PV182: Topics for written exam /Autumn 2018

Note:
The following questions cover most of the topics presented in lectures. However, the written exam will not contain the exact copies of these questions. Expect the variations and supplementary examples to be critisized. You may be asked to denote the problematic places at sreenshots. Some questions may/will be formed as a part of complex question or as a cross-combination of the related questions/topics.

Introduction

Why is it important to consider product usability in a project? Which informatics professions make use of usability engineering ?

What are typical errors in completed design that did not take into account the principles of usability ? Comment, give an example from practise.

UI design is based on the following principles:
- understanding users and their tasks
- participatory design
- design of visual interfaces
- design principles based on heuristics and recommendations

Explain these issues and sketch related techniques and theoretical foundations.

Task and user centered design

Task centered system design concerns with end-user perspective. Explain the phases: identification, requirements, design, walkthrough evaluation. State the goals of each phase and what techniques are suitable to achieve them.

How would you identify real users of a system and their tasks ? Discuss approaches when users and tasks already exist and when not (will arise in future)

What properties must have good task examples ? What facts are recorded and what is described ?

Characterize evaluation of design using walk-throughs. What is input for the walk-through, what properties are tested and evaluated ? Describe the process of evaluation.

Explain and argument the main differences between goal oriented design and task oriented design.

For a given application find 3 typical users. Create their description and name their typical (different) tasks. Clasify the priority.

High level models of human-computer interaction

Schneiderman model of interaction distinguishes semantic and syntactic knowledge. Which usability problems are related to syntactic knowledge ?

Schneiderman model of interaction distinguishes semantic and syntactic knowledge. Which usability problems are related to the semantic knowledge of computer concepts and task concepts ? Characterize mapping problems.

In a simplified Norman model we consider 4 stages of interaction (intention, selection, execution, evaluation). Explain these stages and their interrelations when performing a task.

4-stages model Norman identifies gulfs of execution and evaluation. Explain these issues.

4-stages Norman model supports design solution by raising and considering questions on *visibility, quality of conceptual model, good mappings a high-quality feedback*. Explain, comment, give examples.

User centered design

Explain the difference between *system-centered* and *user-centered design*.

What is *participatory design*, positives and negatives.

Methods for involving a user - explaining design, visualization, sketching and prototyping. Describe these techniques and their usage in early and late design stages.

Explain the following attributes of sketches in the design process: *quick, timely, disposable, plentiful, clear vocabulary, constrained resolution, consistency with state, suggesting and exploring.*

When designing we use prototypes with a constrained functionality (horizontal, vertical, scenarios). Explain the differences and usage.

Evaluating interfaces with users

Evaluating interfaces with users is applied in all stages of project lifecycle. What are the main goals in following stages: *pre-design, initial design, iterative design, acceptance testing* ?

What are the differences between naturalistic and experimental approaches to evaluation ? Explain tradeoffs and external and internal validity of testing.

Usability evaluation applies low cost methods, such as inspection, extracting the conceptual model, observation, query techniques and continuous evaluation. Characterize these techniques and discuss pros and cons.

Explain the basic ethic principles before testing: *user's time, comfort, privacy, informing, volunteering.*

Explain the basic ethic principles during testing: *user's time, comfort, privacy.*

Explain the basic ethic principles after testing: *comfort, privacy, informing.*

Evaluation - Controlled experiments

Controlled experiment focuses on: *hypothesis, measurement, confidence, replicability, control of variables and conditions, unbiased execution*. Comment and explain the issues.

Four scales of measurement are nominal, ordinal, interval, ratio. Explain briefly, give examples and consider the possible sources of errors.

The following concepts are important for designing:
perceived affordances, causality, visible constraints, mapping, transfer effects, idioms & population stereotypes, conceptual models, individual differences, difficulty of design. Explain the selected concepts, provide positive and negative examples.

Information representation and visualization

Visual variable attributes are: *position, size, shape, value, orientation, color, texture, motion*. The attributes may be *selective, associative, quantitative, order, length*. Comment these characteristics for the selected attributes.

The snapshots of a given application contain visual variables with specific attributes. Mark these attributes and asses the characteristics they express.

Metaphors

What are interface metaphors, theirs purpose and possible problems ? Comment emotional coloring, possible restrictions, typical errors of metaphors' usage.

Explain "*interface with direct manipulation*" and related issues *visibility, reversible and incremental actions, pointing and moving, continuous display*. Provide an example of direct manipulation interface and comment where, and in what form are these notions used.

Screen design can be guided by CRAP (contrast, repetition, alignment, proximity). What these principles enforce and guarantee ? Show their application on a given screen snapshot.

CRAP (contrast, repetition, alignment, proximity) may be supported by grids. Compare given screen snapshots and criticize the design using CRAP&grid principles.

Cognitive models

Describe a general model of human processing of external information. Explain the cooperation of *perceptual, cognitive and motor systems* during interaction. Discuss how the parameters *memory capacity, decay, representation and processing cycle time* influence interaction. Explain the model with a given example.

Reaction time is closely related to decision-making. What are the factors influencing decision time ? Explain Hick-Hyman law of reaction time.

Explain Fitt's law, give examples.

Compare KLM and GOMS models. Comment their usage in practice.

Interaction in VE

Characterize manipulation techniques according metaphor:
Exocentric m. – WIM, automatic scaling
Egocentric m. – Virtual hand (classical, GoGo,…)
                   – Virtual pointer (ray casting, aperture, flash light, image plane)
What are advantages and disadvantages of selected methods when used for close and distant manipulation ?

Heuristic evaluation

For evaluating interfaces various criteria may be used, such as following heuristics:
- simple and natural dialog
- user's language
- minimization of memory load
- consistency
- feedback
- clearly marked exits
- shortcuts
- positive error solution
- offered help

Evaluate a selected application given several screen snapshots.

Brain Computer Interfaces

What are brain computer interfaces?

What is the electroencephalogram?   What are the main principles of EEG? What is the 10-20 system?

What are the three main types of EEG-based BCIs?

What is BCI illiteracy and how to improve it?

Mention some case studies that BCIs can be used for HCI.