Human-computer interaction – examination

Course Code: TDA286, TDA460, INL040, TDA287
Date: 06-10-23
Time: 8.30-12.30
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Please answer in English. Only if you have difficulties with English, may you mix your answers with Swedish.

The examination can give a maximum of 100 points. You need at least 50 points to pass the examination (G). Max points per question are indicated after each question.

Please give brief/short answer to the questions and make sure to motivation your answers where appropriate.

How many HCI lectures have you attended in total? ____________ (this will not affect the final score you get from your examination.)
1. **Interactive system design**

There are four important subjects that contribute to the interactive systems design: people, technologies, activities and context.

a. Now you are asked to re-design the Chalmers website for helping students looking for lecture time and location. Please give a short PACT analysis. (6p)

b. People use technologies to undertake activities in contexts. If the technology is changed then the nature of the activities will also change. If the speech technology was perfect and Chalmers University installed a dialog system that can provide the above service via the telephone system, how the nature of the activities may change? (4p):

(Total 10 points)

2. **Human cognition**

Chris Wickens has provided a famous theory about Human information processing (please notice here that it is not the model provided by Norman as in the text book). The theory includes sensory store, perception, working memory, long-term memory, attention, response execution, output and feedback loop.

a. Give a short description (with drawing) about how the different aspects (listed above) related to each other. (3p)

b. What is working memory? What is long term-memory? How do they relate to each other? (3p)

c. What is attention? What kind of role does it play during human information processing? Can you give examples to explain what is meant by focus-attention and what is divided-attention? (4p)

d. People can perceive the same information differently, what kind of factors affect human information perception? (2p)

(Total 12 points)

3. **Usability evaluation methods**

a. Most mobile phones in the market are not designed for elderly people to use. Now, you are asked to design one for elderly users who are over 70 to be able to use easily. How will you start? What kind of methods will you use for requirement analysis? Why? (3p)

b. After the requirement analysis, you made some paper prototype and will evaluate the usability aspect of your design, what kind of methods would you like to use? Why? (3p)

c. Now we assume that your design has been accepted by Ericsson and they made a first full scale prototype and would like you to make the usability evaluation before the mass production started. How would you like to perform the usability evaluation? Why? (4p)

(Total 10 points)
4. **Interaction design basics**
   a. Successful designers must be able to go beyond the intuitive judgments and look for helpful guidance. Such guidance is available in the forms of guidelines, principles and theories. Explain the differences between design guidelines, principles and theories. Provide one example for each of them (5p)
   
   b. A HCI theory normal served for at least one of the purposes: explanation or prediction. Norman’s seven-stage model is a good example. How to use this theory to explain and predict the usability problem in a design? (5p)

   (Total 10 points)

5. **Design process**
   a. Iterative design processes are commonly used for interactive systems development. How is iterative design processes performed in the development? (3p)
   
   b. Why it is so important to carry out the usability evaluation as early as possible in the design process? (2p)
   
   c. What makes the differences between ethnographic observation and normal observation? (2p)
   
   d. To create a user scenarios is important in the design process, why? (3p)

   (Total 10 points)

6. **Research methodologies**
   One publication company would like to study how the text style, size and line space affect people’s reading speed. Their books cover a big range of reader population from school children to elderly people. A lab experiment was carried out. The experimenters selected 3 different text styles, 4 different text sizes and 3 different line spaces to test. They divided the readers’ age into four groups, 9 to 12, 20 to 40, 50 to 60 and 70 to 80. They got 8 subjects from each age group to participate the tests. The same length of texts (but with different stories) for each group were printed with different styles, text sizes and line spaces according to the test conditions and asked each subject to read them and their reading speed was recorded. After each reading, the subject was asked to answer some subjective questions.
   
   a. What are the hypotheses for this study? (2p)
   
   b. What are the independent variables and dependent variables? (4p)
   
   c. In this study, they used mixed within-group (subject) design and between-group (subject) design. Which part is within subject design and which part is between subject design? (4p)

   (Total 10 points)

7. **Task analysis**
a. Do an **HTA analysis** of the following design (5p):

*Stockholm is an international city with many foreign visitors every year. The government would like to design a user friendly subway automatic ticket selling machine.*

b. Now, make a **GOMS analysis**. What differences are between these two methods? (5p)

(Total 10 points)

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8. **Multimodal interaction**

a. What are the design principles for **Universal design**? (3p)

b. **Multimodal interaction design** provides the possibility to access information through more than one modality. Why this is interesting? (3p)

c. Speech interface normally include two technologies: automatic speech recognition and speech synthesis. Why is speech technology so important in multimodal interaction design, even for normal users? What can be the possible advantages and disadvantages when designing a speech interactive system? (4p)

(Total 10 points)

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9. **Social-organizational issue**

a. Analysis of stakeholders is an important step for the usability design. What is a stakeholder? What kind of aspects of the stakeholders do we need to analyze before designing a system? Why is stakeholder analysis important for a system design? (6p)

b. Use internet bank system as example to explain the categories of the stakeholders, (4p)

(Total 10 points)

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10. **Collaboration and groupware**

a. Write down at least 6 of the eight challengers that Grudin has listed. (4p)

b. How would you understand the cooperation? (2p)

c. What is social norm? (2p)

(Total 8 points)

************************************************** Total 100 points

Below are the selected questions that you don’t have to answer. But if you are not sure of your answers to some of the questions above and you still wish to pass the examination, or get higher score, you may take chance by answering the following questions. If the score you get from any of the following questions is higher then one of above questions, the score from the higher ones will be counted into your final score.

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10. **Ubiquitous computing**

a. What does ubiquitous computing mean? Give an example (2p)
b. What does augmented reality mean? Give an example (2p)
c. Give short explanation about activity theory (6p)
(Total 10 points)

11. Usability evaluations

a. Nowadays, the mobile phones are used not only for making phone calls, but also can be used as digital camera, mp3 and walkman, etc. One can access internet and play games on it as well. For such kind of product, how can you evaluate its usability? (3p)

a. What are the usability requirements for such an advanced mobile phone? (3p)
b. How would you plan the laboratory evaluation process for such products? (4p).
(Total 10 points)