Risk management in a dynamic society: A modelling problem

In spite of all efforts to design safer systems, we still witness severe, large-scale accidents. A basic question is: Do we actually have adequate models of accident causation in the present dynamic society? The socio-technical system involved in risk management includes several levels ranging from legislators, over managers and work planners, to system operators. This system is presently stressed by a fast pace of technological change, by an increasingly aggressive, competitive environment, and by changing regulatory practices and public pressure. Traditionally, each level of this is studied separately by a particular academic discipline, and modelling is done by generalising across systems and their particular hazard sources. It is argued that risk management must be modelled by cross-disciplinary studies, considering risk management to be a control problem and serving to represent the control structure involving all levels of society for each particular hazard category. Furthermore, it is argued that this requires a system-oriented approach based on functional abstraction rather than structural decomposition. Therefore, task analysis focused on action sequences and occasional deviation in terms of human errors should be replaced by a model of behaviour shaping mechanisms in terms of work system constraints, boundaries of acceptable performance, and subjective criteria guiding adaptation to change. It is found that at present a convergence of research paradigms of human sciences guided by cognitive science concepts supports this approach. A review of this convergence within decision theory and management research is presented in comparison with the evolution of paradigms within safety research. (C) 1997 Elsevier Science Ltd. All rights reserved.
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