Chapter 9
Decision-Making Models of the Human-Operator as an Element of the Socio-Technical Systems

Nina Rizun
Gdansk University of Technology, Poland

Tatyana Shmelova
National Aviation University, Ukraine

ABSTRACT

The authors of the chapter proved that the fundamental intellectual processes, which lie on the basis of decision-making behavior of the human-operator, could be identified on the bases on the analogies with the devices (elements). The basic intellectual processes of the Rational decision-making models can be adequately identified by the transient processes of the PID-controller; the intellectual processes of the Bounded Rationality and Intuitive decision-making models can be identified by the transient processes of the nonlinear elements. Taxonomy of the most typical automatic control theory elements and their compliance with certain decision-making models with a point of view of decision-making processes specificity and on human-operator behavior in the context of the socio-technical concept was obtained Authors of the chapter also accept the suggestion that the instruments of collective multi-criteria decision-making and social-network analysis theory have similar mathematical and methodological bases.

DOI: 10.4018/978-1-5225-1656-9.ch009

Copyright ©2017, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.
INTRODUCTION

The appearance of the term Socio-Technical Systems (STS) is the result of a rapidly developing interaction between the social and technical factors that create new, sometimes unpredictable, a synergistic effect on the performance of the contemporary company. Large-scale, high-technology systems such as nuclear power generation and aviation have been called STS because they require complex interactions between their human and technological components.

STS theory is theory about cooperation between the social aspects of people and society and technical aspects of machines and technology. Sociotechnical theory refers to the interrelatedness of “social” and “technical” aspects of an organization. Sociotechnical theory, as distinct from STS, proposes a number of different ways of achieving joint optimization.

The STS also tend to have two common features: high technologies and high risk activities. As such, they require much less direct operation due to the fact the technology replaces the human-operator (H-O). On the other hand, require much more remote operator’s supervision due to the modern tendency to supervise the technology by distance. The systems’ work is not transparent due to increased difficulty to know exactly what the technology is being used. The systems are also highly hazardous and of high-risk, and have greater potential for catastrophic.

The relationship between social and technical factors of those systems may be of two types:

- **Linear**: A predictable, manageable. Is associated with expected conditions, the solving of routine, repetitive and well-structured problems, based on pre-established rules, regulations, as well as operator’s experience and technical knowledge; and

- **Nonlinear**: Unpredictable, illogical. Is associated with the occurrence of uncertainty. They are characterized by semi-structured and unstructured problems. Solutions, which have received in the non-programmed, unexpected situations, contain the risk. These solutions require specific personal and professional qualities and creativity.

An addition, STS as a system with feedback, on the one hand, is a powerful tool for changing the socio element as part of the modern enterprise. The dynamism of the science and technology development, the rate of occurrence and processing of information, the increasing of the work’s pace and tension of and more modifies the behavioural characteristics of a human, the specifics of his/her thinking, the models of the DM. On the other hand, H-O creates new requirements for its environmental technology, which should satisfy both his/her professional and behavioural charac-
Related Content

The Emotions of Alan Turing: The Boy Who Explained Einstein's Theory of Relativity Aged 15½ for his Mother
[www.igi-global.com/article/the-emotions-of-alan-turing/113417?camid=4v1a](www.igi-global.com/article/the-emotions-of-alan-turing/113417?camid=4v1a)

Overview of Search and Rescue from Robotics to Wireless Sensors and Robots Networks
Bio-Inspired Polarization Vision Techniques for Robotics Applications
Abd El Rahman Shabayek, Olivier Morel and David Fofi (2015). Handbook of Research on Advancements in Robotics and Mechatronics (pp. 81-117). www.igi-global.com/chapter/bio-inspired-polarization-vision-techniques-for-robotics-applications/126014?camid=4v1a

Beyond the ILS: A New Generation of Library Services Platforms