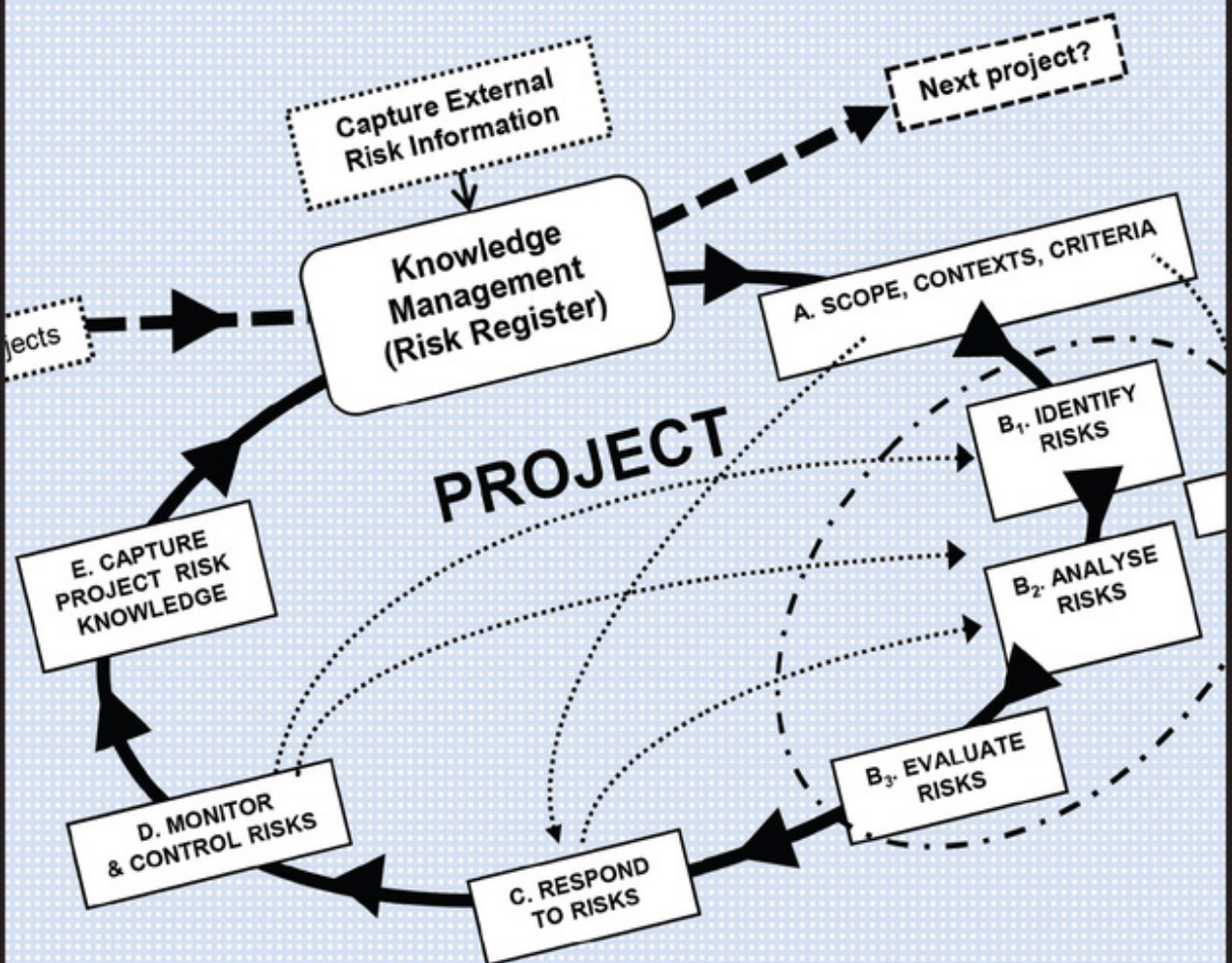


Peter J. Edwards | Paulo Vaz Serra | Michael Edwards

Managing Project Risks



Second Edition

WILEY Blackwell

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WILEY Blackwell

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Michael Edwards has a bachelor of science degree, majoring in mathematics, from Monash University in Melbourne. Over more than 20 years, his work in the Public Service of the Australian federal government has involved initiating and managing projects for services, and service improvements, implemented not only within the department but also offered on a tender or fee-for-service basis to other government departments and to private sector organisations. He is thus experienced in stakeholder management.

Preface to the Second Edition

Welcome to the second edition of *Managing Project Risks!*

The first edition was published in 2020. In late 2023, when our publisher asked us to consider writing a second edition we were quite surprised. Surely our book should have a longer shelf-life than that?

Now we know better! As we turned our minds to the possibility of writing a second edition, we quickly realised how much had changed since 2018 when we first started writing.

To mention only a few developments: drone technology and use has expanded enormously, particularly in terms of weapons applications; so have the evidence and outcomes for global warming and climate change. Regulatory environments have developed. Artificial intelligence (AI) has come to the forefront of technology development. ‘Fake’ and ‘deep fake’ news have entered our vocabulary.

We have experienced a global *corona-virus* pandemic, and face the threat of more such viruses in the future. We have painfully learned the need to become more vigilant in protecting ourselves from cyberattack. Invasive species and their impacts now pose a greater threat for many countries, and of course the political threat of war still manages to engage our minds globally.

In this edition you will find a completely new chapter (Chapter 15), ‘Planning for Crisis Response and Disaster Recovery’, as we think that this topic has been under-explored in terms of risk. A useful tool for assessing project complexity is included in Chapter 13, and a risk-based model of fraud presented in Chapter 14. Chapter 16 (Opportunity Risk Management) includes new material relating to AI.

Two comments from readers (and we always welcome more) about the first edition have pleased us. The first comment appreciated the practical nature of the book. This was always our intent, that the content should be of practical help to people engaged in managing risks on projects. It is satisfying to know that we achieved our objective, at least in part, and we hope that we have expanded that aim with this edition. The second comment related positively to the examples presented throughout the first edition. So, in the interests of never having enough of a good thing, we have added more! Almost every chapter in the second edition benefits from this.

We do hope you enjoy this new edition of our book, and that it will help you in your work and in your professional development.

Peter J. Edwards, Paulo Vaz Serra and Michael Edwards

Preface to the First Edition

If ‘project’ is part of your daily vocabulary, then this book is aimed at you. It is intended to appeal to practitioners of project management across a wide range of industries and professions; to people working in the private and public sectors, and those in the arts and entertainment; as well as to business organisations, service providers and manufacturers. Students are very much included in our target readership as they pursue their academic journeys on the way to entering hopefully satisfying and rewarding careers.

An overview of the content is provided in Chapter 1. Besides offering a systematic approach to project risk management that we hope is easy to follow and understand, we have introduced topics generally not found in other books on this subject but which have an important bearing on how risks are managed, particularly those associated with today’s projects. The additional matters we have dealt with include risk knowledge management; cultural risk-shaping; project complexity and political risks. Strategic risk management is also considered. These topics are based upon our own project experiences and reflections on how they might influence project risk management practice. Six project case studies (located as Appendices) are used to exemplify many of the points we make, together with many examples within the chapters.

We have adopted generic and multi-stakeholder perspectives of projects. This means that whatever the types of projects in which you are involved and whatever role you play in them, you should be able to apply the principles and processes of systematic and effective risk management in your work without constantly having to re-contextualise them.

If you are a practitioner, either as a project manager or someone who specialises in risk management, we concede that you probably just want to get on with managing your projects and the risks associated with them. The inevitable time constraints for all projects will almost certainly already impact severely on the opportunities you have for reading. If this is so, then the arrangement of topics should help you. While they are predominantly sequential (in a flow process sense), the topics are distinguished as separate chapters, easily enabling you to dip in and out of them in a convenient way. The contents should meet several needs: as a refresher for your current risk management processes; as a guide to benchmarking them; or as a framework for replacing informal, reactive and intuitive ways of dealing with project risks with a more formal, systematic and proactive approach.

If you are a student, whatever your academic discipline, you will almost certainly be expected to take a project-oriented approach to your studies and will also experience the

pressure of time. You have to read and investigate so much about so many matters and to demonstrate your knowledge acquisition through examinations and assignments, that what looks to be a 'quick fix' solution to learning about project risk management may look very attractive. You are right – it is! The 'dipping' topic arrangement should also suit you, but we suggest only after you have read and reflected upon the basics of risk management in the early chapters. Risk and risk management *are* big learning topics (as also is project management), so dealing with them is never going to be just a quick process. We offer no easy solutions, but rather a systematic and comprehensive approach to project risk management that will serve you well in study and eventually in practice. Our book will not only provide you with a fundamental grasp of the principles and processes of project risk management but should also help you to maximise the value of the experiential learning you gain from your own projects, now and in the future.

Instructors will find the structure of the book useful for preparing programmed reading guides for their students.

It is fashionable these days to argue that the internet will completely replace the need for books. While the Web is a huge and useful resource, it does come with its own risks. In Chapter 18 (Computer Applications) we note the vast number of hits following the entry of a risk-related term into an internet search engine. Not only would this result impose a huge task in sifting what is relevant from what is not, there is also a substantial risk of finding information that is simply incorrect – the Web offers no certain guarantees for accuracy, reliability and authenticity. We hope our book satisfies all three criteria.

Our aim is to provide an introduction to, and comprehensive treatment of, project risk management that will guide and assist people and organisations tasked with dealing with those risks.

As authors, our objectives are to:

- Effectively communicate a conceptual and philosophical understanding of risk.
- Establish the nature of projects and the stakeholders involved in them.
- Present a systematic and logically progressive approach to the processes of project risk management.
- Discover the drivers of project risks and the factors which shape them.
- Emphasise the importance of capturing and exploiting project risk knowledge.
- Provide guidance about implementing and building (or improving) project risk management systems in organisations.

We are friends, colleagues and family, coming from different generations and different backgrounds and professions. We think those differences contribute much to the strength of the book.

Acknowledgments

We offer sincere thanks to the many people who have helped us with this book. Their contributions have enriched the content in ways that always exceeded our expectations.

Of course, none of our writing effort would have been possible without the encouragement, forbearance and love of our families.

Glossary of Terms

Term	Amplification	Explanation
AI	Artificial intelligence	A process whereby knowledge is generated automatically through learning algorithms incorporated into a computer-based application. Also known as machine-based learning, large language models and generative technologies
AS/NZS	Australian Standard/ New Zealand Standard	Joint publishers of standards for Australia and New Zealand (see later replacement SA/SNZ).
BOO and BOOT	Build–own–operate and build–own–operate– transfer	Building procurement system alternatives that define larger and longer project roles for the construction contractor.
CAD	Computer-aided design	Computer application with graphical design interface capability.
CPN	Critical path network	An analytic project scheduling technique.
DB	Design–build	A procurement system for construction projects (see also D&C) in which the contractor has responsibility for both design and construction.
DBFO	Design–build–finance– operate	See DB and D&C. A procurement system whereby the contractor not only has responsibility for project design and construction but also has an equity share in the investment and will operate the completed facility.
D & C	Design and construct	A procurement system for construction projects (see also DB).
DCF	Discounted cash flow	A mathematical technique for modelling the effects of time on the cash flows occurring over the lifecycle of an investment.
DTA	Decision tree analysis	A quantitative decision support tool.
ECP	Elemental cost planning	A technique, based upon quantitative measures of the discrete design elements of a building and used by professional quantity surveyors to estimate the probable tender price for a proposed construction project or to achieve a balanced distribution of element costs by comparing them to historic projects.

Term	Amplification	Explanation
EMV	Expected monetary value	A quantitative financial decision support tool.
EOI	Expression of interest	Issued as an invitation to participate in a project bidding process.
EPM	Enterprise project management	Total in-house responsibility for managing the delivery of projects in an organisation (see also PMO).
ETA	Event tree analysis	A quantitative decision support tool.
EU	Expected utility	A quantitative decision support tool using non-financial measures of worth.
FM	Facilities management	The ongoing management of activities relating to maintenance, repair, component replacement and energy efficiency during the operational phase of a facility.
FMECA	Failure mode, events and criticality analysis	An engineering technique used in manufacturing to analyse the causes and seriousness of component failure.
HAZOPS	Hazard and operability study	An engineering technique, using pre-determined conditional statements, to explore operational cause-and-effect situations during the project design stage.
HSE	Health and safety executive	Quasi-government authority in the United Kingdom responsible for establishing and administering national health and safety compliance requirements.
IP	Intellectual property	Rights to the legal ownership of ideas.
IRR	Internal rate of return	A form of DCF modelling that finds the percentage rate that will discount all cash flows occurring over the life cycle of an investment to a zero net present value for the whole investment (also known as the 'yield rate').
ISO	International Standards Organisation	Publisher of worldwide standards
IT and ICT	Information technology and Information and computer technology	Technologies (usually computer-based) that deal with the processing of data and information.
KMS	Knowledge management system	The arrangement of explicit knowledge in an organisation in order to facilitate inputs and access.
NLP	Natural language programming	The use of computers to understand and process natural language (text or speech) in order to carry out required functions.
OHS	Occupational health and safety	A term used to typify situations pertaining to the workplace health and safety of people.
OR	Opportunity risk	Uncertainty relating to an option with beneficial effect upon project objectives.
ORR	Organisational risk register	An interactive collection of risk information and knowledge at the organisation level.
PM	Project manager	The person given responsibility for managing all activities and processes required to bring a project from inception to completion.

(Continued)

Term	Amplification	Explanation
PMI	Project Management Institute	US-based organisation for professional project managers.
PMO	Project Management Office	A unit within an organisation that is made responsible for managing the delivery of its projects (see also EPO).
PPP	Public-private partnership	A procurement system for integrating the delivery and operation of public infrastructure and services projects as a partnership between public and private sector stakeholders.
PRM	Project risk management	Activities at the project level pertaining to the management of project risks.
PRMS	Project risk management system	A structured, organised and documented system established by an organisation for the purpose of systematically dealing with project risks (see also RMS).
PRR	Project risk register	An interactive collection of risk information and plans for risk management activity at the project level.
RFID	Radiofrequency identification device	A wireless-enabled electronic identification tag or marker.
RFT	Request for tender	Issued as an invitation to participate in a project bidding process.
RKMS	Risk knowledge management system	A knowledge management system separately dedicated to project risks and not incorporated with an organisation's general knowledge management systems (see also ORR).
RM	Risk manager	The person responsible for ensuring that the risks an organisation faces are managed proactively as far as possible.
RMS	Risk management system	A structured, organised and documented system for dealing with risks (see also PRMS).
SA/SNZ	Standards Australia/ Standards New Zealand	Joint publishers of standards for Australia and New Zealand (see also earlier AS/NZS)
SGBB	Singapore Gardens by the Bay	Botanical garden project in Singapore.
SHA	Safety hazard analysis	A prescribed format for analysing and recording potential threats to work safety and the responses proposed to avoid or mitigate them.
TR	Threat risk	Uncertainty with adverse effect upon project objectives.
VCE	Virtual constructed environment	A dynamic computerised graphical simulation, usually three-dimensional, of a building design or construction process.
VE or VM	Value engineering or value management	A management technique used in the project design stage and based upon identifying required functions for project components and then speculating about alternatives that could deliver the same function at lower cost; better function at the same cost; or better function at lower cost. Value is defined as a measure of worth calculated from the delivered function and the cost to achieve it.
WBS	Work breakdown schedule	A project planning technique that analyses a project by the activities required to undertake and complete it.

1

Introduction

1.1 Introduction

In this introductory chapter, we describe the project and project stakeholder perspectives that we have adopted to frame this book and its content. The chapter synopses will guide you in choosing the actual sequence you wish to follow for individual reading, but we recommend that you do follow the order for Chapters 4–10, as these chapters embrace the sequential and systematic application of the cycle of project risk management processes.

1.2 The Project Perspective

Our world has become increasingly ‘project-driven’. This is largely because projects are seen to be more ‘containable’ than other methods of achieving development goals. Projects are perceived as having clearly identifiable beginnings and finite endings (although sometimes these are hard to pinpoint precisely). The fulfilment of sought-for objectives is intended to deliver desirable (and hopefully measurable) outcomes. This perspective assumes that the project approach is more manageable than other ways of doing things, although this assumption may not always translate easily or fully into reality.

Projects are endeavours usually surrounded by *uncertainty* and often cloaked in *risk*. While we tend to regard them as exclusively human undertakings, projects do occur in the natural world. Beavers build dams across watercourses; termites construct elaborate edifices to shelter themselves from harsh extremes of weather; birds build nests to accommodate their young. These creatures also face risks as they go about their ‘project’ work.

Managing risks is thus an important part of managing projects, as much for human society as for the natural world. Our book describes a comprehensive and systematic approach to the management of project risks. Whilst we have no plans for further references to animals and insects, their potential contribution to risk management should not be ignored. Bio-mimicry has become an important source of innovation for contemporary society in engineering and other fields, and there is every reason to suppose that it could also contribute to risk management.

Project management, as an art and a science (hence its vulnerability to many interpretations), stems largely from a construction industry that has been project-based since human beings first attempted to create shelter for themselves. We have become increasingly aware of the need to organise the ways in which our building activities are planned, resourced and carried out in order to satisfy our need to develop our physical environment. Traditionally, therefore, project management has been associated with building projects, and many books (including those on risk management) retain that perspective exclusively.

For this book, we have tried to embrace the project-driven nature of contemporary society more fully and have deliberately adopted a generic project perspective.

All projects are exposed to risks. While particular risks will be different for different projects, different project stakeholders and different project environments, we seek to demonstrate that it is possible to adopt a *systematically* uniform approach in order to deal with those risks. Thus, while many of the examples presented in this book are taken from projects in the construction industry, we have sought to include some from other fields. The actual risks will not be identical (although many will be similar), but the risk management principles remain the same.

1.3 The Project Stakeholder Perspective

All projects involve *stakeholders*: those people or entities that have the capacity to influence the decision-making associated with projects. We explore this concept in greater depth later in this book. Suffice it to say here that every project involves multiple stakeholders (or at least more than one). For example, I may decide to embark on a renovation project on my house. While it is ‘my’ project, it is likely that other family members will be involved, that tradesmen will be engaged and external suppliers sourced. I may have to approach consultants for advice or even apply for permits from local authorities. To a greater or lesser extent, each and all of these will influence the decision-making that inevitably surrounds the project. Anyone with that influential capacity has to be regarded as a stakeholder. How much influence they can exert will determine the nature, level and treatment of the risks involved.

Similarly, you may propose a project to write a book as a sole author. However, if you want others to read it and if you want to earn royalties from its publication, other people will become involved in, and help to make decisions about, the publication process. The same scenario actually applies to more artistic and creative works. While the intellectual inputs may be entirely individual on the part of the artist, if the project outcomes are intended to become available to others, or even to just a single end-user or purchaser, then we might argue that the follow-up process is also part of the project and thus susceptible to decision-making beyond that of the original artist. Few artists can afford to ignore their ‘market’ entirely.

A single project stakeholder perspective is thus only tenable if the project outcomes were never meant to be available to anyone other than the project originator.

However, while all may be involved in bringing a project to fruition, each stakeholder is likely to have at least some objectives that are different to those of other stakeholders. By definition, as we shall see in Chapter 3, this means that each stakeholder will be exposed

to different risks, albeit possibly of a similar type but of varying uncertainty in terms of likelihood and consequence. Each stakeholder may have to manage its risks in ways that may be subtly different to those of other project stakeholders.

Logically, therefore, whatever the *organisational* arrangement of stakeholders in a project, any attempt to insist upon a common risk management system for all stakeholders for that project is neither practical nor advisable, particularly where the stakeholders are autonomous entities. Even where projects are undertaken 'in-house' by an organisation, e.g. under Project Management Office (PMO) or Enterprise Project Management (EPM) arrangements, there will still be other stakeholders involved, including other departments within the host organisation and external stakeholders supplying goods or services to the project.

In this book, we have deliberately adopted a stakeholder perspective that assumes that each stakeholder implements its own risk management system for each of the projects in which it is involved. Ideally, each stakeholder will employ an overarching approach that, while dealing individually with all of its risks on each of its projects, will apply common principles of risk management throughout and will capture risk knowledge from each project to the benefit of the whole stakeholder organisation.

The unique project and project stakeholder perspectives outlined above provide the essential context for the whole of this book.

1.4 Overview of Contents

The chapter synopses in this section should help you to determine the topic reading sequence you wish to follow. For those who are involved in teaching project risk management, the synopses may help you to formulate a useful reading programme for your students.

In Chapter 2, we explore an understanding of risk itself, providing definitions and common terms. Positive and negative concepts of risk (threat risk and opportunity risk) are presented. We consider the *psychology* of risk, together with risk *awareness*. Risk and uncertainty are distinguished, and their association is clarified. The dynamic nature of risk is discussed. Approaches to classifying risks are considered. The important topic of risk communication is introduced here, but is treated more comprehensively in Chapter 20 (Communicating Risk).

Chapter 3 is all about projects, further consolidating the essential platform upon which the processes of managing project risks can be presented. The nature of projects is considered, in terms of their life cycles and processes. Additional thought is given to project stakeholders and their influence. Project decision-making is considered, and the chapter concludes with some thoughts about what may constitute a risky project.

National and international risk management standards are described in Chapter 4, which then presents a systematic approach to project risk management in the form of an experiential learning cycle. This provides an essential precursor for the more detailed presentation of the stages of the risk management process in subsequent chapters.

In Chapter 5, the important preliminary task of establishing the internal and external contexts for a project is presented, together with the risk drivers (the issues that shape and influence risks) operating in those contexts.

For risks to be managed, they must first be identified. This process is dealt with in Chapters 6 and 7. Approaches to identifying project risks are first considered, followed by presentation of several risk identification tools.

Following identification, risks should be analysed and assessed in terms of their individual and comparative magnitudes or severity levels. Chapter 8 presents simple ways of doing this that will provide an informed basis for subsequently deciding what should be done about the identified and assessed risks. The emphasis in this chapter is on qualitative risk assessment, but some quantitative examples are offered.

The response options and types of proposed treatment actions available for project risks are presented in Chapter 9. At this point, the risk management process usually moves from exploration and planning to the active reality of implementing the project. Most risks are now 'closer' in time. Chapter 10 therefore deals with activities related to monitoring and controlling risks during the project delivery process.

It is said that '*if we do not remember history, we are doomed to repeat it*' (George Santayana, 1863–1952: https://en.wikipedia.org/wiki/George_Santayana). In Chapter 11, the importance of project risk learning is considered, specifically through risk knowledge management. Knowledge about risks, captured from individual projects, should be systematically recorded by the stakeholder organisation as a means of gaining important wisdom about risk that can be exploited for future projects.

While Chapter 11 concludes the coverage of the essential processes of systematic project risk management, we believe that our book would be incomplete without some attention to other topics closely associated with risk.

Relatively new to the risk management literature is the way in which risks are *culturally* shaped. Chapter 12 explores this concept from the perspectives of society in general and from the organisational characteristics of project stakeholders.

Modern projects are often described as *complex*, especially when they fall into the category known as 'mega-projects'. Complexity and its implications for project risk management are discussed in Chapter 13, and in this second edition we also present an early-stage project complexity assessment tool that allows users to identify which parts of a project may contribute most to its complexity.

In addition to complexity, many projects (regardless of their nature or scope) are beset by *political* influences that affect how they are conceived and delivered. This has impacts on the risk management activities of the stakeholders. Political risks are discussed in Chapter 14. New material here includes topics related to ethics, professional misconduct, fraud and corruption, and a risk-based corruption model.

Chapter 15 is an entirely new chapter. Crises and disasters feature ever more prominently in our contemporary world, perhaps because of the global media attention that they attract. We think it is important to consider this from a risk management perspective, but since neither crises nor disasters are projects *per se*, we have resorted to the device of treating the *planning* processes for crisis response and disaster recovery as 'project' vehicles for discussing risk management approaches. We have drawn upon a 'rich picture' of pertinent planning factors to focus the discussion, and we hope readers will appreciate the value of this new chapter.

In Chapter 16, opportunity risk is considered a desirable obverse of the two-sided coin of risk. Differences in the management of threat and opportunity risks are considered.