Chapter 1.5
Human Factors in Public Information Systems

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INTRODUCTION

News reports do not frequently mention many problems or accidents caused by human error. The specialty of human factors seeks to avoid human error by making certain that computers and all other equipment are designed to be easy to understand and use; costly human errors are thus minimised. This article provides a basic overview of the subject of human factors as it pertains to problem and error avoidance in computerised public information systems. When computer/system design does not adequately consider human capability, the performance of the computer/system and the user will be below desired levels.

BACKGROUND: HUMAN FACTORS, THE DISCIPLINE

Human factors has helped to make information systems less costly and easier to use. Some background on this discipline will help to show the relationship it has with information systems.

Human factors is the science of the relationships between humans, their activities, and the context in which those activities take place. The specialty of human factors came into being during WWII when it was found that the sophisticated equipment being designed did not perform as expected; there was a strong and immediate need to understand why many humans were unable to effectively use equipment and/or systems. Teams of researchers learned that the design strategies

used did not consider human performance limitations—for example, some designs presented too much information at the same time or in the wrong order for humans to be able to successfully operate controls. Or, the arrangement of controls made them difficult to reach quickly and easily. From this discovery came the concept that *human* users, their work *activities,* and the *contexts* of the activities had to be thought of as different parts of a whole system and that each depends upon the other for successful operation (Bailey, 1996).

After WWII the discipline of human factors became a specialised knowledge area as it became apparent that the human element of any system had to be considered if the capabilities of new technologies were to be efficiently exploited. The older strategy of modifying designs over a long period of time through user experiences was inadequate; rates of change had become so rapid that products were obsolete before improvements could be added. Now, the strategy often used by successful design environments is to include human factors in design and development. When properly managed, products or systems that use human factors knowledge are more efficient, safer, and more pleasing to use because they are designed to accommodate human performance capabilities (Norman, 1988).

Human factors is an extremely broad technical and scientific discipline; founders of the first national and international human factors organisations came from such diverse fields as engineering, design, education, computer technology, psychology, and medicine. Through its diversity human factors is able to draw upon and combine knowledge from any area when working with human and system performance issues. Due to the complexity of human behaviour, human factors specialists emphasise in their work an iterative empirical approach. First, an initial recommendation or interface design is made and then laboratory or field studies are conducted to test this initial design (the prototype). Changes are made when deficits are identified; modifications are made; and further testing is then performed. This process continues until significant problems are no longer found. Finally, validation is achieved through observation in the field after system deployment.

This emphasis on empirical work tends to shape how human factors specialists perform their roles. Irrespective of the specific methodology chosen for gathering data about tasks, users, and the use of products, human factors work tends to result in product improvements likely to be economical, easy, and efficient to use from the beginning of use; the cost of and need to go back and fix problems when human factors is not used is avoided.

Human factors can also be called ergonomics. As the term "human factors" is in more common usage in the computer field, it is used for this article.

Human Factors and Computers

As with other technologies, WWII helped to stimulate the development of computers. The first models of computer used to manage information were primitive in comparison to the computers of today. They were designed by scientists and engineers to be used by scientists and engineers. These computer systems were difficult to operate and had to be closely watched during operation; users had to understand the technology for successful operation and tolerate problems, as technology-advanced computers became easier to operate. With today's systems, the typical user does not need to understand technology; what is important is that a user understands how to tell a computer exactly what information is needed.

This progress in computer technology means that average users of computers and information technology (IT) are no longer just scientists or engineers; instead, they can be anyone who understands how to operate the computer information system they are using. While computer and IT systems are much easier to use, this does not