Chapter 4

Human Factors in Interface Design: An Analytical Survey and Perspective

Qiyang Chen
Montclair State University, USA

Vinai Sharma
University of Medicine & Dentistry of New Jersey, USA

This paper discusses the issues of human factors that affect interface design. It addresses the challenges that system analysts may face. It presents the strategies of incorporating human factor engineering into the process of system analysis and design. The user performance and their mental models are also discussed.

INTRODUCTION

Human factors are defined as knowledge of human abilities and limitations to the design of systems, organizations, jobs, machines, tools, and consumer products for safe, efficient, and comfortable use (Salvendy, 1999). In the United States, the human factors engineering was initially emphasized by the US military with concentration on human engineering and engineering psychology. Since then a great deal of research efforts have been focusing on the roles of users within a complex system (Murray, 1991). Behavioral studies of programming, which emerged in the late 1970s, were among the earliest in the field of human-computer interaction (HCI) (Rosson, 1996).

With its origin in experimental psychology and systems engineering, the study of human factors is defined as the study of human beings and their interaction with products, environments, and equipment in performing tasks and activities. The
functions of human factors are to augment the performance of systems. The differences between studies in human factors of HCI and in other parallel sciences such as anthropology, cognitive science, psychology, sociology, and medicine are in the use of the knowledge of humans and their behavior in interaction design. The subject of human factors has become an exciting combination of basic and applied research for designing HCI.

Human factors are design oriented (Raskin, 2000). The design process includes comparing and designing systems, tasks, and environments to provide intellectual interaction to adapt the limitations of human beings. Alternatively, the user of the system can be trained or educated to work with a system. The latter approach faces unlimited challenges based on individual variations among human beings. Therefore, the systems are to be designed such that they are insightful and easy to use, calling for no special training or education.

This paper will discuss the issues of human factors that affect interface design. It addresses the challenges that system analysts may face. It emphasizes that human factor engineering must be incorporated into the process of system analysis and design. The users’ performance and their mental models are also discussed.

EMBEDDING HUMAN FACTORS IN SYSTEM ANALYSIS AND DESIGN

Modern interactive systems are event driven. While system analysts may focus on the complex and open-ended nature of software design problems, they may overlook the following design categories that involve a great deal of human factors.

• Work environment (physical demands, skill demands, risk demands, time demands).
• Psychosocial environment (social and cultural style).
• Ergonomic environment (hardware design, anthropometrics and biomechanics).

Ergonomic considerations in the interface design include physical factors, biological factors, psychological factors, work factors, and organizational factors (Sage, 1987).

System analysis and design is a formally structured, time-driven, interactive process with limitations of costs, resources, and organizational and environmental requirements, involving stages with distinct activities that vary as a function of system requirements and is categorized into planning, designing, testing, and evaluating. Created with the specified goals and objectives of transforming inputs into outputs, systems design starts and proceeds with branching and divergence from a higher to lower levels of activities and errands. Human factors engineering must be incorporated into this process.
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