Understanding the Risks Posed by Management

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Abstract

The risks posed by management are neither addressed by risk analysis nor included in safety cases. Yet they have been shown to be significant contributors to accidents. This paper argues for more attention to be paid to them and for the development of a risk-analysis method to address them. The paper examines the aspects of management risk that it might cover and offers a set of proposals for its design.

1   Introduction

Traditionally, risk analyses have addressed equipment failure, using processes and techniques derived from reliability theory. More recently, it has been recognised that the human components of systems also contribute, sometimes substantially, to functional risks, and an increasing number of analysts now attempt to address, to some degree, the hazards introduced by human operators. However, authoritative guidance has not kept up with awareness, and there is a lack of information on how to include human factors in risk analyses. For example, the meta-standard, IEC 61508 (IEC 2000), devotes lengthy parts (2 and 3) to the ways in which hardware and software (respectively) should be addressed, but offers no equivalent advice on analysing the risks posed by humans. The safety-critical systems industry now requires greater involvement of engineers in human factors issues, a determined focus on the dissemination of knowledge and experience in the field, and the development of guidelines on the inclusion of human factors in risk analyses (Redmill 2002).

Lagging even further behind is any attempt to address the risks posed by management, particularly senior management. Yet, judging by the results of numerous inquiries into major accidents, such risks can, in many cases, outweigh those thrown up by the failure of system components. The policies and strategies defined by senior management, the decisions that they make, and the cultures created by them, by design or default,

predispose accidents to occur or not to occur. When the predisposition is to accident, the final triggering event is relegated merely to the activation of 'an accident waiting to happen'.

In her examination of the origins of the 1986 *Challenger* space shuttle disaster, in which seven astronauts died, Vaughan (1996) points to mistake and disaster being 'socially organised and systematically produced by social structures' – due to management's acquiescence or negligence. She says that the cause of the disaster was 'a mistake embedded in the banality of organisational life' and she shows how 'deviance in organisations is transformed into acceptable behaviour'.

In his investigation of the same incident, Feynman (1989) found that engineers at NASA (National Aeronautics and Space Administration) considered the chance of a shuttle failure to be about 1 in 200 launches and, at best, 1 in 1000. But he found that NASA management took the figure to be 1 in 100,000 launches – which, Feynman pointed out, would mean that a shuttle could be launched every day with an average of almost 300 years between accidents. Historical data showed the engineers' estimate to be accurate, but organisational decision-making was implicitly carried out on the basis of management's estimate.

Risk analysts expend effort, often at considerable expense, to determine the likelihood of the final triggers of hazardous events. They address equipment failure and sometimes operator error; they address the hazards arising from unintended interactions of system components, even when no failure occurs; but they do not address the failure of management systems and, in general, the influence of management on functional risk. With respect to safety, the resulting analyses must be optimistic.

For safety cases truly to demonstrate the achieved safety of a system, they must cover all relevant risks. It is therefore time for them to include management risks. But this is not a trivial requirement. First, the junior- and middle-level staff who carry out risk analyses are, typically, not experienced in the higher-level issues, such as company policy, strategic plans, management style, organisational culture, and safety management systems, and are therefore not competent to analyse them for the risks that they might pose. Second, there is no generally accepted process of modelling and estimating such risks. Who should conduct the risk analyses, and how? Research is required.

The purposes of this paper are to raise awareness of the need and to propose a method for including management risks in risk analyses and safety cases. Section 2 briefly examines what might be done about management risks, Section 3 considers management and its risks from different perspectives, Section 4 makes proposals for a method of analysing the risks posed by management, and Section 5 offers a discussion of the proposals.

2   Options in Addressing Management Risk

Given that the risks posed by management can have significant effects on the functional safety of systems that are developed, operated, or disposed

of by or within a company, and that they are currently not included in risk analyses, what might be done about them? Four possibilities are considered.

2.1   Do Nothing

Bringing management risks within the ambit of risk analyses is likely to be a difficult and even controversial business, so the easy route would be not to 'rock the boat'. However, given that the purpose of this paper is to challenge the status quo, this is not an option to be examined further.

2.2   Improve Management's Risk Awareness

One option is to focus on reducing risk rather than analysing it. And one way of doing this is by improving management's awareness of safety risk, and of risk issues in general – with the added exhortation to manage the risks. Certainly, the raising of awareness is an essential starting point, no matter what is to follow. Happily, this step has already been taken, and in a manner that is visible to most companies in the UK.

In its guidance on Internal Control (ICAEW 1999), the Institute of Chartered Accountants in England and Wales requires boards of company directors to identify and analyse 'the significant risks faced by the company' and to 'disclose that there is an ongoing process for identifying, evaluating and managing' them. The Institute also invites directors to provide information in their annual reports 'to assist understanding of the company's risk management processes and system of internal control'. Thus, boards of directors are enjoined not only to be aware of their risks, including safety risks, but also to analyse, understand and manage them, and, further, to demonstrate to shareholders and other interested parties that they are doing so effectively. The Institute also calls on companies' boards of directors to adopt 'a risk-based approach to establishing a sound system of internal control', which is a requirement for boardroom-led systems based on risk management. For those companies that develop, operate or dispose of systems, the functional risks posed by those systems are risks 'faced by the company' and require to be managed within the company's system of risk-based internal control.

Thus, boardroom management is already required to be aware of its significant risks. More than that, it is required to accept responsibility for managing them and for demonstrating that it is doing so effectively. However, compliance with even legal requirements cannot be guaranteed, and where it exists it is certain to be inconsistent across companies and industry sectors (Ramsay and Hoad 1997), so the Institute has published advice for directors (Jones and Sutherland 1999) on the processes necessary for meeting the requirements. Moreover, taking a risk-based approach at the top of a company, and ensuring that the same is done at all lower levels, requires not merely an awareness of what is required but also a change of culture in senior management (Elliott et al 2000). For the benefit of companies for which significant risks are the functional risks of their systems, the Health and Safety Commission has issued advice to directors,

urging them to include health and safety issues in their annual reports (HSE 2001).

Many companies have introduced risk-based systems of internal control (Page and Spira 2005), but it is not known to what extent a risk-based way of thinking has led managers to examine the risks that they themselves pose - in their policies, decisions, and the cultures implicit in their leadership. Thus, general awareness is not enough to ensure that one of the major sources of safety risk is understood and managed. Nor is it sufficient to appeal to phrases like 'significant risks facing the company', for managers new to the discipline of risk management are unlikely to recognise such risks as potentially arising from their own decisions, actions and negligence. Additionally, it is necessary to create a process of getting to grips with the risks that are of interest in the present context.

2.3   Focus on Improving Safety Culture

Another way of reducing safety risk, without carrying out risk analysis, is, at least in theory, by improving an organisation's safety culture. This is expressed by the attitude and behaviour of staff, and should be defined, developed and nurtured by management. If this is to be done systematically, according to a plan to develop a 'good' culture as well as a 'strong' one (Levene 1997), it must necessarily include the raising of management's awareness, as discussed in the previous sub-section. Thus, improving culture is taking a step beyond the mere raising of awareness.

There has been a great deal of research into the subject of safety culture, with literature reviews being carried out, for example, by Guldenmund (2000) and the Health & Safety Laboratory (2002). Both the terms 'safety culture' and 'safety climate' are used, and, while some authors make a point of distinguishing between them, others use them interchangeably (Health & Safety Laboratory 2002). Universal agreement on definitions is therefore lacking. Indeed, Guldenmund (2000) points out that, although safety culture and climate are generally acknowledged to be important concepts, not much consensus has been reached on their cause, content and consequences. He further states that there is a lack of models specifying the relationship of the two concepts either with safety and risk management or with safety performance.

On the assumption that good culture is a good thing, and a way of attempting to improve safety, industry as well as academe has invested in it. The nuclear industry was perhaps the first to address the issue of safety culture (International Nuclear Safety Advisory Group 1991), and the same industry has prepared practical guidelines for the development and maintenance of such a culture (International Nuclear Safety Advisory Group 2001). Guidelines with the same intent have been produced in other large safety-related industry sectors, such as the railways and off-shore oil and gas exploration, and, more generally, for the Health and Safety Executive (2002). There has also been an attempt to define the development of a 'safety culture maturity model' (The Keil Centre 2001).

Thus, there is already a continuing attempt to define, improve and measure safety culture. Yet, even with increased awareness and improved

safety culture, and even if these do lead to improved safety, how can the adequacy of safety, with respect to risks posed by management, be demonstrated? Pointing out that awareness is high and culture good is not sufficient. Completeness also requires the inclusion of such risks in risk analyses, which may then inform safety cases.

2.4   Include Management Risks in Risk Analyses

If management risks are to be demonstrated in a safety case to be tolerable, or to have been reduced to a tolerable level, they must be managed, and to be managed they must be understood. The accepted way of arriving at an understanding of risks is to identify the hazards that could give rise to them and to analyse those hazards so as to acquire the knowledge necessary for the required understanding. It is therefore necessary to subject the risks posed by managers to risk analysis. As already observed, this may be a difficult task. Yet, if it could be done, the results would provide a basis for a number of activities, including assessing tolerability, raising management's awareness of their own risks, determining where it would be useful to propose changes to management behaviour, and identifying appropriate points for inserting risk-reducing barriers. A method designed to address the analysis of the risks posed by management would, potentially, be an asset. The remainder of this paper presents proposals for the design of such a method.

3   Inquiry into Management

A necessary prerequisite to determining how to bring management risks within the scope of risk analysis is to decide what 'management' means. In order to develop a method of addressing risks, there must be an understanding of the types of risk to be dealt with and the nature of the field of exploration. This section identifies a number of perspectives on management risk and considers their implications for addressing risk.

3.1   Levels of Management

In general, three levels of management in an organisation may be assumed - senior, middle and junior.

Typically, juniors constitute the greatest number of managers, their responsibilities are operational, and their influence is local. In operation, failure of their control is likely to lead to a single incident - though, in manufacture, it could introduce a systematic fault into many systems.

Middle managers are fewer and the influence of their decisions and actions extends over the lower level as well as their own. They are charged with ensuring that business objectives are met, so the ways in which they do this can introduce systematic faults into the ways in which junior managers and staff function.

Senior managers are less constrained by protocol than middle and

junior managers, and their decision-making is more by judgement, and even intuition, than according to rules and procedures. Their decisions and actions have strategic importance and their influence encompasses not only their own but also both lower levels. They are responsible for defining an organisation's policies and for approving the strategies for meeting them. Importantly, they are responsible for providing the leadership that defines and nurtures culture, including safety culture. Thus, whether explicitly or implicitly, they define not only the organisation's objectives but also the ways in which the staff attempt to meet them.

Having defined three typical levels of management, it should be pointed out that the Institute of Chartered Accountants in England and Wales distinguishes between management and directors, saying, 'It is the role of management to implement board policies on risk and control. In fulfilling its responsibilities, management should identify and evaluate the risks faced by the company for consideration by the board and design, operate and monitor a suitable system of internal control which implements the policies adopted by the board.' (ICAEW 1999) A company's board is therefore a fourth level.

In seeking a method of analysing management risk, it would be easiest to limit the task to the junior management level. An obvious starting point is to attempt to include the junior manager within the boundary or the system that is the source of hazard, and to fashion a method from the risk-analysis techniques already in use, the developing field of human error modelling, and one or more human reliability assessment (HRA) methods.

The scope of middle management may be expected to extend beyond a system boundary, and identifying and analysing the hazards at this level is likely to require innovation beyond the mere application of existing methods.

The higher the management level, the more difficult it would be to identify and analyse the hazards, and the more likely that every identified hazard would, from some point of view, be perceived as having a safety-related outcome. Yet, the higher the level, the greater the influence of decisions and actions and, therefore, the more worthwhile it would be to study and understand the risks. At the senior and board levels, risks include those of not adequately defining and installing appropriate risk-management systems for analysing and assessing the organisation's significant risks.

Thus, in setting out to devise a method of analysing management risks, decisions must be taken as to where the focus - at least, the initial focus - should be directed. It is likely that, in creating a risk-analysis model, the assumptions that would need to be made at any one level would differ from those at any other. Care would be necessary in devising a method that is applicable at all levels.

3.2   Management Systems

The concept of a 'quality management system' is familiar. Such a system (for example, ISO 9000) defines the roles, responsibilities and procedures necessary for achieving quality in meeting an organisation's objectives.

Similarly, a safety management system may be defined for the achievement and maintenance of safety in an organisation's activities.

At the lowest level in the organisation, staff are, typically, expected to adhere rigidly to the system's procedures. The higher the level, the more discretion a manager is expected to use. Indeed, senior management is expected to put the system in place and middle management to ensure that it functions both efficiently and effectively. From the perspective of a safety management system, management failure can be seen to differ qualitatively from level to level in the organisation.

As with high-level policies, strategies and decisions, the contents of a management system have a predisposing effect on safety. The system is intended to impose constraints on acts that could be unsafe and to place barriers in causal chains that could lead to accidents, so failure to build them into the system, or to introduce checks to ensure that they are being observed, could lead to unsafe outcomes. Similarly, failure to police conformity with a system, particularly when its rigour might cause staff to employ violations, can have the same effect. Thus, instead of addressing the levels of management, from whatever perspective, another option is to consider the safety management system itself. If its function is to define the ways in which safety-related work is carried out, and the barriers that should ensure safety, a method may be devised to determine its correctness, adequacy, and operational integrity.

Although humans, including managers, are integral parts of management systems, senior managers should also be identified as existing outside of the systems - because they are responsible for defining them, putting them in place, and monitoring them. System failures may extend back to these senior managers.

3.3   Organisational Culture

A management system promotes safety and defines the route to it. But it is the culture of staff that determines whether or not the route is systematically taken. Methods of 'measuring' an organisation's safety climate or safety culture, based on questionnaires that test the attitudes of members of the organisation, have been developed (e.g. Cooper and Phillips 1994, The Keil Centre 2001). It could be possible to reflect the results of such measurements as levels of risk, and research could be conducted into ways of doing so. This, however, is not within the objectives of this paper and will not be discussed further.

3.4   Policies and Strategies

In some cases a policy or strategy may be implied, but it is more usual – indeed, in a safety- or quality-conscious company it is normal – for them to be defined and documented. Given this, it is possible, in theory at least, to subject a policy or strategy to risk analysis. One option, therefore, is to seek to devise a method to achieve this. It is likely that a method that is appropriate to analysing a safety management system would also be appropriate to analysing policies and strategies, and this will be explored

further in this paper.

3.5   Decision Making

A key feature of management, particularly at higher levels, is decision making. Behind every management action and instruction lies a decision, whether or not it is consciously taken. Some risks may lie in the decision making itself, for example when the decision maker's mental model of the problem to be resolved, or its environment, does not match reality and the decision leads to an unsafe outcome. Others may arise from the translation of decisions into actions or instructions, or in the misinterpretation of instructions by subordinates. As managers set the scene for safe or unsafe actions with their decisions and resulting instructions, it would seem that an analysis of management risk should include the decision-making.

   Yet, the number of decisions that a manager makes is necessarily huge, and each one could lead to a variety of outcomes, many of them not easily foreseeable. It is therefore not apparent how all management decisions could cost-effectively (or even usefully) be subjected to risk analysis. However, whether or not decisions are analysed, it may be possible for a management system to include processes that cause the introduction of barriers that would prevent certain undesirable outcomes to result from management decisions. And it may be possible to create a method that a manager could use to subject selected important decisions to risk analysis. This possibility will be explored below.

4   An Initial Proposal for a Method

The various aspects of management risk discussed above are different in kind. Taking the perspective of any one of them, it is not immediately clear that a single risk-analysis method would embrace them all. It is therefore worth starting from a different point, that of the need for a tangible representation of the 'system' to be studied. Thorough and methodical risk-analysis must be carried out on a model of the object of study. This section commences by addressing the need for an appropriate representational model and continues by considering other aspects of an intended risk-analysis method that is appropriate to the risks posed by management.

4.1   A Representation of Management

A common feature of management activities is that they may be defined in terms of a set of processes. This is clearly the case for a safety (or quality) management system. Thus, an initial attempt to create a method could usefully be aimed at the risk analysis of such a system, using a process model.

   A process translates one or more inputs into an output. To do so, it employs resources, including humans, and it relies on assumptions about its external environment. All of these features can be included in a simple

model, which may be created from block diagrams, flow charts, the unified modelling language (UML), or a number of other representations. Figure 1 shows a simple process in which three activities, A, B and C, acting sequentially, transform an input into an output. The boundary of the process is defined (around the three activities); the input, as well as resources and data, are derived from outside of the boundary, across which the output is transferred.

A policy or strategy is usually expressed textually, as an intention or instruction, but its implications, including the way in which it would be applied and its likely or potential consequences, may be determined and laid out as a set of processes. Similarly, a significant decision and its implications may also be laid out as a process, though with a greater variety of possible paths and perhaps with less certainty.

A method designed for the analysis of processes would not depend on the pre-existence of a suitable representation of the management issue under consideration, for an expression in terms of a process could be created for the purpose of analysis.

Representing the processes defined or implied in the creation and implementation of management systems, decisions, plans, policies, and proposals for change would not only allow their analysis for safety and other risks in advance, but also allow management to assess the mechanisms and effects of their implementation. It would indicate where improvement is necessary and offer guidance to auditors on where to concentrate their efforts most effectively.

Thus, an initial proposal is to represent management as a set of processes and to design a method for their risk analysis.
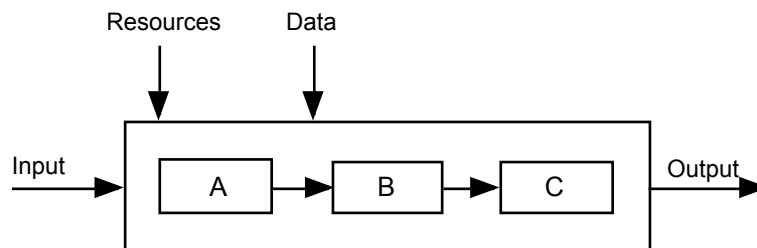

Figure 1: A simple process

4.2   Testing Assumptions

No activity is free of assumptions, and every assumption introduces risk. Assumptions are often made for good reasons, such as when information necessary for a better-informed decision is unavailable. In such cases the assumptions are known and should be recorded. Assumptions that are initially valid may become invalid with time (and often do) and they should be monitored. Many assumptions are implicit, particularly when

dependencies are involved. For example, in Figure 2, Activity B may assume correct input from Activity A, but this may not be the case if Activity A has been subject to staff shortage, competence deficiency, or the loss of a crucial item of equipment. The notes below the figure suggest other assumptions that may be implicit in the process.

A thorough risk analysis should identify assumptions, check their validity, test the confidence that they can reasonably attract, and determine their risks. In the intended method for conducting management-risk analysis, rules will ensure that assumptions are searched for, made explicit, and analysed.
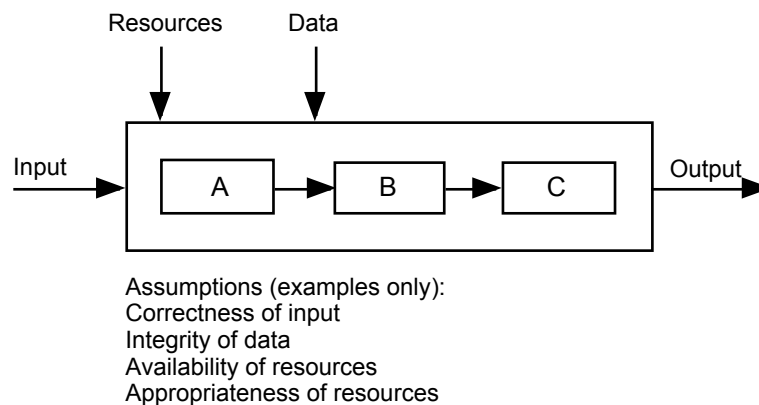

Assumptions (examples only):
Correctness of input
Integrity of data
Availability of resources
Appropriateness of resources

Figure 2: Some implicit assumptions

4.3   Creativity versus Rules

A tool intended for use by a range of personnel should be easily and rapidly employed and its results should be repeatable and auditable. These criteria suggest that its operation should be mechanistic and based on rules. Yet, the management issues to be analysed by the intended method can have subtle, unexpected and unintended effects, which suggests that their successful exploration requires a creative approach. The method's design must therefore provide procedure-based operation, in which the procedures demand, in appropriate places, creativity. This needs to be designed for.

4.4   Integration into Management Systems

A method that proves its worth would, of course, be employed by an organisation for *ad hoc* use. It may even be defined as the standard tool for appropriate risk analyses. But it could also be integrated into management systems and defined as being essential when any new process is introduced or any change made to an existing process. Then, management

systems, whether safety or quality, would be subjected to risk analysis systematically, resulting in adjustments that reduce or eliminate risks rather than fixes after losses have been sustained.

4.5   A Tool for Individual Use

The intended easy-to-use method would be applicable by individual managers for the analysis of their policies, strategies, plans and decisions. In some cases an individual might carry out the analysis alone. But in most cases it would be preferable for the cooption of another person who would provide an independent perspective. The result would be instructions that have been tested for unintended and risky effects before being brought into use. At all levels of management, plans (for projects, project phases, or for the deployment of systems) could be subjected to analysis before being applied.

4.6   A Compliment to Audit

A management-risk analysis method would not only inform safety cases, it would also be complimentary to an organisation's audit function. For example, a checklist to inform audits could be made of processes or activities that are deemed particularly risky or that rely on assumptions in which there is limited confidence. In addition, the frequency or thoroughness of audits and the focus of safety assessments may also be increased for parts of a management system that are considered similarly risky, or whose failures could lead to particularly severe consequences. In these ways, both the efficiency and the effectiveness of audits and safety assessments could be improved.

4.7   Confidence Levels

Being concerned with the future, the results of risk analysis must contain uncertainty. Their accuracy, or reliability for the purpose in hand, must be expressed in terms of the level of confidence placed in them, for their level of correctness cannot be known. Yet statements of confidence seldom accompany risk analyses.

Confidence in a risk analysis depends on the completeness and accuracy of the information on which it is based, which in turn depend on the representativeness and pedigree of the sources of information. It also depends on other factors, such as the means of interpretation of the past information into predictions of the future and the assumptions involved. Analysts should understand these matters sufficiently well to determine the confidence levels that they can reasonably place on their results, and rules in the intended method will require them to do so.

There is also the problem of consistency in the determination of confidence levels. What confidence can there be that two analysts, given the same information, would claim the same confidence level? Or that the same standards would be employed by different analysts to arrive at their

confidence levels? The intended method should not only require statements of confidence but also provide guidelines for their derivation. The nature of these should be a part of the research into the method.

4.8   Coverage

Risk analysis may be described as a four-stage process. Risk mitigation adds a fifth. It is anticipated that the intended method will address all of them.
•   Scope definition. The objectives or the analysis, and the constraints on it, such as time, are defined, as are other prerequisites such as the system to be analysed – including its boundary and the manner in which it is represented (e.g. as a data-flow diagram).
•   Hazard identification. The things that could go wrong and their possible causes and potential consequences are identified, and it is determined whether they fall within the terms of reference of the analysis.
•   Hazard analysis. The relevant identified hazards are analysed in order to determine values for the likelihood of their maturing into incidents and the severity of the consequences if they did so. Thus, risk values, either quantitative or qualitative, are derived.
•   Risk assessment. The risks are assessed (evaluated) against predefined criteria to determine their degree of tolerability – from which, the appropriate risk management actions are derived.
•   Risk mitigation and monitoring. Risk management actions are taken and monitoring of the risks put in train.
   The method will require the essential prerequisite work of scope definition to be carried out. It will necessarily address the next three stages of risk analysis. Then, it will provide guidance on how the output of the risk assessment stage may be used to suggest options for risk management, for example by informing the placement of safety barriers. Further, the method will be appropriate to re-analysis of the improved system and may include guidance on this.

4.9   Composition

It is intended to base the method on an amalgam of established techniques, with the addition of administrative and operational rules appropriate to the method's goals (such as identifying and assessing assumptions and determining confidence levels). The exact composition is subject to research, but consideration has already been given to deriving the use of guidewords and disciplined teamwork from HAZOP (hazard and operability studies), the examination of failure modes from FMEA (failure modes and effects analysis), and to the need to explore chains of cause and effect. Starting with HAZOP and FMEA is justified by the fact that both of these techniques are not dependent for their efficacy on the type of system being explored, and both have been employed on several types of system representation, including textual representations.

5   Discussion

Although risks posed by management have been shown to be significant contributors to accidents, they are not normally included in risk analyses or safety cases – with the result that assessments must be optimistic. If management issues were addressed, not only would there be truer representations of risk, there would also be a basis for the assessment and improvement of an organisation's corporate governance.

This paper proposes a method for conducting the analysis of risks posed by management and points out the research issues that need to be tackled. These include the composition of the method itself, the types of representation of the management issues to be addressed by it, the rules to be built into the method and the guidelines to accompany it. For example, what rules are necessary for the effective exploration of assumptions? The ways in which the method will operate also need to be explored. For example, within the process in Figure 1 there are boxes, which enclose activities, and arrowed lines, which indicate the transmission of output. Do there need to be differences in the ways in which these two entities are analysed? Ease and repeatability of use by many people requires procedure-based operation, but thorough risk analysis demands creativity and, therefore, discernment in use. Ways in which the rules can embrace these apparently conflicting requirements need to be examined.

The paper also points to the potential usefulness of the intended method. It would be appropriate for systematic use on management-system processes, policies and strategies. Indeed, it could be integrated into management systems so as to enforce the investigation of the risks during the production or change of any such documents. Doing this would have the added advantage of ensuring the exploration of the ways in which policies, strategies and the clauses of management systems might be implemented, and this could lead to the early recognition of unsafe or otherwise risky approaches and to the definition of preferred procedures – the use of which could then be monitored.

It would be suitable for selective use in management decision-making, and managers could easily be trained to use it for that purpose. It could inform audits and safety assurance, and it would provide input to safety cases.

Indeed, such a method could be used systematically to provide input to a generic safety case for the corporate governance and safety management of an organisation. Such a document would be dynamically alive, being updated regularly, and would form the basis of input to the organisation's system safety cases.

Vickers (20006) shows that even the most safety-conscious companies suffer from organisational vulnerabilities when it comes to safety, and that these are manifested in a number of ways. For example, by the inability to demonstrate effective safety management, difficulty in changing aspects of their safety management systems, difficulty in auditing or demonstrating completeness of the approach to safety management, and difficulty in identifying corporate safety responsibilities. The proposals defined in this paper show that the intended method for the analysis of management risks

would make significant contributions to overcoming all of these problems.

Although the initial conception of the method was for the analysis of safety risk, it is apparent that it would be equally applicable to other types (e.g. financial, security, reputational, organisational risks and other unintended consequences) arising out of management activities. It would be suitable for analysing not only safety and quality management systems, but also management decisions, plans, policies, and proposals for change of any kind. Such a method, with appropriate rules and guidance, would enhance not only the safety management but, indeed, the overall quality of management of an organisation.

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