

Human-computer interface design

- 1 Hi! I'm Phil Webb, principal consultant with Select Business Solutions.
- 2 In this module on human-computer interface design we will look at a range of topics related to the way in which users interact with the systems we build and the impact that should have on how we build them.
- 3 Human-computer interface design has a number of synonyms—*human-computer interaction* (or HCI), *man-machine interaction* (MMI), *computer-human interaction* (CHI)—but the most popular is *user interface design* (UID) or *user interaction*, known as UX.
- 4 Academic studies and literature tend to use the phrase *human-computer interaction* (HCI).
- 5 This is the study of the interaction between people—or users—and computers.
- 6 It's often regarded as an intersection of computer science, behavioural sciences, design, and several other fields of study.
- 7 Interaction between users and computers occurs at the user interface, which includes both software and hardware, for example, general-purpose computer peripherals and large-scale mechanical systems, such as aircraft and power plants.
- 8 Because human-computer interaction studies a human and a machine in conjunction, it draws from supporting knowledge on both the machine and the human side.
- 9 On the machine side, techniques in computer graphics, operating systems, programming languages, and development environments are relevant.
- 10 On the human side, communication theory, graphic and industrial design disciplines, linguistics, social sciences, cognitive psychology, and human performance are relevant.
- 11 In this module we recognize the reality of delivering solutions that meet business needs.
- 12 So we prefer throughout to use the term *user interaction* (or UX), as it reinforces the focus of all of our activities onto the user.
- 13 Furthermore, we need to get away from our tendency to focus on technology.
- 14 We don't think of the telephone as technology: we just use it.
- 15 Things we think of as technology are like PCs, sing-up systems, and things where the user interface is sufficiently unintuitive that we struggle with it.
- 16 The best way that we as an industry can make IT more usable is to hide the T.
- 17 You hide the technology and present an interface that people can just work with.
- 18 Make the interface simple, intuitive and foolproof, and the rest will just follow.
- 19 In the sessions that follow, we cover the many issues facing user-interface designers.
- 20 We provide fundamental design guidelines, show how these are applied during the development process with a small case study, and close on considering the possible futures of user interfaces.
- 21 Before delving into the detail, we need to be clear about what we mean by *human-computer interaction*.
- 22 As nearly every modern device in most households contains a computer of sorts, we interact with them every day.
- 23 The first thing we need to understand is the multiplicity of these interfaces.
- 24 Physical devices such as mobile phones—of which we will speak more—televisions, satellite receivers, microwave ovens, washing machines, alarm clocks, watches, and a myriad of items, are used on a daily basis.
- 25 Some devices use buttons and switches as their main interface—setting your alarm clock or entering the cooking time on a microwave oven.
- 26 These interfaces tend to be more primitive—press the button four times, for example, to make selections or perform an action.
- 27 They rely on a simple interface technology and on the user's willingness to learn the steps.
- 28 Some of the more recent devices provide a small screen to show information about the device's state and any available choices—the countdown timer in a microwave, for instance.
- 29 With increased sophistication and features on devices such as televisions, DVD players, and mobile phones, screen and keypad interfaces are required.

- 30 Televisions with infrared remote controllers now use the TV screen itself to show menu items with selections made through the controller.
- 31 However, these interfaces can often be tedious.
- 32 For example, place a disc in your DVD player, and after the preamble you are often given various choices—play, choose the language, view the director’s cut, and so on.
- 33 These selections are usually provided against the backdrop of the movie action, are indicated by clever icons randomly placed on the screen and, as often as not, few instructions, if any at all.
- 34 What is the user meant to do?
- 35 By experiment they find that using the up and down buttons on the controller the icons change shape or colour, indicating the active item.
- 36 They wait.
- 37 Nothing happens.
- 38 Or even worse, it goes back through the preamble again, as the user has been deemed to have taken too long in making a choice.
- 39 Eventually, they learn to press the OK button when their choice is selected, and the movie starts.
- 40 They might then find that it’s in the wrong language.
- 41 They have to stop, go back to the menu—how do they do that again?—or restart the DVD, then select the language before playing the movie.
- 42 Now, you may be thinking that this example is a bit extreme, that when you use your DVD player you are relying on your previous knowledge to make selections and to enjoy the movie.
- 43 If you are a new user, however, then you will be baffled by this interface—initially at least.
- 44 This user has no knowledge of driving a DVD, nor have they any model in their head that they could use as a template for probable interaction.
- 45 We don’t have that with the telephone—pick it up, press the numbers.
- 46 The DVD interface does not have numbers.
- 47 They could so easily have a simpler menu—one, play; two, choose language; three, view—where it’s obvious what we need to do: press one, and so on.

- 48 And it’s even quicker, with just one key press.
- 49 But, instead, decoration has been considered more important than ease of use.
- 50 Needless to say, we’ll look at this issue of content vs. decoration later.
- 51 One area which has a carefully considered user interface is the modern mobile phone.
- 52 Although some of us still use simpler mobiles, the demand for multiple channels of information delivered to a single device has resulted in an explosion of features and functions on these very powerful small handheld computers.
- 53 To call them mobile phones is to denigrate their power and sophistication.
- 54 It’s noticeable that the leading devices are known by their names: Blackberry and iPhone, rather than the term *mobile phone*.
- 55 These mobile devices combine wireless communication and powerful software to deliver a vast range of applications or—to use the popular term—apps to their user.
- 56 Yet the user interface on each of these devices is not particularly new.
- 57 They rely on a keypad in the case of the Blackberry to enter information and a touch screen on the iPhone.
- 58 The viewing technology is an adapted web browser that relies on the app delivering legible information on the constrained display.
- 59 The only recent device that broke with this tradition was the iPod, which introduced the thumbwheel as its one and only method of user interaction.
- 60 New users of the iPod quickly learn how to browse and select by simply moving and tapping their thumb or finger around this wheel.
- 61 It was the only thing they had.
- 62 Human-machine interaction can also come under the umbrella of user interfaces.
- 63 Modern cars have sophisticated computers that control the engine’s power, handle the gearshifts, adjust the braking, and much more of what we think of as manual operations.
- 64 Pressing the accelerator or gas signals the engine-management computer to increase engine revolutions and to provide more fuel.

- 65 In the meantime, the engine's temperature, tyre pressure, door locks, fuel capacity, distance travelled, and so on, are all monitored.
- 66 We don't see the computers, but we see the car's state on our screen on the dashboard.
- 67 It's interesting to notice that the term *dashboard* is now used for any display of some of the information on a screen.
- 68 We've introduced the web-based display as the universal mechanism for user interaction on sophisticated mobile phones.
- 69 It's convenient from a technology standpoint as well as the user experience.