Unit 23

QCF Level 3 Extended Certificate
Unit 23
Human Computer Interaction
Previously

• In interface design we looked at Pattern and the six sections it consisted of.
• And then we looked at Geons followed by gross 3d Shapes
So now – Behaviour

• So now we start to look at behavioural models.

• What do you think this could mean?
Behavioural models

• There are a number of models that predict the way in which an interface or user will behave.

• There are 6 types of behaviour models which are split up into Predictive and Descriptive.
Behavioural models

• Models help HCI developers and designers understand and work out how the interface will perform tasks and how efficient it is, is it worthy of computer use or device, or is it too slow?
Predictive models

• There are a number of predictive models that provide guidance when designing interfaces and systems.

• This is a way of pre-empting what will happen without having to carry out lengthy research leading to delays in delivering any interface and allowing lots of people to test it.
Predictive models

• The reaction time to respond to a command from a GUI will vary depending on the user so,

• Consideration must be given to whether or not the interface will respond within an acceptable time relative to what it is doing.

• E.g. shutting down a computer should be relatively quick, and Microsoft spent a great deal of money in getting windows to start up fast.
Predictive models

- As an aside there is also the three click rule in web design which says that a typical user should be able to accomplish what they want by using no more than three clicks on the mouse.
Behavioural models

• The Predictive models are as of follows:-
  • Keystroke-level-model (KLM)
  • Throughput (TP)
  • Fitt's Law
Keystroke-level-model (KLM)

• The keystroke-level-model was built and proposed by Card, Moran and Newell in the 1980s.

• The keystroke model was made to predict and estimate how long it takes for a user to input letters on the keyboard. The model is made up of 11 steps which is used by both users and organisations however, some organisations who can't afford specialist software usually use this method instead.
Keystroke-level-model (KLM)

- KLM recognises very low-level actions.
- The model breaks down the sequence of operations into individual actions, e.g.
  - hitting keys on the keyboard
  - clicking on the mouse
  - pointing with the mouse
  - Moving between mouse and keyboard and back again.

Each action is assigned a time in order to calculate how the system will respond.
Activity - KLM

• Create a simple table to record times (in seconds) for the following –

• The time you predict it will take to power up your computer, log in and access one application.

• Carry out the above and time how long it actually takes, record this in your table.

• Try the same activity using all mouse actions and then again using all keyboard actions.

• Identify how long it takes for the system to respond.
The throughput model – (TP)

- This relates to the productivity of the computer.
- Throughput measures include the amount or speed of processing in response to a command.
- How can we measure processing?
The throughput model – (TP)

• By using the performance monitor on your computer. (Task manager or performance)

• Find the performance monitor on your computer and run it, what can you measure?

• (You probably will not be able to run task manager)
The throughput model – (TP)

- Other measures of productivity include performance in terms of speed of processing and any variation in relation to the number of tasks and their complexity.
- This is call Response time.
Fitts’ Law

• Moving around an interface can improve or degrade the experience for a user.
• It is important therefore that we design any interface with this in mind and preferable before the interface is built (programmed).
Fitts’ Law

- This can be achieved using Fitts’ law which is a method for calculating throughput in advance for any system design by predicting human movement and motion based on time and distance.
Fitts’ Law

- The science bit –
- “time taken to travel between points A and B depends upon the size of the object to be moved and the size of the object with which it is moved.”
Fitts’ Law

- In English –
- User time will vary according to user, the location of an icon, menu or GUI, the click of the mouse button or hitting a key and even the pressure applied.
Fitts’ Law

• How can we apply this?
• Fitts’ law says that you should make buttons and other interface elements big enough, as it is difficult for the users to click on the small ones.

• So
Fitts’ Law

• If you have a small button,
• Like \boxed{OK} add some padding or
• make it wider \boxed{OK}
• If there’s a button on the website, make the whole button clickable – not only the text label
• Also, if you put your object further away, it might be a nice idea to make it bigger to compensate.
Descriptive Models

- These are used to help understand how a user will interact with the HCI and from this will also help improve upon the designs of the actual HCI themselves.
In this part we shall look at the three main descriptive models.

1. The key-action model (KAM)
2. Buxton’s three state model
3. Guiard’s model.
Descriptive Models

• Key-Action Model (KAM)
• This allows you to look at how users will interact with keyboards and therefore what kind of shortcuts they will use to carry out tasks.
• It identifies the need to evaluate how the user will expect the computer to behave or react and how this may be different from how the computer actually reacts to commands etc.
Descriptive Models (KAM)

- In English then -
- This will show how what the user is expecting the computer to do when you try to use certain shortcuts and what the computer will actually do when you press the shortcut.
Descriptive Models (KAM)

- An example of is in computer games.
- When gaming you can generally use the arrows keys to move around as well as using (W,A,S,D) (clearly an older game), if both options were not available then most gamers wouldn’t like how the controls were laid out and therefore could decrease the enjoyability of the game.
Descriptive Models (KAM)

• Keys on a keyboard are described as either 1 of 3 different things. They are either

1. Symbol- These tend to be letters, numbers or punctuation symbols.

2. Executive key-These tend to carry out specific actions for example the ENTER key or F1.
3. Modifier key- these don’t actually type anything but they allow you to change what the next keypress will actually type for example the SHIFT key, if you press the shift key and then the number 5 for example it will put this %.
Descriptive Models (KAM)
Descriptive Models (KAM)

- Other examples include the depression and suppression of buttons on dialog boxes and invitations or steering to the next most likely command by highlighting a button.
Descriptive Models

- Buxton’s three state model: this is used to determine how easy it is to use a mouse or the wheel and will measure how much pressure a user puts on it and how much dexterity and speed is used during this action.
• There are three states which are used to check this:

1. Out of range: Used to show re-positioning and clutching of the mouse.

2. Tracking: For moving an item around the screen such as a cursor.

3. Dragging: Checking the time it takes you to drag an object across the screen or to group an amount of items together.
Descriptive Models Buxton’s

3-State Model

Mouse

State 0

Out of Range

lift

touch

State 1

Tracking

button up

button down

State 2

Dragging
Descriptive Models

• Guiard’s model of bimanual skill relates to the preferred method of interacting with computers and input devices.
• for example when typing a keyboard layout is most suitable for left handed people as the more important keys are on the left side of the keyboard. Guiard’s model looks at the actual position of the keys on the keyboard.
Descriptive Models
Descriptive Models Guiard’s

• The above diagram shows that the preferred hand is the right one but this is not always the case, it will be the left hand in the case of some people or in some cases preferred hands change depending on which task users are doing (ambidextrous).
Descriptive Models

- Activity
- Create a table to store timings in seconds.
- Predict how long it will take in seconds to switch on your computer, then log in and start Microsoft word. Record your prediction.
- Now do this and record the actual time.
- Repeat the above but use only your wrong hand.
- What can you conclude.