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Human–Computer Interaction (HCI) and User Experience (UX)

Human–Computer Interaction (HCI) studies the interfaces between people and computers or, more simply, how people interact with computers. It began as a concept and an area of research and practice in the 1980s when computers became more widely available to users. HCI typically has four main components: the user, the context, the task or function that the user needs to perform and the software or interface that they use.

Initially, users were specialists, professionals who were highly trained in using computers. As microcomputers became more common, users became less specialized and had less training. Likewise, the context changed. Computers were increasingly used in settings such as businesses and homes, as well as in specialist settings such as hospitals and manufacturing plants. The tasks also changed. Early computers had very limited functions, such as programming and data entry. By the early 2000s, however, users were required to use a much wider range of functions, from word processing to multimedia editing. Finally, the software and interfaces changed, from monochrome screens and basic keyboards to colour screens and advanced keyboards, and devices such as mice were added.

For HCI experts, developing effective interfaces was a major focus in improving usability. Initially, this was relatively simple, as the types of interface were limited by the available hardware, such as monochrome displays and basic keyboards. As interfaces became more complex, with the addition of sound and other devices such as mice and games controllers, the range of associated factors to consider became much broader. All three senses became particularly important when mobile devices, such as phones began using touchscreens. HCI designers needed

to focus on visual and haptic (touch) aspects of the interface and good design required an integration of all three senses, visual, auditory and haptic. In addition to usability, HCI designers also began to consider other aspects, such as how much users enjoyed their devices and the role that the visual, auditory and haptic experience played in this.

It has been argued that studying HCI as a single discipline is no longer useful. Instead, its different aspects – which include User-Centred Design (UCD), User Interface (UI) design and User Experience (UX) design – should all be studied separately. While these areas are different, they all draw on the core features of HCI: its use of various human sciences, such as psychology, to provide models of how information is acquired and processed by the different senses. Models of the perceptual systems (the systems which carry information from the individual's environment to the cognitive and motor systems) can provide a basis for understanding how inputs can be designed. They can help to identify different channels through which information passes and which channels are suitable for use in specific situations. HCI modelling can also be very useful in helping designers to minimize cognitive load. One example is the use of visual metaphors – an image representing real objects, such as a pair of scissors as a tool for cutting text in a word processor. Minimizing cognitive load in this way can significantly cut down the time it takes for a user to learn to work with a new interface.

UX studies the experience of people as they use specific computing devices or interfaces. As a discipline, it has developed over time and at intervals it has developed new tools and methods. One of the most common tools is the use of user interviews to determine

users' requirements. Interviews can produce very useful background information, as well as more detailed ideas about what users want from the software. However, arranging and conducting the interviews can be time-consuming and much depends on who is selected. Detailed user descriptions, or personas, are another method of identifying needs. Creating these can be useful, but it can also be time-consuming and produce some irrelevant information.

Using a prototype of a piece of software for user research means much more specific data may be obtained. Whether the prototype is a wireframe, in other words, a drawing or model of an interface or a working model can affect the amount and quality of the data. With a wireframe, users can be guided in a 'cognitive walkthrough' to describe the steps they would take when using the software. Because it does not draw directly on the experience of the user, the data may not be very accurate, but it can be helpful for ideas in the early design stage. With a working model, UX researchers can carry out a usability test. A usability test is where the user tries to perform various functions with the software and describes how easy or difficult this is. This is described as 'thinking aloud' and it provides very detailed and reliable data. However, creating the working model requires a lot of resources and time, and is usually done in the later stages of the project. Another common method in interface design is A/B testing, in which users are randomly allocated to one of two different interface designs and various metrics are used to evaluate which performs better. A/B testing is very low cost and it can produce very good quality results. However, it relies on other research to construct the interfaces which are tested.