**THE BRITISH COMPUTER SOCIETY**

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 6 Professional Graduate Diploma in IT

**USER INTERFACE DESIGN**

22$^{nd}$ April 2008, 10.00 a.m.-1.00 p.m.
Answer THREE questions out of FIVE.  All questions carry equal marks.
Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

Calculators are **NOT** allowed in this examination.

1.  Knowledge of the characteristics of human memory is important in the design of user interfaces. The currently accepted theory on the structure and function of human memory is known as the *Modal* Model of human memory. Using your knowledge of this model, answer the following questions:

    a)  What are the **three** main components of the *Modal* Model of human memory?

    **(6 marks)**

    b)  What are the current ideas about information capacity and duration associated with each of these components?

    **(6 marks)**

    c)  Loss of information can occur from any component of memory or during transfer of information between components. This can cause users problems and user interface designers must use their knowledge of human memory to anticipate and address such potential problems.

    Briefly outline **four** sources of memory problems or bottlenecks which may occur when humans interact with computers and in each case give an example of how a designer of a user interface might overcome this.

    **(13 marks)**


2.  Shneiderman's eight Golden Rules of interface design, which have been derived and refined over two decades, are:
    *   strive for consistency
    *   cater to universal usability
    *   offer informative feedback
    *   design dialogue to yield closure
    *   prevent errors
    *   permit easy reversal of actions
    *   support internal locus of control
    *   reduce short-term memory load

a) Choose **three** of these *Golden Rules* and briefly (one paragraph for each) describe the scientific (physiological, psychological etc) theories upon which they are based. Clearly reference the theories to which you refer.

**(9 marks)**

b) The *Golden Rules* provide a useful starting point for designers - however they have their limitations. Briefly (one paragraph each) identify and describe the limitations of **three** of the rules.

**(9 marks)**

c) Shneiderman (2005) suggests that each of the *Golden Rules* "must be interpreted, refined, and extended [according to] the environment".

*Interpret, refine* and *extend* **two** of the rules to accommodate and differentiate design for each of:
i) mobile; and
ii) desktop platforms.

**(7 marks)**

3. The capture of user requirements is an essential component of user-centred design and is influential during all phases of the design of a system.

a) Give a brief definition (one or two sentences) of a requirement in the context of user-centred system design.

**(2 marks)**

b) Requirements are conventionally divided into two types: functional and non-functional. Describe the main characteristic of each of the two types and give a simple example for each.

**(6 marks)**

c) What factors should you consider in the selection of a user sample?

**(4 marks)**

d) Briefly describe the **four** main categories of data you need to collect about users.

**(8 marks)**

e) What type of data would you try and obtain from users through questionnaires?

**(3 marks)**

f) What are the common problems and limitations encountered when using questionnaires in user requirements capture?

**(2 marks)**

4.  SeeSaw, a small mobile communications company, is planning to build a screen-less mobile phone for the visually impaired. As well as being able to dial out and receive calls in the usual manner, the device will have a phone book facility, enable the user to send and receive SMS text messages and inform the user of the identity of a caller. Other regular functions such as indicating battery status, signal strength, call history, ring tone options and volume settings are also required.

    Your brief, as an interaction designer working for SeeSaw, is to advise on initial design ideas and solutions.

    a)  A sound-based interface to the device could form part of the design solution. However, sound as an interface has problems; for example: *annoyance*, *discrimination* and *transience*. Annoyance is the affect on other people in the vicinity of the user. Discrimination is the issue of being able to distinguish between similar device sounds or between device sounds and background noise. Finally, sounds are transient in nature, i.e. they do not persist.

        Sketch out the slides for a short PowerPoint® presentation to be presented to the product design team giving possible solutions to each of these problems (use one slide for each and use no more than six bullet points per slide).

        **(9 marks)**

    b)  i)   Briefly, what is an *earcon*?

        **(2 marks)**

        ii)  Write a short report to the Project Director (no more than 250 words) on how earcons might be used as the principal form of interaction for navigating a typical mobile phone menu system.

        **(5 marks)**

        iii) What design considerations need to be taken into account when producing a coherent set of distinct earcons for such a task?

        **(5 marks)**

    c)  The company CEO has emailed you asking for your view on the potential for using forms of interaction utilising sensory inputs other than sound, in a phone for the visually impaired. Draft your response using no more than 150 words. The CEO expects you to be creative in your thinking.

        **(4 marks)**


5.  a)  Briefly outline the meaning of each of the following terms as used in user-centred design:
        i)   mental model; and
        ii)  metaphor.

        **(4 marks)**

    b)  Give two examples of metaphors currently used in user interface design.

        **(4 marks)**

c)   What are the main objectives of task identification as part of user needs analysis?

**(9 marks)**

d)   Describe four criteria which might be used to define any system as being usable.

**(8 marks)**