Chapter 3
What-If Analysis on the Evaluation of User Interface Usability

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ABSTRACT

While interactive systems have the potential to increase human work performance, those systems are predisposed to usability problems. Different factors might contribute to these problems during the interaction process and as result, the decision-making process might be compromised. This work uses decision support system methods and tools to assist in the analysis of the usability of a university library website, measuring the constructs of effectiveness, efficiency, and learnability. The pilot study involved thirty-five subjects, and after collecting data, a multidimensional view of the data is created and discussed. Later, a What-if analysis is used to investigate the impact of different scenarios on system-use. The work has the potential to assist designers and system administrators at improving their systems.

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INTRODUCTION

Currently, industrial society is experiencing transformations without precedents. Technological improvements shape how people work and live. For the working sector, transformations that might improve work processes are always on demand. As work is an inseparable part of the human life, transformations in work processes have the potential to impact how humans live. While part of this impact is positive, challenges always exist and must be addressed. For instance, the use of steam power to mechanise production was introduced in First Industrial Revolution, dated around 1760s, creating plenty of opportunities, such as improving production processes and creating new factories and cities (Xu et al., 2018). General challenges to be addressed were to create good work and living conditions in the newly created factories and cities, respectively. Second Industrial Revolution (dated around 1870s) intended to improve production by employing electric power generated from combustion engines, inaugurating the mass production era (Xu et al., 2018). General challenges during that event were related to continue improving professional and social life in dimensions ranging from economy and politics, to urbanisation and transportation. Automated production era is introduced during the Third Industrial Revolution (dated around 1960s), based on electronics and information technology (Xu et al., 2018). Examples of general challenges were related to improvement of several dimensions, such as social aspects of work, diversification in energy sources used in production, development of production, management and governance systems, amid others.

Fourth Industrial Revolution programmes, represented by initiatives such as Industrie 4.0 (also referred to as Industry 4.0) in Germany or Smart Factoring in USA, implies the evolution of industrial workforce, i.e., the use of new types of interactions between human operators and machines (Lorenz et al., 2015). Thanks to technologies such as Big Data Analytics (Russom, 2011), Information Systems (Stair & Reynolds, 2013) and Industrial Internet of Things (Rawat et al. 2017), a new set of applications are possible, bringing improvements in industrial areas such as maintenance, coordination among jobs, decision-making, among others. To achieve production growth, industries escalate the use of technology for employees. Even though, this phenomenon is not restricted to industrial sector, this introduction provides a “thermometer” of how technology use is escalating. Therefore, an increasing number of systems are becoming part of the modern person’s routine, regardless of work position or salary.

Among the several types of today’s existing computer systems, it is possible to highlight one type, those that human operators interact with, referred to as Interactive Systems (Benyon, 2014), pervasive in all sectors of modern society. The kind of interaction processes existing between humans and computers might range from directly manipulating system controls (e.g., configuring medical devices or pre-setting flight parameters in cockpit) to monitoring the system when it automatically changes between previously programmed configurations (e.g., monitoring assembling line equipment in industrial sector, monitoring the application of treatment by Radiation Medical equipment or monitoring Energy Plants’ control panels). It is important to underline that for the interaction process to take place, those systems must provide interfaces to be used by humans, which in turn are designed for supporting their decision-making processes. The human interface is also referred to as User Interface (UI) or Man-Machine Interface, and according to (Benyon, 2014) is defined as the part of the system with which humans come into contact, physically, perceptually and conceptually. When such interfaces use sophisticated graphical support – Graphical User Interfaces (GUI) –, they provide graphical elements to control the system – e.g., buttons, screens, text boxes, or sliders. User interfaces seek to provide system representation to the user, exposing the processes behind the system under control. Users make use of the system to achieve an established goal with it, and if the UI has flaws or problems, the goal is unachieved. Some systems

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