ELEC-D7010 Engineering for Humans 2020

Aalto University

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General instructions: This sheet contains 1) one Mandatory and 2) one Optional task. If you do any task -- remember that you do not need to attend all assignments in the course, you only need to collect minimum 40 assignment points in total by the end of the course -- you must start with the Mandatory. Prepare a separate PDF for every task that you submit. Submit each PDF to the corresponding Assignment in MyCourses. Pay attention to the quality of reporting: use full sentences and visual explanations when needed. Observe the submission deadline.

Note: All exercises are to be done on your own. Do not do them in pairs or groups. In cases of plagiarism, we will follow the policy of Aalto University. While we recommend talking with other students and learning from the Internet, exercise solutions must be executed individually and by the student only. The student must be ready to explain his/her solution when requested.

Assignment 4: Human-Centred Design

A4-1: Planning a Human-Centred Project (5+p) [MANDATORY]

Heads up! This is a hard, *open-ended* task, requiring you to make meaningful assumptions and explain them. You can only achieve this by familiarizing with the materials and the case. *Appreciating your efforts, extra points will be admitted to insightful or thorough reports.*

Context: Imagine leading a human factors team tasked with a hypothetical (but realistic) project in human-centred engineering: The redesign of a emergency medical dispatcher's workstation. "An emergency medical dispatcher is a professional telecommunicator,

tasked with the gathering of information related to medical emergencies, the provision of assistance and instructions by voice, prior to the arrival of emergency medical services (EMS), and the dispatching and support of EMS resources responding to an emergency call." (Wikipedia).

Goal: Your goal in this assignment is to select appropriate *methods* for the project. For example, "task analysis", "usability evaluation", "sketching", and "rapid prototyping" are methods. Different process models exploit and organize methods like these in different stages. You will need to propose what the *main stages* of the project are (e.g., user resarch, evaluation, analysis, etc) and propose one or more methods per each stage and justify their selection. Your proposal should convince the customer that this is an efficient and appropriate plan for the project.

Case brief: The goal of your hypothetical project is to propose *improvements* to an *existing* workstation at a medical dispatch operator. The proposed design should improve the productivity of a dispatcher (rate of dispatches) without compromising efficacy (accuracy of dispatches). Workstation here consists of the software and hardware user interface that the dispatcher uses. [You may want to make some assumptions about which parts your case will address.] The outcome of your project should be be a concept and a prototype implementation of the improved workstation. The customer also wants solid *evidence* for the solution, especially for its superiority over the pre-existing design.

Before moving on, read more about medical dispatch centers: https://en.wikipedia.org/wiki/Emergency_medical_dispatcher

Step 1: Picking a human-centred processes: The following videos and papers provide introductions to *different* human-centric design processes. You do **not** need to look at all of them: Look at a few that seem relevant and then focus on *one* and study it to the point that you can answer these questions: What are 1) the main stages, 2) their respective objectives, i.e. what each stage wants to achieve and 3) commonly used methods? Equipped with this knowledge, you can move on to the actual task (Step 2).

Donald Norman on human-centred design

https://www.youtube.com/watch?v=rmM0kRf8Dbk

Overview of the user-centred design process

https://www.youtube.com/watch?v=dKziavNRuis

Six popular user-centered design methods:

https://inviqa.com/blog/user-centred-design-6-popular-ucd-methods

Interaction design: Overview of design thinking

https://www.youtube.com/watch?v=pXtN4y3O35M

Engineering design process

https://www.youtube.com/watch?v=b0ISWaNoz-c

Service design: Customer journey and touch points

https://www.youtube.com/watch?v=mSxpVRo3BLg

Technology innovation: Ben Shneiderman on the ABC of success

https://www.youtube.com/watch?v=bR3p7oHVn2Q

Human-centred design process in safety-critical areas: A review

https://www.sciencedirect.com/science/article/pii/S1532046404001662

Step 2: Planning the stages and methods: You should plan which stages are needed and which methods to use at each stage why, such that the objectives stated in the brief can be met.

Step 3: Reporting: Your report should consist of four main parts:

1. **A verbal overview** of the case in your own words with further assumptions you have made about it.
2. **A diagram or table** with each stage in your process and the associated methods. Example: https://www.usability.gov/how-to-and-tools/resources/ucd-map.html
3. **A verbal justification** for the chosen methods.
4. **A verbal assessment**: Assess the pros and cons of your approach, as you now see them.

Target length is about 2-3 pages.

Tips: Note that you are not expected to actually design anything, only give a proposal for and reasoned account of which methods should be used. It is fine to propose well-known ('obvious') methods like usability testing etc.

A4-2: Levels of Automation (5 p) [OPTIONAL]

Preparation: Refresh your memory of the levels of automation (LoA) framework from the slides and, if needed, from the paper in MyCourses (> Readings > Parasuraman 2010). LoA is a conceptual tool for both analysing existing systems and ideating alternative levels. A large number of empirical studies has been carried out to understand the right automation level for different contexts.

Choice of device and task: Choose a device *with some automation* that you use or have used. Choose a common user task carried out with the device.

Your task is to analyze the levels of automation the device uses for this task, breaking it down based on the four temporal stages: 1) information acquisition, 2) information analysis, 3) decision selection, and 4) action implementation, as shown in the lecture. Tell what the pros and cons of this design is and speculate what might a better level of automation for this task.

Report: In your written report: 1) report the device and user task with a photo/screenshot; 2) Provide a diagram for the 4 stages and a written description of the associated stages; 3) Assess what might be the pros and cons of this level of automation; 4) Speculate what happened if the level of automation was raised: To which level and with which consequences? 5) What do you think is the best level of automation and why?