

Integrating Performance Shaping Factors to Risk Assessment of a Complex System

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The use of new technologies for the operation of complex systems led to the increase of the complexity of the systems automation and process control. In this context, it is essential to understand the dynamics of the interaction between workers and systems, in order to ensure the safety of the workers and optimize the processes operation, as well as to prevent damage to the environment. Human beings play important roles in the operation and supervision of complex systems and their performance is influenced by given specific working conditions, called performance shaping factors (PSFs), related to human characteristic, technology and organization. Context factors such as high temperatures, high pressure and hazardous chemicals are pointed as causes or contributors to unsafe human actions in event analysis and also provide a basis for assessing human factors in safety analysis [1]. The performance of complex socio-technical systems dependent upon the interaction among technical, human, organizational and environmental factors and these factors can be important co-contributors which could potentially lead to a catastrophic event. To improve safety and therefore reduce undesired events, it is necessary to understand how human performance is affected [2]. The quality of the procedures, the training provided, the workplace design, the organizational questions, the environmental factors and the job conditions must be evaluated in order to be compatible with the physical and cognitive capabilities and limitations of human beings. The aim of this paper is to propose a methodological framework applied to the identification of a set of PSFs which affects the operators performance of a central control room. After the identification of a set of PSFs, a decision-making model based on AHP (Analytic hierarchy process) is used to find out the principal PSFs that influence the operation of the systems. The integration process of the chosen PSFs in the risk assessment is carried out through the use of

logic fuzzy and standard ISO 17776. The central control room (CCR) is a shared operational context where operators make decisions during their work (Fig. 1). The operators exchange information with each other and with the various agents of the socio-technical context in order to construct their situation awareness and be able to make correct decisions during their work. Operators send and receive requests for tests, maintenance and general improvements to and from the maintenance technicians, instrumentation, supervisors and coordinators. All plant automation and process control are concentrated in CCR environment through ECHOES (Operation and Supervision Central Station), which is a system specially designed to allow the operation, monitoring and control of an industrial plant (Fig. 2).

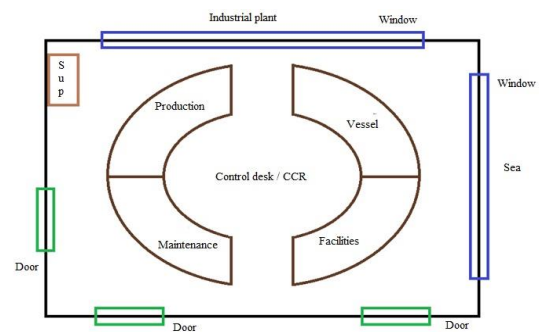


Figure 1. Central control room

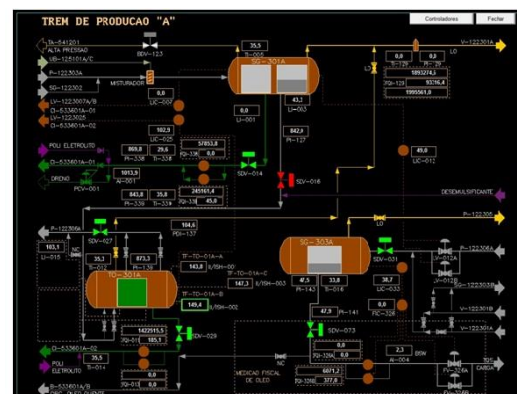


Figure 2. ECHO system

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