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

April 2008

EXAMINERS' REPORT

Realising the User Interface

General Comments

This was the first year that this module has been offered. The syllabus is an updated and extended version of the now-retired module User Interface Design.

As is often the case with Professional Graduate Diploma examinations, the range of answers was very wide. Some answers were very good whilst others showed little or no evidence of study and, particularly, understanding. Candidates should note that they should have studied the materials and that producing common sense observations does not compensate for a lack of study.

That said, candidates should be aware that open-ended questions require something more than can be rote-learned from a textbook. At professional graduate diploma level, examiners are looking for application of theories and evidence that a candidate can think through a problem situation and come up with a viable solution.

Reading and understanding the question is essential before embarking on the production of a successful answer. Many candidates seem to produce vague and irrelevant answers based on the recognition of one or two words or phrases in the question, rather than fully understanding what is required.

Whilst candidates are not assessed on the legibility and grammatical correctness of their answers, they should be aware that answers that are unreadable or of a completely nonsensical construction will not be in a position to gain many marks.

Question 1

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)

Answer Pointers

1a. 0-3 marks awarded for each paragraph according to the level of understanding displayed and the knowledge of specific theories supporting each of the *rules*, eg the Magic number seven theory of short-term memory.

1b. 0-3 marks awarded for each paragraph according to the level of understanding displayed and the knowledge of the limitations o each of the three chosen *rules*

1c. 0-7 marks will be awarded according to the level of completeness and understanding exhibited in the answer. Highest marks will be awarded to those answers that compare and contrast differences in rules according to platform.

Examiners' Guidance Notes

In past years on papers in the previous syllabus, questions suggesting *rules* for interface design have inevitably elicited from candidates a straightforward regurgitation of Schneiderman's eight Golden Rules – regardless of the question focus or specific instructions to avoid doing so.

In this paper, the question deliberately set out the *Golden Rules* in the paper, in anticipation that candidates would avoid describing the rules and instead actually address the issues in the three parts of the question. In general, with one or two notable exceptions, this did not happen.

In part (a) a few candidates related their chosen three rules to scientific theories and most chose instead to describe three, and sometimes all, of the *Golden Rules*. In part (b), most candidates again chose to describe the rules rather than their limitations. Some candidates managed to write the description of the same three rules for part (a) and part (b). Part (c) of the question was the least well answered element of the question and candidates either failed to provide an answer at all, or demonstrated a lack of understanding of the question requirements.

Candidates should be aware that examiners are always looking for answers that address the question. Simply writing out everything the candidate knows about a subject (usually rote learned from a text book) will not be sufficient to achieve a pass grade. Candidates should also be aware of the instructions given: when asked to choose three rules, choosing more will not gain marks (on the contrary, in fact) and writing an answer to question element worth 3 marks that extends over two sides of paper does not normally comply with the instruction for a 'brief paragraph'!

Question 2

The CalCutter Scenario

A health club has approached you to develop CalCutter - an application to monitor an individual's energy intake and consumption (calories/joules) on a daily basis. Functionality of the application will include:

i) Capturing personal characteristics such as height, weight, gender and age.

ii) Capturing the details of food and drink consumed including date, time of day and quantity.

iii) Accessing an existing database of food and drink items, providing the energy value for a standard quantity.

iv) Accessing an existing database of methods of exercise, providing the energy consumed for a standard unit of measurement (such as distance or time).

v) The application will be web-based and accessible through a number of platforms such as desktop PC, mobile phone, PDA and networked games consoles.

vi) Indicating to the user the amount of three common physical activities (e.g. jogging, swimming and cycling) required to burn off the energy just consumed.

vii) Providing daily, weekly and monthly summaries and ad-hoc reports as required (such as warning if the energy balance profile may lead to health risks).

This question refers to the CalCutter scenario provided above.

a) Write a brief report (no more than 200 words) to your client explaining why you intend to use a prototyping approach to the user interaction design, involving users at all stages of the development process.

(7 marks)

b) Prototyping is often referred to by its fidelity. Explain this concept and briefly describe the difference between low and high fidelity prototypes.

(3 marks)

c) Briefly describe three low-fidelity prototyping techniques that can be used to capture user requirements and reactions at early stages of development.

(6 marks)

d) Storyboards/Concept Boards and interactive prototypes are two examples of high fidelity prototypes. Provide a short summary of each of these, advising your client on their function and resource requirements (time, technology, etc.), and justifying the use of each.

(6 marks)

e) Your manager has come across the term "Wizard of Oz" prototype. Provide a short explanation of this technique.

(3 marks)

Answer Pointers

2a. 0-7 marks awarded accordingly to the clarity of the report and adherence to the word length. Over long reports will be penalised. Highest marks will be awarded to candidates who include a number of benefits that might accrue from a prototyping approach, for example:

- Cost - cheap
- Easy to build
- Continuous evaluation and user feedback
- Unlimited design refinements
- Physically demonstrate user interactions
- Ease of communicating concept and structure

Finished product based on user feedback on look, feel and performance

2b. Fidelity refers to the level of detail.

- High fidelity - prototypes look like the final product
- Low fidelity Artists renditions with many details missing1 mark each

2c. Up to 3 marks each depending on the depth of discussion. Key points can include aims, context of use, primary functions and resource requirements

2d. A number of different prototypes will be required which will increase in detail and functionality. These prototypes will deal with site structure, navigation structure, concept and mood boards leading to a small scale functional prototype. The table below lists the various prototypes that could be built and their use identified in the context column.

Seq.		Type	Function	Technology	Time	Justification	Context
1	Site Structure	Chart	Establish the information architecture	Drawing Package e.g. SmartDraw	1 week	Organising information into sections	User Input, Library, Outputs (Reports)
2	Navigation Structure	Chart	Establish the connectivity of various sections	Drawing Package e.g. SmartDraw	1 week	Connecting the different sections	Links, Menus.
3	Concept Boards	Visual	Establish the metaphor/ context	Imaging Software e.g. PhotoShop	2 weeks	To ensure that the application appeals aesthetically	Logos, icons, inspirational health images.
4	Interactive Prototype	Small-scale functional model	To test the usability	Web Developer tools e.g. Dreamweaver	2 weeks	To ensure that the application meets user requirements – iterate, refine	Task analysis, front to back-end linkage.

2e. Marks will be given for knowing what this method is and offering an explanation
The participant interacts with a computer interface as usual
Instead of the program writing back, a person writes back pretending to be the computer
Very useful for assessing hard-to-implement features e.g Speech & handwriting recognition interface design

Examiners' Guidance Notes

Nearly all candidates attempted this question and overall performance was fine though it is worth noting that there appeared to be some confusion about the differences between high and low fidelity prototypes and in particular examples used. Many applicants attempted to varying degrees of success the question on the Wizard of Oz and given that this is not that commonly used was a positive aspect of the curriculum the students cover.

The only other point of interest is that many applicants made little reference to the scenario though answered the question and perhaps this needs to be refined for next time as the scenarios are useful.

Question 3

You will need to make use of the CalCutter scenario in answering this question.

a) A CalCutter user may wish to access the application on a variety of different platforms. Two example platforms are:

- Mobile phone (240x320 pixel screen, 16 colours, standard telephone keypad, up/down/left/right buttons)
- Desktop PC web browser (800x600 pixel viewable area, keyboard and mouse input)

For each of these two platforms, design a home page with appropriate navigation options consistent with the functionality listed in the scenario. Present your design solutions using (for each platform) one well-formed sketch and a single paragraph justifying your design decisions (use no more than 100 words in each of the two paragraphs).

(8 marks)

b) Recent initiatives of the W3C advocate a web design philosophy based on the separation of style, content and behaviour. (In both parts below, use the CalCutter application to illustrate your answers.)

i) Explain what is meant by the phrase "separation of style, content and behaviour".

(2 marks)

ii) Describe the technologies that can be used to support this design philosophy.

(3 marks)

c) Web accessibility is one driving force behind this design philosophy. Define web accessibility and explain why it is important. Explain the role of the WAI in promoting web accessibility.

(4 marks)

d) Describe how adhering to the idea of separation of style, content and behaviour can help in increasing the accessibility of your site.

(4 marks)

e) Aside from web accessibility, state three other benefits that this design philosophy might yield.

(4 marks)

Answer Pointers

3a. An appropriate answer will present well-formed sketches, and two paragraphs justifying each of the designs illustrated in the sketch. Highest marks will be awarded to candidates who recognise the fundamental differences in the two platforms and design accordingly. Differences include:

- screen size
- screen orientation – landscape/portrait
- screen resolution, colours etc
- primary/secondary interaction methods/devices
- context in which the device will be used – home, on the move, in the gym etc
- primary functions of CalCutter according to device and location

0-4 marks for each sketch/justification combination. A maximum of two marks for a sketch without justification.

3b. Marks will be allocated based on explanation given and the depth of reasons it is important:

- Web accessibility means access to the Web by everyone, regardless of ability and is essential for equal opportunity.
- Can help with Barriers on the web
- Corporate social responsibility and legal issues
- Financial impact
- Web accessibility also has benefits for other users - These include the aged and speakers with other first languages
- Can increase usability

3c. Possible answer (wikipedia):
Web accessibility refers to the practice of making Web pages accessible to people using a wide range of user agent software and devices, not just standard Web browsers. This is especially important for people with disabilities such as visual impairment. In order to access the Web, some users require special software or devices in addition to a standard web browser, or specially designed web browsers. Design for accessibility is a sub-category of good design for usability.

The World Wide Web Consortium (W3C)'s Web Accessibility Initiative (WAI) is an effort to improve the accessibility of the World Wide Web (WWW or Web) for people using a wide range of user agent devices, not just standard web browsers. This is especially important for people with physical disabilities which require such devices to access the Web.

The W3C was founded in 1994 to advance the Web. It is responsible for the development of uniform protocols to assure the interoperability of the Web. The WAI, part of the W3C, has developed a number of guidelines that can help to make Web sites more accessible, especially from the view of physically disabled people.

3d. Marks given on depth of response and clarity of examples. Relevant points include:
Separation can create documents that work even if the user cannot see and/or hear and Create documents that do not rely on one type of hardware for either control or output. Separation also enables users to make use of own style sheets and settings (layout, size etc) and can enable certain elements to be parsed out or removed.

3e. 0-4 marks according to completeness of and level of understanding displayed. Answers may include:

- simplifying of html coding
- content presented differently according to platform or device capabilities – eg desktop/ mobile
- user controls presentation of content
- content may be presented according to learning style of user
- content may be presented according to cognitive style of user
- ability to provide skins for visual optionality
- etc

Examiners' Guidance Notes

Candidates answered this question better than any others on the paper and the majority of candidates seemed generally confident, if not always best informed, in their answers. There were a number of reasonably good answers, although, often, candidates were unable to demonstrate a consistent standard across all five sections.

Part (a) was reasonably well answered by many candidates although in general the standard and attention given to detail in the sketching left something to be desired. Parts (b), (d) and (e) were generally well answered by candidates. In Part (c) of the question, where candidates were asked about the WAI, a few candidates were well-informed and several others evidenced a basic working knowledge of the initiative, however there were a number of candidates who have clearly never heard of the WAI. That said, there is clearly evidence of an improvement in the general level of familiarity with WAI over that displayed in answers to similar questions in previous years on papers from the old syllabus.

Question 4

You work for TechMob, a small development company that specialises in designing and building mobile applications. The latest offering from TechMob is an application known as RemoCell that, once loaded and running, allows a mobile phone to be used as a remote control device for a TV.

The RemoCell application is based on touchscreen technology and is designed to work with mobile phones with a minimum screen size of 240px by 320px. The application utilises the infra-red beam to communicate with the TV.

Functionality of the mobile remote application is limited to channel selection, volume controls, on/standby and sound muting.

A prototype of RemoCell has been designed and implemented by your colleagues and your job is now to design a user-testing regime to evaluate the usability, functionality, and visual appeal of the application on a number of suitable mobile phones across a range of manufacturers. You have been tasked to collect qualitative as well quantitative data as part of the evaluation process.

a) Your team leader has asked you to provide a rationale to Senior Management on why this user testing and evaluation process is required. As part of your rationale, briefly discuss the goals of evaluation of the RemoCell product.

(7 marks)

(b) With specific reference to the RemoCell application, briefly clarify the difference between quantitative and qualitative data and give two examples of each you may be able to collect from user-tester.

(6 marks)

(c) The decision has been made to undertake a heuristic evaluation of the RemoCell design. Outline your approach to the implementation of the heuristic evaluation in a summary document to be presented for discussion and approval at your next RemoCell team meeting. The document should provide details of the nature and stages of such an evaluation and, using two examples, define heuristics.

(12 marks)

Answer Pointers

4a. 1-2 Marks will be given for each relevant goal with additional consideration of appropriate examples. Goals could include

1. To assess the extent of the system's functionality - Does it meet the user task requirements, Are the functions easy to access and use
2. To assess the impact of the design on the user- How easy is it to learn ?, Does it have Usability ?, What are the user's attitude towards the system ?
3. To identify any specific problems not envisioned originally

4b. 2 marks for explaining the difference between the two forms of data and up to 2 marks for two examples of each

- measurement of time to achieve a given goal (eg change movie language to Finnish);
- count of number of navigation errors;
- closed question survey – user rating of interface features;
- attitude survey (Likert-type scales);
- count of button presses to achieve a given goal;
- count of smiles or grimaces during operation;
- measurement of response times to user actions;

Qualitative data includes, but is not limited to:

- open question survey;
- interviews;
- user diaries;
- expert reviews;
- focus groups;
- observation of user interaction (real-time/video)

4c. The answer here can be broad but should include a clear definition of heuristics, identifying two heuristics (but not necessarily the original ones defined by Nielson) and provide the framework to carry out such a test. Marks will be allocated based on the completeness and clarity of the answer as well as the demonstrated understanding of the topic. As a reference the following are broad points of relevance

- Helps find usability problems in a UI design
- Small set (3-5) of evaluators examine UI
- different evaluators will find different problems
- evaluators only communicate afterwards
- findings are then aggregated
- independently check for compliance with usability principles ("heuristics")
- Can perform on working UI or on sketches
- Stages
- Pre-evaluation training -give evaluators needed domain knowledge and information on the scenarios
- Evaluation - individuals evaluate and then aggregate results
- Severity rating - determine how severe each problem is (priority)
- Debriefing - discuss the outcome with design team

Examiners' Guidance Notes

Almost half of the candidates attempted this question. Candidates were not consistent across all the subparts and seemed on average to be not clear on the goals of evaluation and the actual mechanism of Heuristic Evaluation. Most were able to answer part b on quantitative and qualitative data and perhaps suggests an element of rote learning. Most candidates offered little consideration of the set scenario.

Question 5

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)

Answer Pointers

5a. 0-3 marks per slide according to clarity and completeness of each. Answers are not expected to include a description of each of the problems – this is included in the question itself!

5bi. musical tones that can be used as means to navigate menu structures.

5bii. 0-5marks will be awarded according to the clarity and completeness of the answer. Answers that clearly exceed the word limit specified in the question will be penalised.

5biii. 0-5 marks will be awarded according to the clarity and completeness of the answer. Highest marks will be awarded to answers that show a thoughtful and creative design process and are likely to include descriptions of the possible earcon tones.
Answers that clearly exceed the word limit specified in the question will be penalised.

5c. 0-4 marks will be awarded according to the clarity and completeness of the answer
Answers will be expected to explore possibilities with the use of other forms of sensory communication, particularly haptic.
Answers that clearly exceed the word limit specified in the question will be penalised.

Examiners' Guidance Notes

This question asks candidates to adapt and apply knowledge gained from texts and/or classes to a real world situation. The three sections expect candidates to present their knowledge and ideas in different styles and formats: visual presentation, report and email. Many candidates either ignored this requirement or failed to address it, choosing instead to write generic answers.

In part (a) of the question, several candidates demonstrated a lack of knowledge by making an assumption that an earcon was a piece of hardware. Parts (b) and (c) of the question produced some interesting answers, but in the main candidates failed to demonstrate an understanding of the issues involved with designing for something other than a visual interface. In part (c) the instructions to '*draft your response using no more than 150 words. The CEO expects you to be creative in your thinking.*' were largely ignored. Interestingly, only three candidates showed application of real world knowledge and discussed the possibility of haptic interaction based on the vibrating function of all mobile phones.