



Special Issue Article: Learn&amp;train for safety

## Prevention of “simple accidents at work” with major consequences



Kirsten Jørgensen

Management Engineering, Risk Research Group DTU, Denmark

## ARTICLE INFO

## Article history:

Received 2 September 2014  
 Received in revised form 18 January 2015  
 Accepted 29 January 2015  
 Available online 18 February 2015

## Keywords:

Occupational accident  
 Safety at work  
 Safety barrier  
 Safety management

## ABSTRACT

The concept “simple accidents” is understood as traumatic events with one victim. In the last 10 years many European countries have seen a decline in the number of fatalities, but there still remain many severe accidents at work. In the years 2009–2010 in European countries 2.0–2.4 million occupational accidents a year were notified leading to 4500 fatalities and 90,000 permanent disabilities each year.

The article looks at the concept “accident” to find similarities and distinctions between major and simple accident characteristics. The purpose is to find to what extent the same kinds of prevention or safety methodologies and procedures established for major accidents are applicable to simple accidents.

The article goes back to basics about accidents causes, to review the nature of successful prevention techniques and to analyze what have been constraints to getting this knowledge used more broadly. This review identifies gaps in the prevention of simple accidents, relating to safety barriers for risk control and the management processes that need to be in place to deliver those risk controls in a continually effective state.

The article introduces the “INFO cards” as a tool for the systematic observation of hazard sources in order to ascertain whether safety barriers and management deliveries are present. Safety management and safety culture, together with the INFO cards are important factors in the prevention process.

The conclusion is that we must look at safety as a part of being a professional in all kinds of jobs and occupations as well as at management level.

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## 1. Introduction

The concept “simple accidents” is understood as traumatic events with usually no more than one victim in contrast to major accidents. The use of the term “simple accidents” is intended to underline that this kind of accident is perceived as trivial, common or traditional, and that such accidents seem to be rather simple to explain, both as to why they happen and when they happen. These accidents result primarily in injuries with minor consequences, but also once in a while people may be more seriously harmed and the consequences may turn fatal. Most occupational accidents are simple and happen in all occupations, sectors and countries – more or less everywhere.

Through the last 10 years many European countries have seen a decline in the number of fatalities, but there still remain many severe accidents at work. In the years 2009–2010 in European countries 2.0–2.4 million occupational accidents a year were notified (Eurostat, 2013a,b) leading to about 4500 fatalities and about 90,000 permanent invalidities each year (see Table 1).

These worrying statistics need to be discussed taking into account the developments in the field of occupational health and

safety. Safety legislation has been growing continuously for the last 50–60 year, making employers the main ones responsible for their employee's safety. Safety organizations have been established and specific regulations have been established for many types of hazards and activities. Frequent safety campaigns are a prioritized support activity by authorities and insurance companies. Safety training and education courses have been established and technology has improved remarkably with regard to in-built safety. However, the costs of injuries from occupational accidents for EU 15 is still estimated at 55 billion euros (Eurostat, 2004). Other cost calculations tell stories of great costs for both employers, employees and the broader society (Gavious et al., 2009; Rikhardsson and Impgaard, 2004; Labour Organisation in Denmark, 2010; Eurostat, 2004). If employees, employers, the regulatory authorities or politicians are asked, then all agree that nobody should be injured when they are at work and certainly not be made permanently disabled or get killed. Furthermore they agree that it is better to prevent than to cure.

The question then is why we still see so many occupational accidents happening again and again. What do we miss or have not understood about how to avoid these accidents?

This paper is divided into three parts:

Part 1 will look at the concept “accident” to find similarities and distinctions between major and simple accident characteristics. The purpose is to find to what extent the same kind of prevention or safety methodologies and procedures established for major accidents are applicable for simple accidents.

Part 2 will go back to basics about accidents causes, to review the nature of successful prevention techniques and to analyze what have been constraints to getting this knowledge used more broadly. To do this we will start our description of the causes of occupational accidents with the injury and its consequences and go back in the causal sequence through the immediate, proximal causes to the root causes. This review will identify gaps in the prevention of simple accidents, relating to safety barriers for risk control and the management processes that need to be in place to deliver those risk controls in a continually effective state. A safety barrier is understood to be a physical and/or behavioral barrier blocking the development of a scenario from becoming a loss of control and leading to harm. They include technical safety barriers that need to be provided, used, maintained and monitored as well as behavioral safety barrier covering procedures, plans, rules, availability, manpower, competence, commitment, conflict resolution, coordination and communication (Hale and Guldenmund, 2003).

Part 3 introduces a proposal for how to cover the gaps found in part 2, relating to information about hazard sources, safety barriers and management delivery systems for different risks. This will present the concept of “INFO cards” as a tool for the systematic observation of hazard sources in order to ascertain whether safety barriers and management deliveries are present.

Part 4 looks at the problem of getting safety to be prioritized in a company and the need for integration at all levels of the hierarchy. Safety management, safety culture and safety climate, together with the knowledge included in the INFO cards are important factors in this process (Glendon et al., 2007; Hale et al., 2010; Jørgensen, 2002; Zohar, 2008).

The conclusion will be that we must look at safety as a part of being a professional in all kinds of jobs and occupations as well as at management level.

## 2. The concept “accident”

Accident models and theories in safety and prevention have traditionally treated accidents as all of the same kind. Nevertheless, there has sometimes been a distinction made between major accidents and occupational accidents in the sense that some theories, models and cause analyses have been based either on major accidents or on occupational (simple) accidents. But the definitions, the causal modeling and analyses and the discussions about preventive measures seem to treat accidents as all of one kind. We need to look a bit more closely at the phenomenon “accident” to untangle this.

### 2.1. Definition

The definition of an accident has been formulated in many ways throughout history. However, an analysis of different accident models shows that three elements are always to be found in models; the description of the causes, the events leading up to them

and the consequences (the injury or damage) (Jørgensen, 1982). The causes are most often described as multiple and sequential; the events as sudden, unexpected and unplanned and the consequences as harm to people, materials, production or other values (Kletz, 2002; Sklet, 2004; Jørgensen, 1982; Eurostat, 2002, 2013a,b). The main difference between the definition of major accidents and that of simple, occupational accidents is that major accidents have consequences not restricted to the immediate occupational area and are characterized by harm to many people, valuables and materials, while occupational accidents happen at work and normally have consequences for only one person.

### 2.2. Frequency and seriousness

Major hazards can therefore be defined as events resulting in very severe consequences. Exactly because of these potentially severe consequences a lot of effort has been, and has to be, taken to obtain the lowest possible probability for such an accident, often through technologically complex and tightly coupled systems with a high degree of control and defense-in-depth, developed through predictive analyses. As and when a major accident happens a lot of effort has been put into identifying causes and cause – consequence relations driving a learning process aimed at removing causes (Sklet, 2004; Rasmussen and Svedung, 2000; Rasmussen, 1997).

Simple occupational accidents have a much higher frequency and have in fact killed or permanently injured more people in total than all the major accidents which have occurred. Nevertheless, the consequences for each individual occupational accident can be seen as minor compared to the major accidents. However this is only according to a view from society or the regulator; for the victims it does not make any difference whether they are killed or maimed alone or as one of a crowd. The types of hazards and causes leading to occupational accidents and injuries are many and complex and occur often in loosely coupled (work) systems. Most importantly, these systems are believed to be controllable by the victims or those close to them by removing the root causes, identified often by statistical analysis as their errors (Rasmussen and Svedung, 2000). The question is if that is true.

### 2.3. Hazard information

Frequency and seriousness are also a question of who is at risk, when, where and in what situations and with what probability a given type of accident can lead to serious consequences. Hazards regarded as major hazards are largely connected to processes, technologies, and materials with well-defined hazards such as explosions, crashes or collapses, which we can easily locate (Rasmussen and Svedung, 2000; Sklet, 2004; Stoop and Roed-Larsen, 2009). Major hazards are, for the same reason, controlled, or at least isolated technologically and are surrounded with procedures and rules in tightly coupled systems to control the hazard (Bird and Germain 1985; Glendon et al., 2007; Hale and Guldenmund, 2003; Rasmussen and Svedung, 2000; Sklet, 2004; Stoop and Roed-Larsen, 2009; Perrow, 1984).

In contrast to the strong focus on major hazard prevention, the many types of occupational hazards are so common in every work process that most people hardly think about them. These include a

**Table 1**

Registered accident at work in 2009–2010 reported to Eurostat from 27 EU countries + Norway according to the severity of the accidents and the duration of absence.

| Severity  | Fatal | Permanent disability | 3–6 months absence | 1–3 months absence | 14–30 days absence | 4–13 days absence | Unknown | Total     |
|-----------|-------|----------------------|--------------------|--------------------|--------------------|-------------------|---------|-----------|
| Year 2009 | 4381  | 98,771               | 102,116            | 439,358            | 604,386            | 906,396           | 284,952 | 2,440,360 |
| Year 2010 | 4567  | 83,294               | 83,230             | 369,126            | 506,760            | 744,500           | 267,600 | 2,059,077 |
| Total     | 8948  | 182,065              | 185,346            | 808,484            | 1,111,146          | 1,650,896         | 552,552 | 4,499,437 |

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