Title page

Writer:	Louise Hedrich Haugaard

Degree:	Master's Program in Information Studies
Course:	Research Methodology
Semester:	9th semester, 2020
Date:	10th of February

Page count:	7,7
Number of characters incl. space:	18.591

Research methodology exam; Synopsis for Master Thesis 2020

By Louise Hedrich Haugaard

Introduction

This paper is based on the requested information from the exam-requirements such as academic background, methodological considerations and the field of interest in my upcoming thesis in the spring 2020. As I am currently in a dialogue with a possible case partner in order to find the specific case as well as the right angle on the case - it is still work in progress. The possible case partner that I am currently in dialog with is Janus Laust Thomsen, head of the Research Unit for General Practice. We are discussing two potential cases. The two cases presented by Janus is: 1) Use of artificial intelligence in general practices in order to reduce the doctors workload by automating processes and developing decision support, and 2) Using Virtual Reality to treat different phobias and the use of Virtual Reality as pain distribution. During this paper, I have chosen to only elaborate on the field of interest which is health technologies, but as both of the presented cases are going to be conducted in collaboration with other researchers, the details about methodology will not be absolutely concrete, as it depends on the collaboration with The Research Unit of General Practice as well as the methods they are using. My main purpose is to support The Research Unit of General Practice, in order to provide dem with a study that focuses on the users – and in this case the users are patients/doctors depending on what case I choose to work with.

1. The group members:

Louise Hedrich Haugaard, Gammel Viborgvej 60, 8471 Sabro

Email: lhauga15@student.aau.dk

Student number: 20153933

2. Project title:

As mentioned, this synopsis is in an early stage and the following title is therefore a preliminary project title. Furthermore, it is my experience that the project title often emerges during the process

and is more coherent with the content in a project, when the title is created later in the project phase.

Preliminary title: *"AI and Decision making – how AI can support doctors in their everyday work life"*

3. Knowledge resource group affiliation:

For my master thesis, I want to focus on the design and implementation of an IT solution that supports doctors in their everyday work life. I want to have a strong focus on user involvement throughout the entire process as I wish to understand and thereby empathize with potential users in order to create and develop an innovative and valuable solution. This is also one of the purposes of e-learning Lab (Aalborg University, n.d.). Furthermore, E-Learning lab is the group affiliation where most of our lectors throughout the master program is assigned to, as well as the requested supervisor.

Requested supervisor: Ann Bygholm

4. A description of the academic background of the project:

The thesis project is going to address the issue of involving end-users in the process of designing and developing an IT solution for general practices. I wish to work with a user centered design approach as described by Sanders (2008) as I have the goal of involving users as much as possible throughout the design process. However, some natural limitations can arise; It can be very time consuming to involve users several times during a design process and I am not sure at this point, how many resources the doctors involved are willing to put into the project. This means, that it will not be very difficult to approach the project with a full participatory approach, as this would require extensive user involvement and it would be necessary for me to involve the users as "design partners" throughout the design process (Sanders, 2008, p. 2).

To this I wish to include Elizabeth Sanders and Pieter Stappers' (2008) landscape of design to place my research within the user-centered design landscape. The map will thereby be used as a visual representation of my own placement in, and approach towards the field of user centered design and will be used to determine both my mindset and approach throughout the entire design and project process. Furthermore, the map can also be used to illustrate the methodological and theoretical approaches that I have regarding collecting user data and the map can thereby also help me limit the project's scope and focus. In addition to this, I want to apply Design Thinking as a way of "framing" my project in order to address the complex issues that I will be facing in the thesis process. Design thinking is described in various ways, but I intend to apply the five-stage process of design thinking as described by the Hasso Plattner Institute of Design at Stanford University: Emphasize, Define, Ideate, Prototype and Test (d.school). Design Thinking can help me with exploring ideas in a quick and efficient way and allows me to work in an iterative way. Furthermore, when applying design thinking with a human-centered approach and thereby include research, it can help capture unexpected insights and produce innovative products and services that reflects more precisely on what the user wants (Brown, 2008). It can also be helpful when I am to work with a "wicked problem". "A wicked problem" is a well-known description for a complex problem where there are no pre-set right or wrong answers and it is often difficult to determine when such a problem is solved (Buchanan, 1992). In one of my previous projects, we collaborated with Steno Diabetes Center, at Aalborg University hospital were my study group and I developed an application to children and young patients with diabetes. The main purpose with the design process were to investigate how an IT solution could support and empower the young diabetic patients and help them manage their disease in their everyday life. To this, the concept of patient empowerment was a large part of our focus, and especially the thought of empowering and helping users through the design. Development and implementation of IT is very interesting. Therefore, I aim to include relevant theories and base the project on a strong academic background in order to collaborate with The Research Unit of General Practice in order to present a solution the can support the doctors decision making in their everyday life – just as we aimed to support the children with diabetes in their everyday life. n the next section, I will present the problem and purpose of the project as well as why this case is relevant now.

5. The problem and purpose of this project:

In March 2019, the government launched a new national strategy for artificial intelligence. The vision is clear. Denmark must lead the way with responsible development and use of artificial intelligence (Regeringen - Finansministeriet og Erhvervsministeriet, 2019). The strategy sets up four tracks that characterize the Danish approach:

- Ethical basis with "humans" as center for focus
- Danish scientists must do research in the development of artificial intelligence
- Danish companies must achieve growth by developing and using artificial intelligence
- The public sector must use artificial intelligence to offer world-class service.

One of four prioritized focus areas are the health care sector - In the healthcare sector, artificial intelligence can, among other things, help doctors diagnose diseases faster, prioritize patients with the most urgent needs and contribute to better capacity utilization in hospitals (Regeringen - Finansministeriet og Erhvervsministeriet, 2019).

As mentioned before, I am going to be collaborating with Center for General Practice at Aalborg University. At Center for General Practice, they have an interdisciplinary research team that conducts studies and different types of research on both a national- and international level in the area of general practice, and they are divided into different research groups. I will be working in collaboration with the research group called "New Technologies" and as mentioned in the introduction, they have started a project about Artificial Intelligence and doctor's decision making. he project is already ongoing and are founded by The Danish Agency for Digitization. Right now, their main focus is on how to organize the incoming data and how to handle massive amounts of data in a safe and ethical manner. According to Janus Laust Thomsen, the next step in the project is, and what I find especially interesting, to find out *what* kind of information doctors need and *how* it should be displayed for them to safely make decisions without any doubts. It is my experience that IT solutions are often developed without involving the actual users of the system. When it comes to health care technology and especially when it comes to developing a tool that doctors base critical decisions on, I would say that it is very important to involve the different kind of users

as well as the context in which the system are going to be used in. Therefore, I see a clear need to identify needs and demands from the healthcare personnel in order to design and develop a tool that can help doctors diagnose and treat patients. I consider approaching the case with the purpose of investigating what kind of information the doctors need – what kind of data is relevant for them? How much data do they need?

Based on the above, I have formed the following preliminary problem formulation:

"How can AI support doctors in decision making, what sort of information should be collected and how should it be displayed in order for the doctors to safely make decisions regarding patients' health?"

5.1 Extensive fields of knowledge and theoretical frames of understanding:

Throughout the Master Program of information Studies, I have been introduced to various fields of knowledge and theoretical frameworks such as: Experimental Studies, Practice Theory as described by Nicolini (2012), Co-Designing (Sanders, 2008), User Innovation, Contextual Design (K. Holtzblatt. H. Beyer, 2016), System design and Agile Development, Interaction Design (Preece et al., 2015) including concepts such as user experience and usability.

My aim is to include theories and methods relevant and beneficial for the issue and field of knowledge that I want to address. As mentioned earlier, my goal is to approach the design process with a user centered mindset, in order to gain knowledge about the users' needs. Therefore, I find it relevant to include qualitative methods such as Contextual Inquiry as I want to design a solution for work context and thereby a work practice. Such method allows me to not only understand the user but also their context of system use.

Because I want to understand the problem from the user's point of view, I will need to include several of the mentioned methods and theories in order to carry out a study that is based on reliable and valuable data. The methodological considerations will be presented in the next section.

6. A description of the methodological considerations:

As mentioned in the beginning of this thesis proposal, I have not settled on my methodological approach nor the use of methods. What I do know is that I want to structure my thesis around the Design Thinking process and thereby use it at as "framework" for my design process. Therefore, in this section I will present some of the considerations I have in regard to which methods I will be applying throughout the data collection and data processing. All of the methods will be qualitative methods, as these allows me to gain deep and elaborating knowledge about the respondents. The methods the I have considered to apply in my upcoming thesis is the following

6.1 Interviews:

According to Preece, Rogers and Sharp (2015) interviews can be seen as a "conversation with a specific purpose" and it is therefore important to consider what kind of data I want to collect as a researcher, what purpose it has and what I want to focus on (Preece et al., 2015, p. 197).

In my upcoming thesis I would like to conduct two different kinds of interviews during the design process. Firstly, I would like to conduct interviews with my case partner In order to get a better understanding of the problem that I am addressing and thereby gain insight about Technology in the Danish Healthcare sector, ethical considerations and requirements from the Center for General Practice. Secondly, I would like to interview the future users of the system, as I wish to work user-centered and thereby wish to understand the users' needs and work practice. Interviewing a number of users, in this case doctors, in order to gain valuable knowledge that can be used for design decisions. A research interview can be on a continuum from a relatively unstructured interview with few planned questions to a very tightly structured interview with many steered questions from the interviewer. One must choose the interview form as the given research project demands. However, no research interviews are completely unstructured, as the conversation is always conducted based on the researcher's interest in gaining knowledge about something specific (Brinkmann & Tanggaard, 2015)

In order to both conduct interviews about specific topics that provides me with the opportunity to deviate from the questions, and ask elaboration questions, I am planning to conduct semi-structured interviews with both users and my case-partner. Semi-structured interviews are an interview form where the researcher has a list of pre-defined questions and specific topics that he/she want to be covered, but the method is flexible as the interviewee has a great deal of freedom regarding replying the questions. It also allows the researcher to pick up on the interviewees replies if anything needs to be elaborated or explained.

The goal for me as a researcher is not just about getting knowledge about the respondents' world - I want to implement technology into their everyday work context. Because of this, I need to learn more about that specific context and how the respondents act in it. For that I would like to apply Contextual Inquiry as a method for data gathering. The method will be described in the following section.

6.2 Contextual Inquiry:

I am also considering applying Contextual Inquiry as a method for data gathering, because I want to position myself within the context of the potential users. Contextual Inquiry is a part of the Contextual Design methodology as described by Beyer and Holtzblatt (2016) and is a method to systematically examine people, tasks, procedures and environment in their work context (Privitera, 2015). Contextual Inquiry as a method consists of the three following basic principles: *visit users, observe them as they perform focused activities and talk to them about what they do - while they do it* (Beyer & Holtzblatt, 2016b). Part of the method consists of conducting contextual interviews with people in their natural work context. Through these interviews, the interviewer observes ongoing work activities while and asks investigative questions along the way(H. Beyer & Holtzblatt, 2013). I want to conduct Contextual Inquiry where I follow the routines of a doctor in a general practice and explore how they normally make the decisions, how they interact with both patients and relevant systems, with the aim of gaining knowledge about their work life and potential issues that needs to be addressed in a future design. It is my assumption that contextual interview could be more beneficial than ordinary interviews, and Beyer and Holtzblatt also argues that the combination between interview and observation can help the interviewer gain a deeper understanding of the user and his or her domain, as the interviewer in this way can gain access to unarticulated knowledge, which may be difficult to capture otherwise (Berndt et al., 2015).

When the data is collected, the next step in the process is to process and analyze it, in order to get familiar and withdraw relevant knowledge from the dataset.

6.3 Coding:

For data processing, I am considering to code with inspiration from Graham Gibbs' thematic coding, as this type of coding offers systematic analysis of collected data and is a method for making sense in large amounts of qualitative data (Gibbs, 2007). Gibbs refers to two different kinds of coding; *concept-driven coding* and *data-driven coding* (Gibbs, 2007). Concept-driven coding is based on predefined categories that have been prepared in advance by the actual coding process. These categories may be based on literature and previous studies, but they may also be based on the analyst's own insights gained through data collection and observation (Gibbs, 2007). Data-driven

coding is when the researcher approaches the collected data with a complete open mind without any presumptions or pre-defined categories. As I most likely will have a certain focus for the data processing (identifying user needs,) I will not be able to approach the coding process totally open minded. However, as I wish to work as user centered as possible, I will strive to code as openly as I can.

7. Timeline for project-work:

In the schedule below, I have presented my timeframe for this thesis. The schedule is like the rest of this thesis preliminary, but it still provides an overview of how I aim to proceed and handle the different work activities during the thesis project.

ACTIVITY:	TIMELINE:	GOAL:
Concretizing thesis-topic	Feb 2019 – Mar 2020	To agree on a case with my case partner and thereby specify the topic so that is concrete and tangible for the thesis.
Literature review	Feb 2020 – Mar 2020	To find relevant literature and thereby gain knowledge about the topic and field of knowledge.
Planning data collection	Mar 2020 – mar 2020	Here is the main importance to focus on the data collection as this will be the foundation for the project and solution.
Conducting data collection	Mar 2020 – Apr 2020	Collecting all data.
Processing data	Mar 2020 – Apr 2020	Transcription of interviews, coding and analysis of data.
Ideation	Apr 2020	Ideate and define the solution based on the analysis
Requirement specifications	Apr 2020	Define and produce the solution requirements

Design (and development)	Apr 2020	Design the solution and create prototypes if possible
Test the solution	Apr 2020 – May 2020	Testing the solution with end users in order to make corrections (iterative process)
Conclusion	May 2020	Write a conclusion based on the entire design- and writing process, the analysis and the test of the design
Discussion	May 2020	Writing a discussion based on aspects that has been interesting, unclear or puzzling.
Hand in thesis	May 2020 – Jun 2020	Hand in thesis at May 24.

8. Literature list:

Aalborg University. (n.d.). *About e-Learning Lab*. Retrieved 9 February 2020, from

https://www.communication.aau.dk/research/knowledge_groups/e-learning-

lab/About+eLL/

Berndt, E., Furniss, D., & Blandford, A. (2015). Learning Contextual Inquiry and Distributed

Cognition: A case study on technology use in anaesthesia. *Cognition, Technology & Work*,

17(3), 431–449. https://doi.org/10.1007/s10111-014-0314-y

Beyer, H., & Holtzblatt, K. (2013). Chapter 8: Contextual Design. In *The Encyclopedia of Human-*

Computer Interaction, 2nd Ed. (pp. 419–465).

Beyer, K. Holtzblatt. H. (2016). *Contextual Design, 2nd Edition*. Morgan Kaufmann.

http://proquest.safaribooksonline.com/9780128011362

Brinkmann, S., & Tanggaard, L. (2015). Interviewet: Samtalen som forskningsmetode. In *Kvalitative*

metoder: En grundbog (pp. 29–53). Hans Reitzel.

Brown, T. (2008). Design Thinking. *Harvard Business Review*, 1–9.

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, *8*(2), 5.

https://doi.org/10.2307/1511637

Hasso Plattner Institute of Design. (2010). An Introduction to Design thinking: Process Guide.
Presented at the Hasso Plattner Institute of Design at Stanford University. Retrieved from
https://dschool-
old.stanford.edu/sandbox/groups/designresources/wiki/36873/attachments/74b3d/ModeG
uideBOOTCAMP2010L.pdf?sessionID=573efa71aea50503341224491c862e32f5edc0a9

Gibbs, G. (2007). *Analysing qualitative data*. SAGE.

Preece, J., Rogers, Y., & Sharp, H. (2015). *Interaction design: Beyond human-computer interaction*

(Fourth edition). Wiley.

Privitera, M. B. (2015). Chapter 1: Introduction to Contextual Inquiry. In *Contextual inquiry for*

medical device design (First edition, pp. 1–22). Elsevier/AP, Academic Press is an imprint of

Elsevier.

Regeringen - Finansministeriet og Erhvervsministeriet. (2019). *Strategi for kunstig intelligens* (pp.

5–61). https://www.regeringen.dk/media/6537/ai-strategi_web.pdf

Sanders, L. (2008). An evolving map of design practice and design research. *Interactions*, *15*(6), 13.

https://doi.org/10.1145/1409040.1409043