# THE BRITISH COMPUTER SOCIETY

## THE BCS PROFESSIONAL EXAMINATIONS
Professional Graduate Diploma

## USER INTERFACE DESIGN

28th April 2006, 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.*

1.  It is an established fact that the characteristics of human memory place limitations on how well users can interact with computers.  One of the most common problems experienced is referred to as "cognitive overload".

    a)  What is meant by "cognitive overload"?  Provide your own example of how a user interface might result in "cognitive overload".                                                                **(10 marks)**

    b)  How can the use of the desktop metaphor, e.g. in the form of a windows based interface, contribute to avoiding problems of "cognitive overload"?                                              **(15 marks)**

2.  You are part of a team developing a shopping list application called *ShopAtHand* for a PDA and your role is to design the interaction between the user and the device.  A supplementary barcode scanner is to be used as one of several means of capturing data.  The basic application functions include, but are not limited to:

    *   maintaining a list of items needed to be purchased on the next visit to the shops;

    *   maintaining a list of frequently purchased items and standard lists;

    *   presenting lists to the user in a variety of ways whilst shopping (listed by shop, by item type, etc) and allowing the user to check off the items as they are purchased or placed in a supermarket trolley;

    *   recording and presenting, in flexible ways, records of purchases, summaries, etc.

    **[In answering this question, you will need to make use of the PDA device description and illustration given on the next page.]**

    a)  Using your knowledge of interface design principles, make initial design decisions on the interfaces for the various functional elements of *ShopAtHand*.  These will include screen layouts, button mappings and data input strategies.  Present your ideas as a series of no more than six labelled sketches and succinct notes describing functional interfaces and user scenarios.                                            **(15 marks)**

    b)  Write a justification of your design in relation to interface design principles and theories.  Where possible, make reference to specific authors and texts and demonstrate how your designs conform to good interaction practice.                                                                                  **(10 marks)**

## PDA Device Description & Illustration for use in Question 2

**Device**

A typical handheld PDA (personal digital assistant) is illustrated in the diagram below.
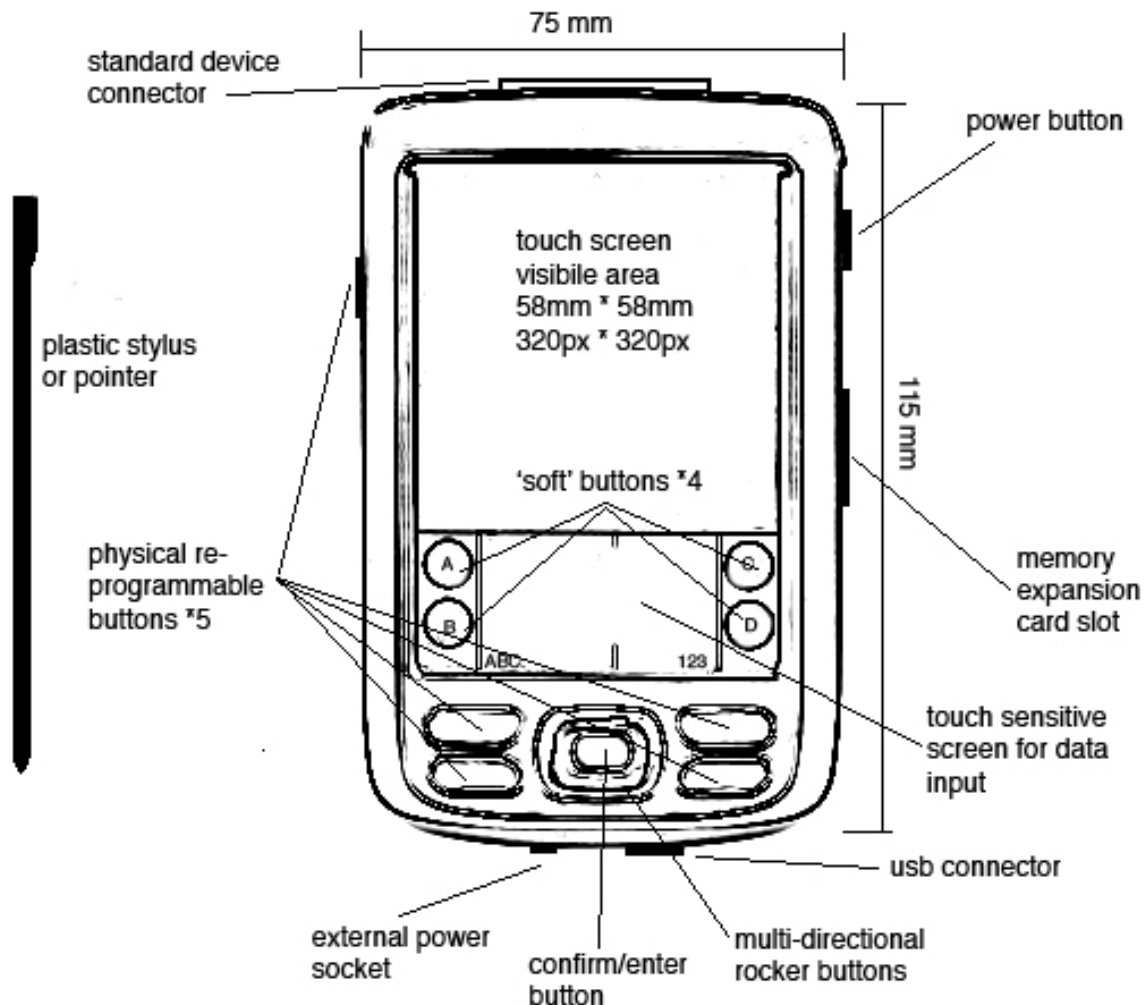


The interface to this device consists of a colour screen with a visible area of 320 x 320 pixels. The screen is touch-sensitive and interaction is typically via a plastic stylus. Most applications for the device can use direct manipulation of interface elements (i.e. drag and drop) on this screen as one means of interaction. When not in use the stylus is stored in a slot in the back of the device. There is a further area of screen that is used for data input via the stylus and a form of handwriting recognition. The left side of this area is used for alphabetic characters and the right side for numeric characters. Double tapping either area will replace this screen area with a representation of an alphanumeric keyboard, with which users can tap out characters rather than using the handwriting screen.

The input area also has four 'soft' buttons (i.e. invoked by tapping the button with the stylus) that are reprogrammable according to application. Additionally there are five 'hard' or physical buttons that are generally used, but are also completely reprogrammable, to invoke high level PDA functions and applications, e.g. diary and clock.

Finally, there is a central set of buttons that mirror the functions typically found on a mouse. The four-way rocker buttons move pointers or screen focus either left, right, up or down and the central button fulfils the 'click' function of a mouse.

The device can interface with a personal computer through a standard USB connector or via Bluetooth. There is also a standard device connector to allow supplementary devices such as a camera or scanner to be fitted to the PDA. A memory expansion slot allows additional flash memory to be used.

**3.** In October 2000, the usability guru, Jakob Nielsen, controversially wrote in his web-based Alertbox:

"About 99% of the time, the presence of Flash on a website constitutes a usability disease. Although there are rare occurrences of good Flash design (it even adds value on occasion), the use of Flash typically lowers usability. In most cases, we would be better off if these multimedia objects were removed. Flash tends to degrade websites for three reasons: it encourages design abuse, it breaks with the Web's fundamental interaction principles, and it distracts attention from the site's core value."                                        (http://www.useit.com/alertbox/20001029.html)

*a)*   Explain what is meant by the term 'usability'.                                           **(3 marks)**

*b)*   Describe the 'fundamental interaction principles' of the web that Nielsen refers to in his article.   **(5 marks)**

*c)*   How does multimedia development software, such as Flash, encourage 'design abuse'?   **(7 marks)**

*d)*   Create a list of six 'top usability tips' for designers who wish to build multimedia objects for the web. Write a brief paragraph explaining the rationale for each of your tips.   **(10 marks)**

**4.** You are a consultant working for Usable World, a global usability consultancy company. One of your clients, an international engineering corporation, has produced a web site for marketing their services across the world and wants to evaluate the usability of the web site. Your job as a consultant is to provide advice on evaluation methods.

*a)*   What advice would you offer on how the web site should take into account different languages and cultures?   **(10 marks)**

*b)*   Provide advice on how the web site might be evaluated in terms of general usability. Your advice should include: how to define usability; how users might be recruited for a usability study; what kind of usability data should be collected; and how the usability study should be carried out.   **(15 marks)**

**5.** The digital design company for which you work has landed the contract to design and build the DVD interface for the latest teenage block-buster movie (such as 'Harry Potter'). Your responsibility in the development team is to test and evaluate the interface in terms of the user experience. This includes the usability of the interface, but also covers compatibility of the design in terms of market and user demographics and the overall look and feel of the movie.

*a)* *i)*   List and briefly describe five different types of *quantitative* evaluation data that you could collect to test the interface.   **(7 marks)**

   *ii)*   Design and describe in detail a test and evaluation process that uses one of the types of quantitative data you have listed in your answer to part *a) i)*. Your answer should at least include notes on: test reliability and validity, the test environment, the protocols for data collection, the kinds of data you will collect and how the data will be useful to the design team.   **(5 marks)**

*b)* *i)*   List and briefly describe five different types of *qualitative* evaluation data that you could collect to test the interface.   **(8 marks)**

   *ii)*   Design and describe in detail a test and evaluation process that uses one of the types of qualitative data you have listed in your answer to part *b) i)*. Your answer should at least include notes on: test reliability and validity, the test environment, the protocols for data collection, the kinds of data you will collect and how the data will be useful to the design team.   **(5 marks)**