National Exams May 2014

04-Soft-B2, User Interface

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.

2. This is a CLOSED BOOK EXAM.
   Any non-communicating calculator is permitted.

3. TEN (10) questions constitute a complete exam paper

   FIVE (5) questions from PART A
   FIVE (5) questions from PART B

   The first ten questions as they appear in the answer book will be marked.

4. Each question is of equal value.

5. Most questions require an answer in essay format. Clarity and organization of the answer are important.

PART A: ANSWER FIVE OUT OF THE NINE QUESTIONS – EACH QUESTION IS WORTH TEN (10) MARKS

Question 1

Human information processing theory explains how cognition happens in the brain. The processes include, attention, perception, short-term/working memory, long-term memory.

A. What is short-term/working memory? What is long term-memory? Name two user interface design implications related to human memory and explain why you think they are important.

B. What is attention? What kind of role it plays during human information processing? Name two user interface implications related to attention and explain why you think they are important.

Question 2

Mental Models and Interface Metaphors

A. What is a mental model? Why mental models are important to consider when designing user interfaces?

B. Define what is meant by an interface metaphor. Provide one example.

C. What are some of the relationships between mental models and interface metaphors? In your answer, discuss the pros and cons of using interface metaphors to design user interfaces.

Question 3

The designer of a user interface needs two kinds of knowledge. One kind is specific to the system being designed; the other is general design knowledge.

A. An example of the former kind is knowledge of users. Name four user characteristics which a designer would want to find out about when designing a user interface. Explain the relevance of each characteristic.

B. Besides knowledge of users, give two more areas of knowledge that are important to a designer of a user interface. Explain the relevance of each area.

Question 4

When doing several iterations of a user interface design and testing, is it better to go to the same users or find new ones? Give some reasons why using the same users would be a good idea, and some reasons why it would not be.

Question 5

Prototyping is a valuable tool to ensure useful and usable design results.

A. What is a prototype? Give two reasons for using prototypes in interactive design.

B. What are key differences between low-fidelity prototypes and high-fidelity prototypes? What are key differences between horizontal prototypes and vertical prototypes?

C. Briefly describe the Wizard of Oz prototyping technique. Give one advantage and one limitation of using this technique to prototype a user interface.

Question 6

You are working as a user interface designer for a software engineering company. The product manager in your team is a strong advocate for persona-based design. She is asking you to incorporate persona-based design to the current User-Centered Design (UCD) lifecycle used within your group.

A. What are the pros and cons of persona-based design?

B. Briefly describe how you would put together a persona? At which stage(s) of the UCD process would your personas be created? At which stage(s) of the UCD process would your personas be used?

Question 7

Describe and compare laboratory studies with field studies as methods for conducting user interface evaluation (usability testing). In your answer, point out the differences between a laboratory study and a field study and explain the pro and cons of each approach.

Question 8

A. Explain what do usability specialists mean by "triangulation" when gathering data (e.g., users and requirements data or usability data).

B. What needs to be true, as a group, about the chosen data gathering methods in order for triangulation to actually work?

Question 9

Design principles are simple design rules that should be considered when designing user interfaces. Describe the following three design principles and explain how they relate to the design of user interfaces.

Visibility   **Affordances**   **Feedback**

PART B: ANSWER ALL QUESTIONS – EACH QUESTION IS WORTH 10 MARKS

Given the following case study, answer each of the questions below.

Medic123 is a large supplier of medical equipment to many hospitals in Canada. One of their most popular products is a new ambulatory smart infusion pump. One of the innovative concepts in the design of the pump is a drug library. The drug library contains a repository (database) of drugs available in a given unit of a hospital. Once the drug library is loaded into the pump, hospital staff (i.e., nurses and anaesthesiologists) can program the pump to have it deliver (infuse) a specific quantity of a drug at precise time intervals. Preliminary usability testing of the pump reveals a diminution of programming errors when compared to other existing pumps as well as a very positive user experience (reported by participants through subjective measures).

To upload the drug libraries to the pumps, Medic123 will rely on a computer software. The software will run under the Windows operating system and will be provided to hospitals purchasing the new ambulatory smart infusion pump. Hospital pharmacists are the intended users of the software. Using the application, they will be able to upload drug libraries to the pumps used throughout their hospital.

Different drug libraries can be configured for different area of the same hospital (for example, a drug library for the pumps in the maternity unit and a drug library for the pumps in the intensive care unit). The software will allow pharmacists to perform a variety of tasks related setting up smart infusion pumps drug libraries. For example typical functionalities of the software will include (but not limited to): building the drug libraries, set the upper and lower limits for each drug in the library, set the minimum and maximum time intervals for drug delivery, and logically organize the drug libraries in accordance the different units and departments of a hospital. Pharmacists are expected to update and upload drug libraries to the pumps once or twice a year.

Since Medic123 does not have any expertise in designing Windows-based computer software, it has contracted MedicSoft, a software engineering company specializing in medical software, to conceive, design, and test the application. You are the user interface designer for MedicSoft and have been assigned to this project. Your task is to design the user interface and user experience for the software following a User-Centered Design approach.

Answer each of the questions on the next page.

MAKE WHATEVER ASSUMPTIONS YOU NEED TO CONSTRUCT *POSSIBLE* ANSWERS. *Clearly state your assumptions*.

Question 10

Briefly describe three different usability goals you believe are important for the design of the smart infusion pump software. For each goal, explain why you believe that particular usability goal is important.

Question 11

Briefly describe how you would conduct a requirements analysis. Include the data collection methods you would use as well as one advantage and one disadvantage of each method.

Question 12

Briefly explain how you would create a low-fidelity prototype for the smart infusion pump software. How would you then transform your low-fidelity prototype into a high-fidelity prototype? In your answer, include all prototyping techniques used, who will be involved in the design of the prototypes, and describe the kind of prototype you would create.

Question 13

In the process of designing the user interface for the smart infusion pump software, you will have to consider the issues the internationalization and localization. Explain how you will incorporate these aspects into your design.

Question 14

Once your first high-fidelity prototype of the smart infusion pump software is finished, you decide to conduct a laboratory usability testing evaluation to obtain feedback on your prototype. Produce a protocol for your usability testing sessions. Your protocol must include and explain the following aspects:

- The goals for the usability testing evaluation;

- The questions to be answered to ensure the evaluation goals will be correctly assessed;

- The evaluation approach and methods used during the usability testing sessions;

- The practical issues to be considered: participants, evaluators, equipment, tasks, budget, and schedule; and

- The ethical issues to be considered: privacy and participants' rights.