c_841934-l_3-k_program-upms-2020.pdf

8.   Åsa Cajander was supposed to be a keynote speaker and panelist at the NAPSA paper conference on social work on March 12-13, 2020. The presentation was about workplace environment and digitization. It was canceled due to Covid-19. https://www.napsa2020.se/

9.   Åsa Cajander was supposed to give a presentation on STRIA to HR specialists and HR generalists at Uppsala University's HR department during their internal conference on May 12, 2020. The presentation was about workplace environment and digitization. It was canceled due to Covid-19.

10.   Marta Larusdottir presented at the "Klarspråk 2020" conference organized by the Institute for Language and Folklore on November 19-20, 2020. The presentation was about speaking the language of users. https://www.youtube.com/watch?v=Mz2TjIPvhKw

11.   Åsa Cajander presented the study at 1177 during a networking event with the "Swedish Collaboration on Digital Care Research" in March 2021. Read more here: https://digitalcareresearch.se/2021/01/18/19e-februari-2021-lunchwebbinarium-kl-12-45-13-00/

12.   Åsa Cajander was interviewed in a podcast organized by UU Innovation called "Kvartssamtal med UU innovation" about her work as a researcher and collaboration: https://www.uuinnovation.uu.se/aktuellt/?tarContentId=899238

13.   Magdalena Stadin presented at the digital conference "AI for HR and Managers" organized by Arbetsmiljöforum on March 23, 2022. The presentation was about AI, robotics, and workplace environment.

14.   Magdalena Stadin presented at Siemens Energy AB in Finspång on April 28, 2022, during their workplace environment day. The presentation was about AI, robotics, and workplace environment.

15.   Magdalena Stadin presented and participated in a panel discussion at the Department of Occupational and Environmental Medicine's spring meeting in Uppsala on May 12, 2022. The presentation was about AI, robotics, and workplace environment.

16.   Åsa Cajander participated in Prevent's anniversary with a short recorded film in May 2022.

17.   Åsa Cajander participated in Prevent's workplace environment podcast and discussed digitization and workplace environment in May 2022. https://preventpodd.libsyn.com/28-dina-it-system-hjlp-eller-stjlp

18.   Åsa Cajander recorded a short film called "Jobbsnackis" for Prevent, which focused on digitization and usability issues in May 2022. https://www.prevent.se/jobba-med-arbetsmiljo/osa/jobbsnackisar/jobbsnackis-asa-cajander/

19.   Magdalena Stadin presented and participated in a panel discussion called 'AI och arbetsmiljö – Vad vet vi?'. Organiserat av Work, Employment and Research Center (WE), Göteborgs universitet in June 2022.

20.   Magdalena Stadin presented at an occupational health conference in Sigtuna. The presentation was about AI, robotisation and the work environment. October 2022.

21.   Magdalena Stadin participated in a podcast episode about digital stress in the podcast 'Jobb 360' available at Spotify, Podcaster and Acast. Recorded in October 2022.

22.   Magdalena Stadin participated in a podcast episode about AI and the work environment and labour market, in the podcast 'The Employer Branding Geek' available at Spotify. Recorded in November 2022.

23.   Podcast episode UpTalk Weekly (Uppsala University): https://www.youtube.com/watch?v=-cNx99XGw4U&list=PL4Xuwfw4Q6Dbw3FwMyDGIl8

24.   Podcast episode Uppsala University central: https://www.uu.se/nyheter/artikel/?id=20448&typ=artikel&lang=sv

25.   Åsa Cajander participated in Prevent's webinar on AI and automation in 2023. https://www.prevent.se/om-prevent/evenemang/webbinarier/ai-och-automatisering/

26.   Åsa Cajander presented at Gilla Jobbet 2023. https://gillajobbet.se/filmer/artificiell-intelligens-automatisering-och-arbetsmiljo-asa-cajander/

27.   Åsa Cajander participated in Unionen Fokus, a digital event for Unionen members in 2023. Webinar. https://play.unionen.se/88d6a5cb-1339-45ac-8415-351e718fb2bd

28.   Åsa Cajander presented at Vitalis 2023. Title: Den digitala arbetmiljön inom hälso och sjukvården - hur ser den ut idag och hur kan vi jobba för att det ska bli bättre imorgon?

29.   Magdalena Stadin presented and participated in a panel discussion about AI robotisation and the work environment at the conference Riks-P, Stockholm University in May 2023.

Courses for researchers and practitioners where the project results have been included

C1. Digitalization, Automation, AI and the Future Sustainable Work Environment. (2023, Uppsala and online)*.* Åsa Cajander och Magdalena Stadin and others have organised this course. This online course addresses the challenges of digitalisation, automation, AI, and robotics in the workplace, offering insights into user-centred design methods and their application in various sectors. Participants gained knowledge in the digital work environment, AI's impact on different sectors, and the design and evaluation of digital systems with a work environment perspective.
https://niva.org/course/digitalization-automation-ai-and-the-future-sustainable-work-environment/

C2. The UCD Sprint: Bringing Users Along to Sprint (2023, York, UK at the INTERACT 2023). Marta Larusdottir co-organised this course for practitioners and researchers. A process called the User-Centred Design (UCD) Sprint process has been suggested to support teams in exploring users' needs and the future usage of the software with the active involvement of users.
https://link.springer.com/chapter/10.1007/978-3-031-42293-5_19

C3. *The UCD Sprint: A Process for User-Centered Innovation.* (2023, Hamburg at the CHI conference). Marta Larusdottir co-organsied this course for practitioners and researchers. It was on a similar subject as C2. https://dl.acm.org/doi/abs/10.1145/3544549.3574176

C4. *Tutorial on UCD Sprint: Inclusive Process for Concept Design, (2022, Århus, Denmark, NordiCHI 22 conference)* Co-organised by Marta Larusdottir. A recently proposed method known as the User-Centred Design (UCD) Sprint process aims to assist teams in thoroughly exploring user needs and the future application of software, actively involving users in the process. This course provides an introduction to the UCD Sprint process, enabling participants to gain practical experience with two specific steps, all while considering the impact on the work environment. https://dl.acm.org/doi/abs/10.1145/3547522.3558901

C5. *Introduction to User-Centred Design Sprint. (2021, Bari, Italy and online at the INERACT conference)* The organisers were Marta Larusdottir, Virpi Roto and Åsa Cajander. It was given for practitioners and researchers to understand users and their needs while designing software for a particular work environment. This course provides an introduction to the UCD Sprint process, similar to courses C2, C3 and C4. https://link.springer.com/chapter/10.1007/978-3-030-85607-6_17

C6. *Experimental Interaction Design at Aalto University (2019, Helsinki).* The summer course for master students and PhD students was a collaboration between several partner universities, including Aalborg University, Aalto University, Reykjavik University, Tallinn University, and Uppsala University. Co-organised by Marta Larusdottir and Asa Cajander.This course introduces the UCD Sprint process, allowing participants to engage in hands-on practice with two of its key stages while considering the work environment. The course is explained in the following publication: https://link.springer.com/chapter/10.1007/978-3-030-85616-8_15

Artiklar i media, pressmeddelanden och bloggar

Over the first two years, we continuously blogged on www.htogroup.org and www.asacajander.se when we had relevant things to talk about. The blog has 400-800 readers per month. All blog posts have also been shared on Twitter and LinkedIn, where they have sparked discussions and reflections from others. Since the summer of 2022, we have been blogging at a new location: https://hto.blog.uu.se/, where we continuously discuss our research.

Johannes Geiser, who worked within the framework of the STRIA project, won an award for the best thesis and is interviewed here: https://ju.se/center/encell/kunskapsbank/reportage/reportage/2020-09-25-how-do-ux-professionals-apply-ux-methods-and-practice-lifelong-learning.html

We issued a press release about the study on 1177, which resulted in a number of media articles both based on the press release and from journalists who made contact:
1. https://www.forskning.se/2020/11/10/sa-har-chatten-pa-1177-forandrat-arbetsmiljon/
2. https://www.uu.se/nyheter/artikel/?id=15748&typ=artikel&lang=sv
3. https://www.voister.se/artikel/2020/11/1177-chatt-granskas/
4. https://www.prevent.se/arbetsliv/forskning/20202/sa-forandrar-chatt-arbetsmiljon-for-vardpersonal/
5. https://www.duochjobbet.se/arbetsmiljo/sa-paverkades-arbetsmiljon-av-chattandet/
6. https://telekomidag.se/studie-sa-paverkade-chatt-1177s-arbetsmiljo/

Tidningen Lag & Avtal och Arbetarskydd (juni 2023). Artikel.https://www.arbetarskydd.se/nyheter/ai-fralsare-eller-fiende/3687867

Allt om Arbetsmiljö, Ann Patmalnieks. 2023 https://alltomarbetsmiljo.se/nyheter/fa-vill-bli-trostade-av-en-ai

Arbetsllivsjournalisterna, Mats Utbult. 2023 https://arbetsmiljoforskning.se/forskning-sa-kan-nya-system-inforas/

Tidningen Arbetarskydd. 2023
https://www.arbetarskydd.se/nyhetsarkiv-ovriga-nyheter-robot/hur-mar-vi-nar-it-blir-en-kollega/1481124