

# Preface

There is much that brings complexity to the study of risk and the practice of its management. Each different type of risk requires a different understanding of its origins and how to control it. Even the same type of risk may be found in very different technologies and very different circumstances that greatly influence it. In addition, the essential uncertainty of various aspects of risk, particularly where and when we may suffer from it, result in an extraordinary complexity in our personal and societal responses to it. The enormous range of this uncertainty brings within the scope of investigation matters whose effects are as varied in consequence as routinely experienced machinery breakdown and infrequent catastrophe. Our ability to harness the powers of nature in the service of industry and society has grown rapidly, especially since World War Two, and far more rapidly than our understanding of risk and its management. The punctuation of the historical record with high profile disasters continues apparently little influenced by our efforts, as anyone with access to world news knows.

Various strands of theory and research have the potential to contribute to a better understanding and capability, from statistics and reliability mathematics to the study of psychology and human factors and failure analysis and prediction tools. However, it is generally true that developments in these disparate areas have proceeded in parallel and it is further evidence of the complexity of this field of study that each can be accommodated without apparent overlap. There has also been little development in the way in which society as a whole responds to significant events, and in parts of the English speaking world at least no real thought has been given to how laws might be framed to allow society to better learn how to control risk.

It is not all bad news, however, as one thing that can be said to have changed dramatically for the better in modern times is the amount of effort and good intention devoted to this field. This has given rise to a rapid growth in both undergraduate and graduate courses of study and to a somewhat unsatisfied need for useful texts to support these studies. There is a particular need to present a view of risk and its management that sketches the overall character of the subject and that is founded on essential underlying principles that have stood and will stand the test of time. These principles should be relevant to the whole wide scope of pure risk and accommodate complexity, whatever its source. Such a text should also ensure that the new generation of aspiring risk engineers, advisers and managers is able to learn from the costly lessons of the past. It is hoped that the present work satisfies all or many of these needs. Much insight can be gained from practical examples, but a book can become unwieldy if it contains too many of them. Consequently, a number of examples are to be found on the associated web site, to which the reader is invited.

This book is the distillation of 40 years of experience in teaching and practising the management of risk, beginning in the mid 1970s when the author was given the task of establishing a postgraduate course in occupational hazard management. It quickly became apparent that the prominent practitioners of the time shared very little by way of terminology or methods and that there was also little material suited to inclusion in a course of study at that academic level. What there was had been widely ignored in favour of ideas from the 1930s. Industrial safety was a behaviour-oriented sub-professional activity supported less by research or theory than by beliefs. At the gathering of the first group of students admitted to the course, one asked: 'What makes you think you can teach us anything?' Subsequent experience made it clear that teachers learn from

students and students learn from teachers. In my case, the teacher took himself out into the real world, which is where the great majority of my work has been over the years. Consulting work was punctuated by the need to conduct lectures in the subjects of accident phenomenology and risk philosophy and to absorb the implications of hundreds of case studies submitted by students as the subject matter of their assignment work. It was also punctuated by periodic assignments as an expert witness, which provided an opportunity to see both the good and bad influences of the operation of the law and insurance companies.

A scientific education equips one less to understand the peculiarities of human behaviour in industry than to recognise the risk problems that people seemed so unable to perceive for themselves. Ideas of fault and blame appear to be both innate and virtually immovable and people are ready and even grateful to return to them after a period of discomfort experiencing the more rational (and perhaps therefore frightening?) world to which the underlying principles direct attention.

The need is to uncover a theoretical basis for understanding risk that is in accordance with the idea apparently credited to Einstein (but understood and approved of by many scientists) that everything should be made as simple as possible, but not simpler. From a good and simple theory comes the opportunity to understand complexity for what it is – the interaction of the real world with the principles which govern it. The temptation to enter the world of correlative statistical ~~analysis of circumstances trusting that, with luck, the can later be designed to brilliance. Deeper~~

~~analysis will uncover the real meaning of an accident, has been resisted. It almost certainly will not.~~  
*For the same reasons, the student and practitioner of the subject should develop a healthy caution towards the fads and fashions that periodically sweep through this field in the form of models and methods.*

With these admissions made public, the content of the book will be no surprise: exploration of complexity, with its point of connection with underlying principles hopefully always made evident. Wherever extraneous complexity exposes itself (for example decision theory, human error theory, present net value, the details of reliability mathematics) the choice has been to exclude it, in the belief that it can always be studied at another place and time and from a more qualified teacher. Because of the still pervasive acceptance of accident theory, including the need to find causes, a chapter is included that explicitly explains the theory and the results of adopting it. Where appropriate, attention is drawn to the links with the principles that are given a more thorough explanation in the book.

Every idea and guiding principle contained here has demonstrated its practical value in understanding real problems, given birth often in moments of the need to understand or to explain. The occupational scope of these testing grounds has included heavy engineering (integrated steel plants, open and deep mines, the power industry, fabrication and construction, petrochemical), manufacturing, paper, fish farming and forestry, food processing, universities, hospitality, as well as local and national government departments (regulators, ports and harbours, water, roads and traffic). The cultural scope has included very large and very small industries, well- and not so well-managed ones, large bureaucracies and industries in developing as well as developed nations.

At all times, the emphasis is on the development of preventive capability. Very little emphasis is given to reactive methods, including accident investigation. If one understands the processes of damage and loss well, no special understanding is required to conduct an accident investigation, unless it be unravelling bent metal (in which case theory is not of much assistance), or seeking someone to blame or prosecute (which has little social or practical value).

The underlying physical principles on which risk can be understood can be applied no matter what the organisation, industry or culture. Understanding management structures and capabilities is a completely different problem. Risk management requires a special set of capabilities not

necessarily found in day to day management. As one manager said: 'I can understand every aspect of managing this company, from sales to production and industrial relations. Why is it I cannot understand safety management?' In the early days of the author's career as an aerodynamicist there was a sign in the aerodynamics design office, which said: Simplificate and add lightness. Therein lies the task for risk advisers. Not being skilled in management theory, nor in individual and group psychology, the author cannot claim to offer much in the way of theoretical insight into this fundamental need. It is, however, a fact that risk management is a specific rather than a general task. No matter what the culture is, what needs to be done remains the same. The method of getting it done needs to be suited to the ability of the organisation and the people presently occupying positions – it will still need to be done long after they have moved on, so the task belongs to the organisation, not the individuals currently on watch.

We cannot afford to be too prescriptive about how the tasks are done or the objectives achieved, as this may be uncomfortable for the affected manager, whose abilities and ideas must be respected. We can inform and educate, listen carefully to the reasons for lack of progress and then think of ways in which the goal can be achieved within that framework, or capabilities developed that will eventually lead to the goal being reached.

In all this work, it is very important to distinguish between the management of operational risks and risks of a more general nature. Operational risks are those that arise in the specific processes of the organisation and if badly managed may lead to highly significant adverse consequences. Health and safety practitioners are experienced with general risks but their methods may be, and in many cases are, unsuited to the management of operational risks (and, regrettably, possibly also to understanding general risks). It is unsettling to see the effective and embedded practices to manage operational risks in the commercial aviation industry being threatened by general safety management methods of unproven value.

This book is written as a contribution to other practitioners, academics and students as well as to industry professionals including other engineers, scientists and managers in the hope that it makes even a small (although a large one would be better) contribution to reduction in the numbers of people killed by their employment, which will have amounted to about 55 worldwide since you began reading this preface.

Further information about this book and its subject matter can be found at [www.derekviner.com](http://www.derekviner.com).

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