

## Recovery from failures – understanding the positive role of human operators during incidents

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### Abstract

The basic focus until now of reliability, performance, and quality management has been on the prevention of failures and errors. Yet, in fact it is rather the negative consequences of a failure that we want to prevent, than the occurrence of an initial failure itself. This idea introduces a relatively new research area, focussing on the recovery or failure compensation process, which takes place (either successfully or not) after a failure has occurred and which contributes to the (complete or partial) prevention of negative consequences.

There are only a few scientific publications in which the failure compensation process plays a central role. In almost all of these, the importance of the human factor for recovery is stressed. In the failure compensation process, three phases can be distinguished, about which general agreement exists: *detection* (of the symptom(s), indicating that something has gone wrong), *explanation* or *localisation* (of the failure's causes) and *correction* (of the problem through planning and execution of ad-hoc/structural countermeasures).

The purpose of this paper is to discuss the development of a comprehensive model of the failure compensation process and the factors influencing recovery, based on findings from a literature survey and an exploratory pilot study involving incident data from a chemical process plant. The resulting insights provide a basis for organisation and system (re)design in order to promote recovery possibilities, and underline the importance of learning positive, effective ways of dealing with errors when they occur.

### Introduction

While the *negative* role a human operator can play in overall system performance has long been recognised in safety and reliability management, as can be seen from the vast amounts of research focussing on human error and its prevention, relatively little attention has been given to understanding the *positive* role that the same human operator can have in returning a system to its normal and safe state after a failure has occurred. In many areas of work / industry, after an initial error (human failure) or other type of failure has occurred, there is in most cases still a chance to recover from the failure through the timely and effective application of countermeasures. The aim of these countermeasures is to avoid the negative