

# Design of alarm systems in different complex control settings

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*Anna Thunberg & Anna-Lisa Osvalder  
Chalmers University of Technology  
Gothenburg, Sweden*

## **Abstract**

Alarm systems play an important role in the maintaining of safe and efficient operation of complex process control settings. If the relationship between the operator's behaviour and the design of the human-system interface is clarified and more understandable, it will be possible to develop more efficient, effective and safe alarm systems. The results from five theoretical and empirical studies performed in different application areas (nuclear power, pulp and paper, oil refining, medical technology, and aviation) have been summarised to identify important design guidelines for alarm systems that take the operator's perspective into account.

The results show that adaptable alarm systems are needed since the operators have different roles and needs in different working situations. The alarm system should provide guidance for the operator to perceive the relevant information. Further, the operator's monitoring is greatly affected by information from colleagues. A main shared overview display should be provided to facilitate communication between team members. In addition, the operator and the team should have the ability to regulate their workload. Finally, increased transfer of knowledge between industry sectors can facilitate development of safe and efficient alarm systems.

## **Introduction**

Alarm systems are important for the safe operation of many complex industrial settings, e.g., nuclear power, medical care, aviation, offshore, and process industries. Well-designed alarm systems help the operators to monitor and control the status of the process while alarm system design flaws can contribute to or worsen hazardous situations.

Alarm system research has mainly taking its starting point from existing alarm problems with the aim of reducing the problem. But to identify alarm system problems and act on them is not the most efficient way to develop systems. Prevention of alarms is better than cure (Hatch, 2005). And to prevent alarms, there is a need to understand how operators monitor the plant process as well as to predict the working performance of the operator.

In D. de Waard, G.R.J. Hockey, P. Nickel, and K.A. Brookhuis (Eds.) (2007), *Human Factors Issues in Complex System Performance* (pp. 373 - 384). Maastricht, the Netherlands: Shaker Publishing.