Chapter 21

IO Concepts as Contributing Factors to Major Accidents and Enablers for Resilience-Based Major Accident Prevention

Eirik Albrechtsen  
SINTEF Technology and Society, Norway

Audun Weltzien  
Norwegian University of Science and Technology, Norway

ABSTRACT

On the one hand, inadequacy of IO-concepts can, in combination with other factors, contribute to major accidents. On the other, work processes and technology within an IO-context contribute to prevent major accidents. This chapter shows how IO concepts can enable a resilience-based approach to major accident prevention by employing a case study of an onshore drilling center. Interviews indicate that drilling and well operations justify a resilience approach, as these operations are complex and dynamic. The case study shows how an onshore drilling support center facilitate adaptation to current and future situations at the sharp-end by providing decision-making support for the sharp-end by its ability to monitor what is going on, anticipate future developments, and look into past events and data. By use of the case study resilient capabilities and their required resources are identified. To ensure that inherent organizational resilience is managed and maintained adequately, there is a need to: 1) identify and refine inherent resilient capabilities and resources; and 2) develop methods and tools to manage resilience.

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INTRODUCTION

The recent introduction and development of IO-concepts, i.e. work processes and technologies for smarter decisions and better execution, enabled by ubiquitous real time data, collaborative techniques and access to multiple expertise (IO center, 2011), in the offshore oil and gas industry represent a Janus-face for major accident prevention. On the one side inadequacy of IO-concepts can, in combination with other factors, contribute to major accidents. On the other side, work processes and technology within IO contribute to prevent fatalities, severe injuries, environmental discharges and major material losses e.g. by improved decision-making by e.g. access to real-time data and access to expertise.

There are many claims that IO among other things results in improved HSE performance (e.g OLF, 2007). Often, this promise is justified by showing a reduction in lost-time injury rates or other occupational accident statistics. However, history has shown that good occupational accident statistics do not necessarily reflect a low risk for major accidents. Major accidents have happened in systems with good occupational accident statistics, e.g. Texas City refinery explosion (Hopkins, 2009). The same story applies to the Deepwater Horizon accident. The installation had a low lost-time injury rate prior to the blowout in April 2010. The investigation reports from the Deepwater Horizon accident as well as from the Montara blowout in 2009 and the near accidents at Snorre A in 2004 and Gullfaks C in 2010 show that what can be characterized as IO-related processes and technology have been significant contributing factors to these incidents, e.g. inadequate information flow between distributed actors and lack of involvement of onshore experts.

The investigation reports from the above mentioned incidents show that there have been deficiencies in the safety management systems, e.g. related to risk assessments, safety training, management of change, collaboration between different actors and flow of safety-related information (Tinmannsvik et al., 2011). For complex and dynamic socio-technical systems, Woods and Hollnagel (2006) claims that conventional safety management approaches are insufficient as they are mainly based on assumptions and models of systems being linear and simple. The approaches and methods applied in safety management need to be powerful enough to match the context of the system to be controlled. A resilience-based approach to safety management is one way to cope with the challenges of complexity, dynamism, conflicting tasks and unanticipated events (Woods and Hollnagel, 2006) On the one hand side IO-concepts contribute to these challenges, but on the other hand they are enablers for a resilience-based safety management approach which makes it possible to cope with theses challenges.

By employing a case study of an onshore drilling center, the purpose of this chapter is to elaborate on how IO concepts can enable a resilience-based approach to major accident prevention. The chapter first identifies how IO concepts influenced the blow-out incidents at Macondo, Montara, Snorre A and Gullfaks C. With these incidents as a rationale it is argued that a resilience-based approach to major accident prevention is needed as a supplement to traditional approaches. By use of a case study of an onshore drilling center it is shown how IO concepts can enable resilience-based safety management.

IO-RELATED WORK PROCESSES AND TECHNOLOGY IN RECENT MAJOR ACCIDENTS

There have been few attempts to link the development and implementation of IO concepts with major accident risk. Major accidents in the oil and gas industry happen seldom, however when they do happen the consequences are severe. No major accidents or near accidents are wanted, but when they occur they represent opportunities to learn and
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