Transcript
Video: Human-computer interaction: design for all and assistive products.
Series: ICT user interfaces.
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Hello, I'm Alejandro Rodríguez Ascaso, lecturer at the Department of Artificial Intelligence at UNED.

This video is entitled User Interfaces. It is a key concept when we talk about accessibility and usability in ICT products and services. The user interface is the part of the system that enables communication with us, human beings. It provides the means for users to send commands to the system – this is called input – so that the system behaves in a certain way, and for the system to provide feedback to users about its state or any changes – this is called output.

In a car, the inputs of the user interface are the steering wheel, accelerator, and brake pedals, while the outputs include, among others, the speedometer.

If we describe user interfaces in a very simple way, we can say that communication between a person and a system involves several elements.

On the human side, we have perception channels – touch, hearing, and sight – and expression channels – speech and movement. All of these connect to the human brain, our system of representation.

On the system side, the user interface includes input channels linked to human expression (such as the keyboard, mouse, joystick, or speech recognition) and output channels linked to human perception (such as the screen, loudspeakers, hearing aids, or screen reader). These input and output channels are managed by a processing element that, in turn, communicates with the rest of the system.

In a personal computer, the input is usually provided through the keyboard and mouse, which are operated by hand movements.

The output consists of the screen and loudspeakers, which generate information perceived by sight and hearing.

In the case of a blind person using a personal computer with a screen reader and either speech synthesis or a braille display, the input is the keyboard, controlled by the movement of the fingers.

In this case, the output is the voice synthesis connected to hearing, and the tactile information provided by the braille display—or even the raised markings on the keyboard that help identify the position of each key.

This user interface model is indeed a simplified one. Interfaces are complex systems, and their design requires considerable effort. We have just seen how this model applies to blind users, but we haven't yet looked at interfaces adapted for people who cannot hear or who have limited movement in their upper limbs. Nevertheless, this example helps us to understand how personal computer interfaces have evolved over time, and what solutions have been developed to ensure the accessibility of computers for particular types of users – in this case, blind people.

Information was initially entered through the keyboard and displayed as a series of command lines on the screen. Some of you might remember those days, although it was quite some time ago.

Back then, a device was invented that allowed blind people to read the information on the screen. It was called the Optacon. It converted the text appearing on the screen – or even in a book –, into braille, line by line.

Soon after, the WIMP paradigm appeared, an acronym for "Windows, Icons, Menus, and Pointer". This type of interface is familiar to everyone, but look closer. Information is no longer displayed line by line; it is now arranged on a desktop, in different windows. The Optacon's line-by-line reading solution no longer works.

In addition, a new element of interaction appeared – the mouse – which is useless for blind users, as it requires coordinating hand movement with the visual tracking of the pointer on the screen. To address this, screen readers were developed: programs capable of communicating with the operating system to describe, through speech or braille, the various windows, menus, and icons, allowing blind users to operate the computer entirely through the keyboard, without needing a mouse.

So, problem solved? Hmm… I'm afraid not. What will the next interaction paradigm be? Think about augmented reality, where computers overlay synthetic information onto our perception of the real world. For example, we might see a globe, a real one with a superimposed synthetic image of a satellite orbiting above it. What challenges does augmented reality pose for a blind person?

These cases suggest that we are caught in an endless cycle: first, a new interaction technology emerges; then, a new accessibility solution has to be invented. Is it a vicious or a virtuous cycle? Can it ever be broken? I don't have the answer to that question, do you? Let's leave it for another video.

In this video, we've explored the definition of a user interface, a simple model showing its components and their relationship with human senses and actions, and concluded with a brief history of how technology and accessibility have evolved.