ELEC-D7010 Engineering for Humans 2020

Aalto University

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General instructions: There are 1) one Mandatory and 2) two Optional tasks in this assignment sheet. 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. *If* you do an Optional task, which I recommend, you can choose which one to do; you can also do both. 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.

A3-1: Hierarchical Task Analysis (5 p) [MANDATORY]

Preparation:

Refresh your memory of HTA from the slides and e.g. from:

https://www.interaction-design.org/literature/article/task-analysis-a-ux-designer-s-best-friend?utm_source=webgains&utm_medium=banner

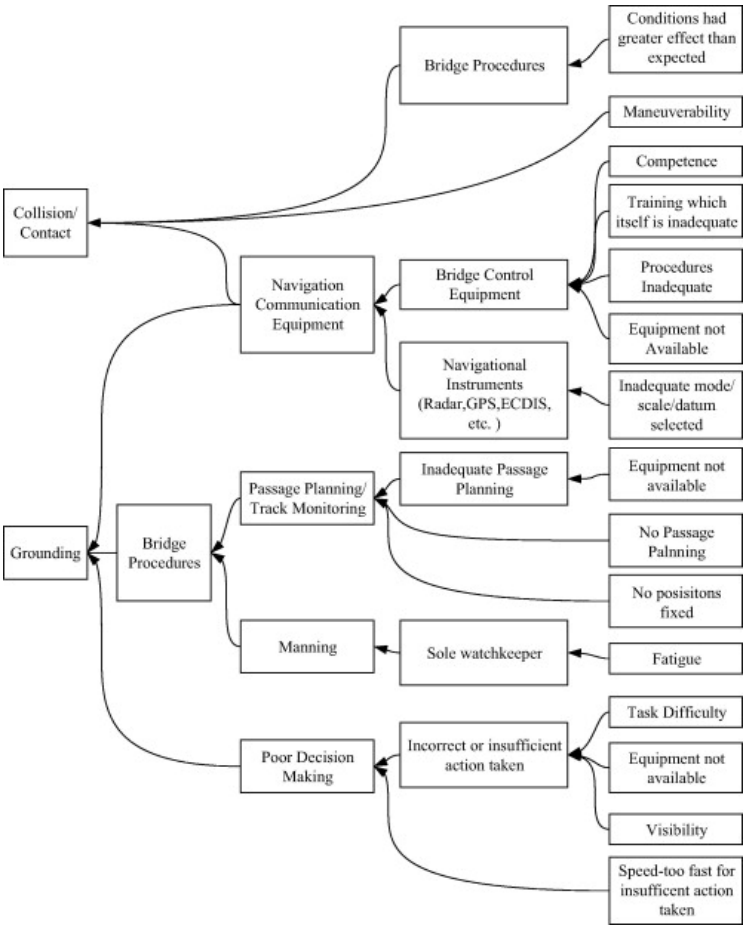
I also offer two optional readings to deepen understanding (in My

Choice of user interface: Choose a device, the common name of which starts with the fourth letter of your last name. For example: Oulasvirta --> augmented reality selection menu. If this is impossible, take the third letter etcetera.

Your task is provide HTA diagram for one *common* user task carried out with the chosen UI. Minimum depth of the tree: 2, maximum: 4.

Tip: It suffices to focus on sequences and hierarchies (i.e,. no need to express Plans) in the HTA. Pay attention to subtasks and how you define them (see slides)! For visually clean diagrams, I recommend using e.g. www.draw.io

Report: In your written report: 1) present the UI visually, 2) describe the user task verbally, and 3) present the HTA. 4) Conclude what you learned about the UI by doing the HTA. Your report will be graded based on correct understanding of HTA, especially the notions of subtask, sequence, and hierarchy. Show your understanding of this method in #4 (conclusion) by making statements about the design and interaction based on your analysis.



Example: Fault tree diagram from a marine accident

A3.2: Root Cause Analysis (5 p) [OPTIONAL]

Preparation: First read about root cause analysis by reading one of the articles on RCA in MyCourses (Readings). Then familiarize with the *fault tree notation*:

http://www.conceptdraw.com/How-To-Guide/visual-root-cause-analysis-problem-analysis-and-solving

Then read about general guidance for accident analysis:

https://www.ccohs.ca/oshanswers/hsprograms/investig.html

Tip: You can alternatively use other representations of RCA, such as the fishbone diagram, if you believe that they better match with your case.

Choice of accident case: The Boeing 737 MAX case. Please keep in mind that this article is not a full-fledged accident report. Some stated causes are hypothetical and some details are missing.

https://spectrum.ieee.org/aerospace/aviation/how-the-boeing-737-max-disaster-looks-to-a-software-developer

Your task is to analyze the root cause of the accident and summarize it using the fault tree diagram representation. The challenge is to summarize the primary, secondary, and tertiary causes of the report in a single diagram adequately and truthfully.

Report: In your written report: 1) summarize the accident in your own words, briefly, and provide a visual illustration; 2) summarize the main findings given in the article; 3) then tell how you approached the RCA task: which parts of the article and which auxiliary data did you use and how; 4) report the RCA diagram (one page maximum size); 5) conclude with a summary of the root causes. Your report is evaluated based on how well the diagram matches the original article.

A3.3: Accident analysis using SRK (5 p) [OPTIONAL]

Preparation:

1. Familiarize with the repository of NTSB (National Transportation Safety Board) accident reports:

https://www.ntsb.gov/investigations/AccidentReports/Pages/AccidentReports.aspx

You can alternatively use the Finnish safety board's site (some cases in Finnish):

http://www.turvallisuustutkinta.fi/fi/index/tutkintaselostukset.html

2. Familiarize with the definitions of S, R, and K in the Rasmussen model:

https://en.wikipedia.org/wiki/Ecological_interface_design

Choice of case: Use the site / search engine of point #1 above to find any accident that (1) you find interesting -- from any domain listed in the site -- and (2) that involved *human error*. Open the PDF-formatted report associated with the accident.

Your task is to provide a breakdown of the Skills, Rules, and Knowledge -level problems that could potentially explain the involved error. Depending on what the report says, this may need to be more or less speculative. It is fine to speculate about multiple differnet causes.

Report: In your written report: 1) provide a reference to the case file; 2) give a verbal summary of the accident and 3) rephase how human error was involved; 4) provide a breakdown of possible error mechanims according to the SRK taxonomy. 5) Suggest improvements to technology that might have mitigated or eliminated this error. Your report is graded mainly based on adequate understanding of the SRK model as demonstrated in the breakdown.