

By Dr. Roland Schoeffel, SD&C Schoeffel Design & Consulting GmbH i.G., Germany; Convener, ISO/TC 159, *Ergonomics*, Subcommittee SC 1, *Ergonomic guiding principles*, WG1.

Limited usability is a problem endangering technological progress.

The enormous technological revolution over recent years has also introduced some unexpected problems, one of them being poor product usability.

With more complicated products coming onto the market, with ever more different and creative designs of displays and controls, technological progress may sooner or later get stuck at a point where nobody can handle the new devices.

In addition, growing globalization and international travel have heightened this development.

The concept of product usability

a standard to help manufacturers to help consumers

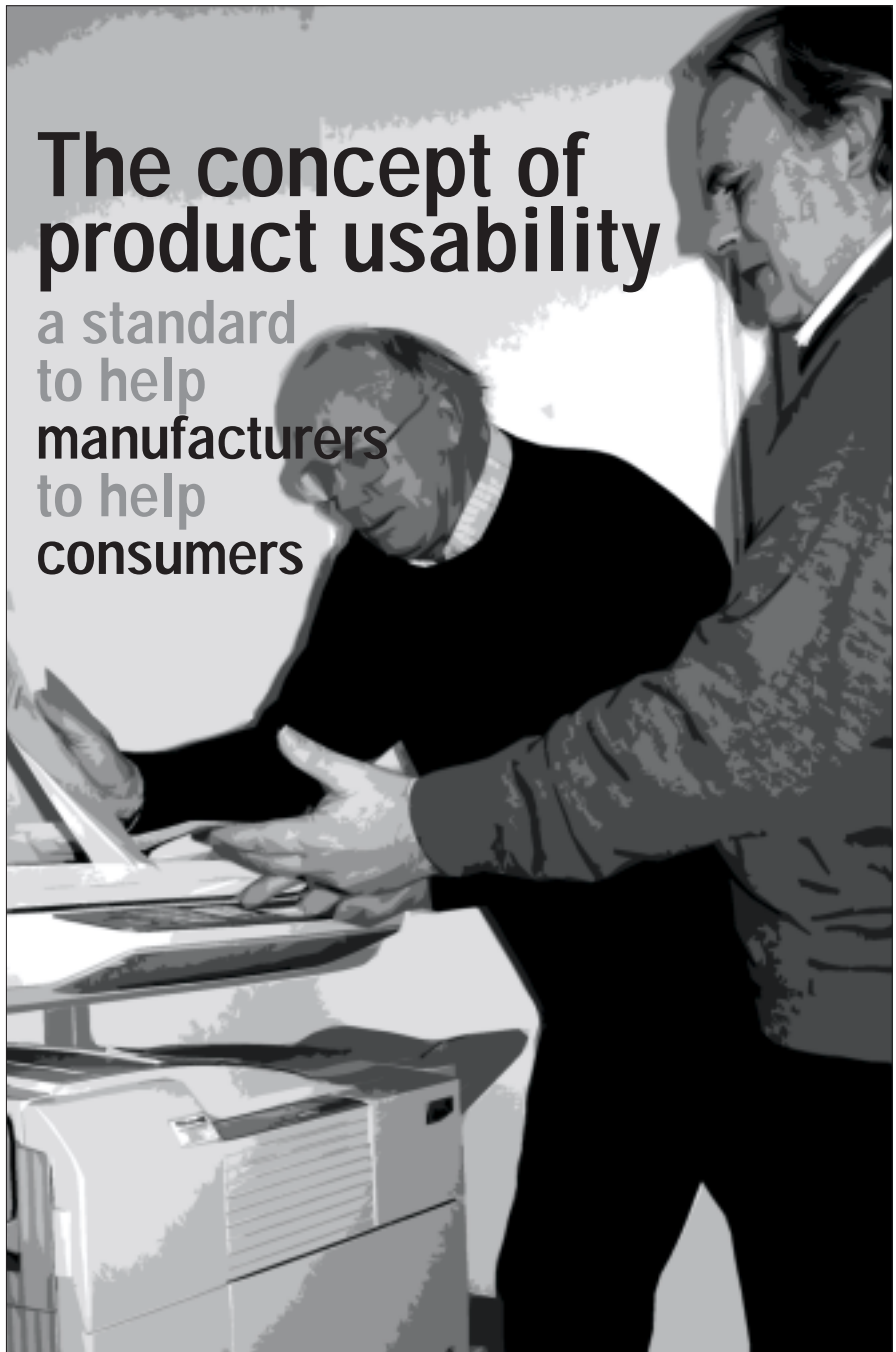


Photo: P. Krieger



Clock of an electric oven with poor usability.

The concept of product usability

To introduce the concept of product usability, imagine for a moment how you would go about setting the time on the clock depicted (*left*), supposing that after a power failure, the clock showed blinking zeros:

If you failed to find the solution given in the footnote (*bottom right*), don't blame yourself. Usability tests of the clock have shown that generally nobody obtains the right solution without help. So for a start, let us define usability as the quality of a product making it easy to operate.

If the above usability problem with the clock sounds familiar, studying this issue from an individual level to taking in a complete demographic view of the situation changes things. When we include millions of products with limited usability and millions of consumers unable to operate products properly, we get a somewhat strange picture of today's world as a

To set the time, you were supposed to press the two buttons in the middle below the display with your left hand, and, while pressing them, turning the round knob at the right.

place rather difficult to handle. Imagine people arriving at airports all over the world for the first time, and thousands of them being unable to operate the ticket vending machine in the connected subway stations. Or consider travellers in hotels who are unable to operate the room telephones or the TVs; and those who have difficulties getting to grips with the functionality of a rented car. It is better not think about how many would not be able to operate a fire extinguisher correctly should that become necessary.



Written instructions are often no solution to the problem. Sometimes the space on a product is insufficient. Sometimes it is hard to decide on the language to be used; pictograms often cannot be understood either; and who really wants to study 200 pages of instructions for a rented car before starting, or the 100 pages in tiny letters for a mobile phone? And – even with instructions – many consumers just do not succeed in getting their video recorders into operation, even after trying for several hours. If the usability of a product is defective, even good instructions do not help.

Usability and psychology

Luckily, psychologists at universities have been concerned with how people engage in “problem solving” for many years, and this has translated into an understanding of usability. Psychologists found that the brains of all human beings func-

About the author



Dr. Roland Schoeffel has been researching operator work load for the German Armed Forces, and was later Director of the

Siemens Unit for Ergonomics and User Interface Design in Munich. In 2002, he founded his own company. He has worked for 15 years in standardization, and is now convenor of ISO 20282. He is a Registered Member of the Ergonomics Society and a Certified European Ergonomist.

info@sdxc.de

tion very much in the same way; people stumble over the same problems and to a large extent go for the same solutions. Although the neuronal wiring of the brain is still unknown in detail, much has been established about human thinking, memory and intelligence, which today can be used for usability design.

Today, the controls and displays of a product can be regarded as a reverse intelligence test. Reverse, because they should not test the user’s intelligence, but rather the IQ of the product designer in terms of his or her ability to engineer a product so that everybody can operate it easily. However, to achieve such ease of operation is not easy. The displays and controls of today’s products show levels of successful operation between 0 % and 95 %. One hundred percent of those able to operate a product intuitively and without help at the first encounter is hard to achieve for many products. If the percentage falls below 50 %, producers normally notice that there is a problem. The anger of the users searching for help is then so deep that it cannot be ignored.

The ISO 9241 success story

It was in the computer world that the term “usability” was first used. In the 1980s, companies like Apple and IBM opened up a new market for computers to be used by everybody, not just specialists with technical expertise. This led to the further discovery that sales would increase if customers could trust that their products were easy to operate and were not built for technicians only. Subsequently, the increasing volume and availability of software applications and diversity of equipment available have placed great emphasis on the need to make computers easier to use. There is a huge difference in the usability of the first line-based text editors and today’s Microsoft Word. Without the successes achieved in designing for usability, the incredible progress in general computerization and the entire Internet revolution would not have been possible.

Recognition of these issues led to the development of a new standard, ISO 9241, *Ergonomic requirements for office work with visual display terminals (VDTs)*, which deals with the human-centred design of computer systems. In the 17 parts of ISO 9241, Part 10 addresses the psychological principles which the interfaces to computer systems should possess if they are to achieve high levels of usability, and Part 11, addresses the definition of usability which is also used in ISO/CD 20282, *Usability of everyday products – Part 1: Universal user profile*, and Part 2: *Test methods*. The definition of usability is “the extent to which a product can be used by specified users to achieve spec-



Photo: P. Krueger

ified goals with effectiveness, efficiency and satisfaction in a specified context of use”.

What is ISO/CD 20282 ?

ISO/CD 20282 is intended to further the usability concept established in ISO 9241 by developing requirements and recommendations relating to the design and evaluation of everyday products – that is, consumer products, or equipment used by the general public. The aim is to provide guidance on how to design products that can be used intuitively. It therefore provides a standard method for the evaluation and testing that allows developers and consumer organizations to measure how successful a product is in enabling users to be successful in getting the main functions of the product into operation when they first try using it.

The standard is currently envisioned in four parts:

1. User characteristics and context of use
2. Test method
3. Classification and labelling
4. Design guidelines.

Part 1 has been circulated as a CD. It describes everyday product usability as a transferral or, better, as an *instantiation* of the usability concept of ISO 9241. In addition, this part describes all the contextual factors that should be considered when trying to ensure ease of operation of an everyday product merchandized globally.

Part 2 is under development and provides a method for the measurement of usability relevant to everyday products, i.e. ease of operation, efficiency of operation and satisfaction.

The possibility of producing two further parts, dealing with classification and labelling and design guidelines is under discussion.

What will ISO 20282 mean for the consumer ?

In the European Community, a new directive on consumer protection demands that producers must ensure that products can be used in a way consumers expect them to be used. ISO 20282 represents a very

timely contribution to this goal by helping people to evaluate the usability of products.

Up to now, only IEC/TR 61997 offers a model for the classification of user interface quality:

☆ = meaning a product's main function is easy to operate

☆☆ = meaning all of a product's functions are easy to operate

☆☆☆ = meaning all of a product's functions can be operated easily and with pleasure.

Meaning for the disabled and the elderly

ISO 20282 is actively seeking to address the wide range of user characteristics that are present in the global population who may use everyday products. This includes recognition of the importance of including the growing proportion of older persons and the need to ensure that the design of everyday products addresses the needs of those people with disabilities. Better usability has been identified as one important factor in enabling older people to continue to be independent and to profit from modern technologies. ISO 20282 will support this objective by offering standards based on well-established scientific evidence and experience of good practice. However, there is no doubt that further research will be needed in order to extend the standardization to cover all the issues associated with the many different sources of disability.

And what does ISO 20282 mean for industry ?

The majority of modern international companies are well aware of the importance of usability: many have their own usability laboratories and are using them to enhance their products' usability, and there is good support for the ISO standardization process.

Those companies that do not yet employ teams for usability design and testing tend to ask the same questions.

The first question is whether the investment in usability will pay off. As it happens, several independent studies have

shown that investment in usability is cost-effective. One study on electrical consumer products in 11 European countries investigated what the consumers named as the factors most important when buying a product. The most important factor was the price, the second most important factor, usability. This finding is matched by the fact that all the international con-



Photo: P. Krieger

sumer organizations nowadays include “handling”, or a similarly named factor for usability, in their evaluation procedures. Another study, an internal investigation by a European producer of home appliances, found that a product with high usability outsold the otherwise technically identical forerunner by a factor of more than 2. And industrial studies of the product development process have shown that the pre-emptive insertion of usability requirements early in the development process is far cheaper than product changes made after customer complaints about products already on the market. Studies also show that investments in usability do actually decrease the load on hotlines and the amount of repairs necessary during guarantee time.

The second question is: why should a company follow the standard? Shouldn't every producer go for usability as he likes and thinks is best for his products and customers? As with most standards, a producer can still ignore the standard and all its recommendations. But the clever ones will quickly find out and appreciate that by following ISO 20282, the usability built into a product at one place in the world will improve their usability ratings everywhere else in the world, too. □