FIFTH EDITION

PROJECT MANAGEMENT

HARVEY MAYLOR & NEIL TURNER

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Project Management

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Project Management

Fifth Edition

Harvey Maylor
Neil Turner

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Guided tour

Each part opening page contains a **part diagram** mapping the structure of the book, which allows you to get a clear picture of how the book is set out and how each part and chapter in the book relates to each other.

A **chapter diagram** serves as a reminder of where you are in the book and the relation of the chapter to the other parts of the book.

A bulleted list of **Learning Objectives** will enable you to focus on what you can expect to learn from the chapter.

A list of **Principles** sets forth and defines the fundamentals of what will be covered in the chapter.

For quick and easy reference, a brief **Contents** list of the topics covered within each chapter with corresponding book page numbers is provided.

Short **Case Studies** explore the topics introduced in the chapter and enable you to put the information into context.

Real World boxes show how the theory discussed in the chapter relates to and can be applied to cases in the real world.

To help you consolidate your learning, the **Summary** section reflects on what the chapter has covered and provides an important revision tool.

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8   Chapter 1 Introduction

emergence and uncertainty) or the means by which it is delivered (through a temporary organisation, which is a social construction involving integration). Further exploration of the means for delivery shows that this is rarely entirely random and that managers use combinations or systems of activities, people and organisations to deliver the project. Such a system of delivery is termed a **process**. The process is the main unit of analysis here.

A project as a process

The characteristics described above are useful to determine what is and is not a project. Further description of a project comes from analysing the system of delivery, including consideration of how activities in the project are identified, planned and executed, and how issues such as change and uncertainty are handled by the project team.

There are significant advantages to considering projects in this way (see Real World box). A basic classification of processes considers **volume** and **variety**.[6] Volume is the quantity of throughput for that process. For a petrochemical plant, this is very high, whereas for a chauffeur service, it is low. The variety is the number of different variations of process possible. For instance, a petrochemical process is likely to have relatively little flexibility, while for a small operation such as the chauffeur service, the process will have far more flexibility to respond to the needs of individual passengers.

The relationship between volume and variety is shown in Figure 1.2. As you can see, there is generally an inverse relationship between volume and variety. For example, a noodle bar has a high-volume, low-variety process – it provides a high volume of products with very limited variety in the process for preparing the noodles and serving the customers. A strategic management consultancy, meanwhile, may operate at the other end of the scale, providing a low volume of services, with the process tailored to the needs of each client, and is therefore a high-variety process.

REAL WORLD   Benefits of the application of process thinking

It is now possible to build a McDonald's drive-through restaurant in just 24 hours. One project went from 'clear site' to 'open for business' in less than 48 hours, including foundations. Whatever your views of the proliferation of these outlets, they do represent a good case of what can be achieved when the true level of uniqueness of a project is assessed. The contractors who actually build the outlets are Yorkon and Britspace, and they have done so over 300 times in the UK alone. If each one had been considered to be a unique project, then we could reasonably expect the build time to be very long – months would be completely normal for such a space to be constructed. Recognising that this was likely to be a project that was repeated meant that it was worth the companies investing in finding ways to improve the process. So, instead of trying to build a unique store on each site, the firms considered the opportunities for making the building *modular* and *manufacturing* the modules off site. One store typically consists of six modules and these are shipped to the site and 'assembled' on site, rather than involving traditional building techniques. Each time it was done, the processes for carrying this out could be improved.

Project Management in Practice boxes at the end of the chapter provide you with a practical function of the points learned throughout the chapter.

The **Key Terms** list is another useful revision aid and helps you create a bank of essential terminology.

Topics for Discussion offer a set of useful questions and tasks for self-assessment and revision.

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Summary

■ The world in which projects operate grows in complexity. This places additional challenges on project leaders in delivering and at the same time has increased expectations about delivery. It is no wonder, perhaps, that stories of 'failed projects' seem to have such presence in the media. Having frameworks or mental models enables us to make sense of complexity. This is not to say that we can ever completely describe something that is very complex, just as in the common aphorism: 'All models are wrong. Some are useful.' This is the utility this chapter has sought to provide in an attempt to facilitate the objective identified at the start – *get the thinking right*.

Key terms

4-D p. 35	emergent complexity	project/product lifecycle
5 Cs p. 27	models p. 44	p. 39
7-S p. 29	framework p. 29	sense-making p. 26
change p. 26	ICOM p. 33	socio-political complexity
Competitiveness p. 29	integrator p. 33	p. 43
Completeness p. 29	issues p. 26	structural complexity p. 43
complexity p. 42	managerial challenge p. 42	structures p. 29
context p. 28	model p. 31	subjective p. 45
Customer focus p. 29	PESTEL p. 28	

Relevant areas of the Bodies of Knowledge

Two Bodies of Knowledge are referenced throughout this book as they are used by many organisations as the basis for their own project management systems and as a knowledge base for accrediting their people. For instance, in some UK government organisations they require project managers to be licensed – that is to have passed a basic knowledge test of project management, such as those from the APM.

The standards do not set out to be comprehensive about everything that is known about project management; rather they provide guidance on some of the common ground between projects that covers 'most projects most of the time'. PMI's Standard[17] (American National Standards Institute) is Part 2 of its Guide to the Project Management Body of Knowledge – generally referred to as 'the pmbok guide.' The guide itself is relatively extensive compared with the APM version, but both are valuable and very widely-used resources.

Written by committee, one feature is that they tend to be focused on aspects of first-time projects (see Chapter 1) rather than the vast majority of project management activity that takes place in 'as . . . but . . .' and 'painting by numbers' projects. They also assume that the relationship between the party carrying out the project and the 'customer' is contractual. Many projects are not 'direct revenue earners', instead being change projects (reorganising a firm, a merger or acquisition, or an individual undertaking a course of study, for instance). As a result of these factors, the application of the Bodies of Knowledge is a long way from universal. However, both are associated with professional qualifications and

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PROJECT MANAGEMENT IN PRACTICE
The rescue of Crossrail

The brief was nowhere near this simple for Crossrail, but at one level this was what was required. The project team needed to just:

1   Dig a tunnel under the centre of London, of course avoiding all the existing infrastructure (water mains, train tunnels, sewers, burial grounds, reclaimed land,) whether or not we know they are there.
2   Fit the tunnel out with stations, interchanges, rails, power, signalling. Make sure the signalling is up to the latest safety standards.
3   Get some trains that will run on the system, work with the signalling to the east of London, the underground, and the west (all completely different).
4   And do not run late or over-budget.

How hard can it be?

As it turns out, it was ridiculously hard. This is a case study worth following as it has been a saga that has claimed reputations, careers and vast amounts of public and private money. It is, of course, nowhere near as good in this regard as the Sydney Opera House or the Canadian Gun Control Register (also worth looking up).

The case came to one of its many crunch points in 2018. The costs of the scheme had already risen from the previous estimate by £2.8 billion to £17.6 billion. It was due to open in late 2018. However, during the summer of 2018, it became clear that this was not going to happen. Following a review, the developing company, Crossrail Limited, had to admit that even up until July 2018 this had been hugely optimistic. They 'reset' the schedule to 'between October 2020 and March 2021.' As of March 2021, this is now looking more like 'sometime in 2022'.

Points for discussion

The following aspects of this case are worth exploring further:
1   Just how optimistic were the original forecasts for schedule and budget?
2   Why did this optimism prevail in Crossrail Ltd.?
3   Who is to blame for this? Is it Transport for London, the UK Department for Transport, Crossrail Ltd., the contractors or individual leaders?
4   What approach should the project have taken, that might have contributed to a better outcome?
5   Will the problems be remembered once it is open and operating?

PROJECT MANAGEMENT IN PRACTICE
Using the 7-S approach in the review of a real project[21]

The Arson Task Force (ATF) was the name given to a 24-month project to reduce the incidence of arson in one area. During the project, the incidence of arson there declined and the team built an extensive knowledge base of cases of arson, its impact, effects and, most importantly, the causes and patterns of occurrence.

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Topics for discussion

1   Why would creativity be essential in a personal project, such as an assignment or dissertation? How might this be incorporated into your plan of work?
2   Why should the plan be viewed as a value-adding activity?
3   Identify the costs and potential negative effects of the misuse of plans.
4   Why is getting scope 'sign-off' so important?
5   To whom does the project manager have to 'sell' a proposal?
6   When is it important for the brief to be highly precise and when should it be left as loose as possible?
7   Why is it important to know the customer for a proposal document?
8   What is the benefit to be gained from mapping a process before proceeding with the detailed planning?
9   From a project with which you are familiar, how might providing gates and gate criteria have helped in its management?
10 Should the activities in a project be run sequentially or concurrently? Choose a project and analyse the options for the outline plan.

Further information

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1   Nonaka, I. (1990) 'Redundant, Overlappping Organisation: A Japanese Approach to Managing the Innovation Process', *California Management Review*, Spring, pp. 27–38.
2   Much fuller discussion of this can be found in Maylor, H. and Blackmon, K. (2015) *Researching Business & Management*, 2nd edition, Palgrave Macmillan, London, Chapter 2.
3   GSK's pipeline can be seen at https://www.gsk.com/en-gb/research-and-development/our-pipeline/

and Pfizer's at https://www.pfizer.com/science/drug-product-pipeline
4   Von Hippel, E. et al. (1999) 'Creating Breakthroughs at 3M', *Harvard Business Review*, September–October, pp. 47–57 and interview with 3M VP Innovation. See www.prince2.com
6   National Audit Office https://www.nao.org.uk/report/national-audit-office-strategy-our-strategy-2019-to-2021-22/
7   Variously attributed to Admiral Lord Nelson and General Eisenhower.

Further Information and **References** suggest books, websites and journals that may be of interest to you; information about the references used throughout the chapter is brought together here.

Preface

Projects are hugely important to the world. Our recent analysis showed that global annual spend on projects is in the region of US$22 trillion. For countries, whether it is delivering on climate change or any other aspect of policy, projects are the means by which society changes. For organisations, the success or otherwise of their projects will provide key determinants of their futures. And for individuals, either leading or contributing to projects is almost certain to feature at least once in their career, even if it is not their specialism.

The first edition of this book was published in 1996. Back then, the title was obvious as it reflected the thinking of the time – projects needed managing, we had a growing group of people who were identifiable project managers, and 'Project Management' was the 'field' in which we worked. The world, our thinking about it, and how we operate in it, have all changed significantly. Today, the title of so many courses is still 'Project Management' but our field is widely known as 'Project Studies', reflecting a broadening of the interests of those involved in the field. We could entitle this book 'realising strategy' or 'delivering benefits' or 'leading change'. Regrettably, we cannot change the title but this doesn't mean that we don't recognise that leadership in projects is active – and it should be a verb, not a noun.

Since the last edition, our thinking has developed, our analysis gets more powerful, our databases of experience fuller. Projects are not just process sets, but human systems of activity. In addition, I am reminded that a synonym for 'project' is 'enterprise'. The original promises of project management included delivering both discipline and enterprise. It is notable how often the very skills of the entrepreneur are needed, but neither recognised nor developed. I trust that this will come through here, showing that we need to respond to the complexities inherent in projects through all three of our facets of project leadership: managerial, relational AND entrepreneurial.

Finally, this 5th edition was very close to not happening. The level of copyright theft experienced with the fourth edition obliterated any financial rationale for spending many hundreds of hours updating the content. Fortunately, my co-author believed in the project and was prepared to look beyond this. Neil – you are a star!

We wish you great projects. After all, they are hugely important.

Harvey Maylor
Oxford
August 2021

Acknowledgements

Making sense of the
project context

Making sense of the project context

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| 2 Structures and frameworks |
| 3 Projects and organisations |

Managing the project process: the 4-D model

D1: Define it
4 Setting up for success
5 Planning for success

D4: Develop it
16 Completing projects and learning to improve

D2: Design it
6 Time planning and scheduling
7 Making time planning robust: Advanced Project Thinking (APT)
8 Building a business case for a project
9 Engaging stakeholders
10 Managing risks and opportunities

D3: Do it
11 Organising people in the project
12 Leading people in projects
13 Monitoring and controlling the project
14 Procuring, contracting, and working with supply chains
15 Problem-solving and decision-making

1 Introduction

Making sense of the project context

Managing the project process: the 4-D model

D1: Define it

D4: Develop it

D2: Design it

D3: Do it
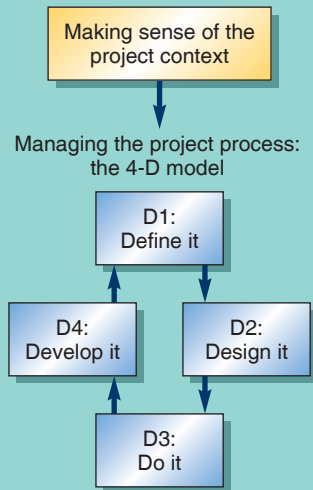
'Life is one big project.' The trick is in managing it.

Principles

1 What is and is not a project needs to be defined so that we know whether the practices known as 'project management' (PM) are relevant.

2 Project management has a fundamental role in modern organisations and the careers of the people working in them.

3 The past 70 years of PM development should be understood to help understand the current state and the opportunities for the future.

Learning objectives

By the time you have completed this chapter, you should be able to:

➔ identify the definitions of a project and the task of management within a range of projects

➔ demonstrate the importance of successful project management to individuals, organisations and economies

➔ recognise the development of the modern subject along with some of the challenges and limitations.

Contents

Sustainable Development Goals

In 2015 the United Nations Member States adopted 17 Sustainable Development Goals (SDGs).[1] These replaced the Millennium Development Goals, and focused on major worldwide targets to be achieved by 2030 as part of the Agenda for Sustainable Development. These include 'No poverty', 'Zero hunger', 'Gender equality', 'Clean water and sanitation', 'Affordable and clean energy', 'Sustainable cities and communities', 'Responsible consumption and production', 'Climate action' and 'Peace, justice and strong institutions'.

The UN call these goals a 'universal call to action', and they represent a huge challenge for the planet in a relatively short period of time (15 years). Few would argue that these are incredibly important issues, yet the action necessary requires coordinated policies and implementation across the globe. The Sustainable Development Goals Report (2019)[2] showed that progress was being made in some areas, but the UN Secretary General warned bluntly that, 'It is abundantly clear that a much deeper, faster and more ambitious response is needed to unleash the social and economic transformation needed to achieve our 2030 goals.'

Projects can range from the small and relatively mundane, to those that impact the very fabric of our civilization. Getting them right matters. If your new kitchen is late or over budget, that is exasperating, but it is unlikely to be life-threatening. The SDGs, on the other hand, are a different order of magnitude entirely, both in terms of significance, and difficulty. Despite the obvious differences, both have similarities. We are looking to take our aspiration, be it a home improvement or ensuring quality primary school education, and turn it into reality. Individuals, organisations and governments turn ideas into reality through projects.

Introduction

The Sustainable Development Goals represent an enormous challenge, yet it is difficult to bring together the relevant stakeholders without such a guiding set of goals and ways to track progress. At the time of writing the latest report still makes it clear that there is significant work to do, but ongoing data points highlight successes and shortfalls. Of course, none of this is easy. More straightforward pieces of work regularly fail, and the press internationally usually carries a plentiful supply of project failure stories. It would be tempting to believe that all projects fail. Indeed, there are well-cited studies, notably Standish Group's Chaos reports,[3] that show how the majority do not meet their initial objectives. Yet this 'project' approach to carrying out work continues to gain in popularity for individuals, corporations and governments.

The SDGs illustrate some of the features that we will see as being applicable to a wide range of other projects. They have a finite duration, with an end date of 2030. They involve a vast array of interlinked activities carried out by an incredible array of people. There are measurable outcomes, but success is dependent as much on perception as reality – what people *believe* about the SDGs matters. All the work has to be carried out while countries face their own particular challenges. The consequences of failure are frightening, but human beings naturally focus on the here-and-now far more easily than the far away or life decades hence.

We will explore success and failure and some of the reasons for each in future chapters. For now, this is a good example of the art and science of managing a project and the importance of projects in general to the world in which we live. The nature of the SDGs means that many forms of innovation are required by the individuals and project teams involved. In later chapters we will address the many opportunities as well as the challenges that come with projects.

In this chapter, we will begin with **definition**, stating what constitutes 'a project' and 'project management'. This is vital as it is possible, quite literally, to frame almost any activity as a project. Indeed, we can go as far as to say that the opening quotation of 'Life is one big project' – 'life' does fit many of the accepted definitions of 'a project'. The challenge is more aptly stated as 'finding what is not a project' so that it is possible to discuss with some clarity the range of human activity that this covers. In the case of organising work to support the sustainability goals, there are many issues that require significant coordination. We will explore the role of a project manager in outline here and the careers of project managers. Second, projects are important. They represent a significant part of all economic activity, being important to the individuals who carry them out, their organisations and, in many cases, society as a whole. Lastly, project management as a subject is developing fast. By understanding its history and the opportunities for the future development of this subject, we hope to show that rather than being fixed, pre-determined or staid, there is a lively conversation around how we should run projects in the future that is worth joining, as we certainly do not have all 'the answers' and as the statistics show, there are plenty of problems for projects.

1.1   Basic definitions

Does it matter what activities do and do not constitute **projects**? Almost any activity can be claimed to be a project. One practitioner put it to us very simply: '*a project is whatever I call a project*'. One step on from this is the most basic of accepted definitions: *a project is a task that has a beginning and an end*. This is insufficient, as the two examples below will demonstrate.

> #### Environmental health manager
> The role of the environmental health department in a local authority (a county council in this case) includes visiting food premises (restaurants, cafés, school canteens and mobile catering outlets) to determine whether the practices that they are following in the preparation, storage and serving of food meet legal requirements. Inspectors have considerable powers (including closure of the premises) where deficiencies are identified. The manager of the department was convinced that he was a project manager. Each inspection lasted for several hours and was, therefore, an activity with a start and a finish. QED in his view it was a project.

> #### Delivery Team leader – UK Ministry of Defence – ship procurement
> The prime role of the team leader is the management of the process from initial concept or identification of a requirement for a new capability, through the stages of approval, development, delivery into service, ongoing maintenance and finally disposal. The role is central to integrating the requirements (both current and future) of users, while making sure any equipment is compatible with other technology being used across the military. The provision of what is termed *through-life support* is vital, with upgrade paths being required for all equipment. The duration of the project was that of the ship. In the words of one team leader: '. . . end to end, this is a 60-year project.'

Both an inspection and the ship's life have a beginning and an end. However, it is not useful to define either of these as projects. Consider the requirements for managing each of these tasks. The first is relatively straightforward and would not require the input from the kind of approaches that will be discussed as 'project management' – they would simply be too cumbersome and costly for such a task. The process that was followed each time (arrange visit, visit, report and follow up) was the same and each inspector was visiting one or two premises a day. This was **operations** rather than project **management**.

It was, however, only one part of that manager's role. Other parts included planning and executing the response to public health issues, such as an outbreak of a particular disease (e-coli poisoning, for example). These were fortunately rare events and each one had its own characteristics. They also had to be pre-planned, so that no time was wasted when they did occur. Other projects included regular initiatives to highlight particular aspects of public health – such as an autumn campaign of promoting influenza vaccination. The role of this manager was therefore split between the **general management** associated with the ongoing activities and the project management of both initiatives and reactions to 'crises'. He was advised to look to operations management as a subject to help with the management of the day-to-day tasks, but to build a relevant knowledge base and set of practices for the projects he ran.

The second case is a hugely complex task that will change significantly in nature over the 60-year period. Each part (e.g. designing the ship, building it, trials, hand-over, maintenance, refurbishing and disposal) is a project or series of projects in its own right, with each project needing appropriate management. This task is clearly very different from that of the inspections.

It clearly does matter what we call projects, as when they have to be managed, it is useful to know something about the approach that should be taken to the management task. To help clarify this task, a comparison of the following definitions is useful.

> Association for Project Management (UK's largest professional body for project managers), 2019: A unique, transient endeavour undertaken to bring about change and to achieve planned objectives.

> Project Management Institute (one of the world's largest professional associations), 2017: A project is a temporary endeavour undertaken to create a unique product, service or result.

> British Standard 6079, 2019: Temporary management environment, usually undertaken in phases, created for the purpose of delivering one or more business outputs or outcomes.

> PRINCE2 2017 (PRojects IN Controlled Environments – UK government standard for project management): A temporary organisation that is created for the purpose of delivering one or more business products according to an agreed business case.

Some common themes are evident here:

1 **Unique**: the exact project has not been performed before. The project has a degree of novelty, in terms of time, place, team carrying out the task, product or service being provided. However, something like it has almost certainly been done by someone somewhere before. For this reason, projects are said to have *aspects of uniqueness*.
2 **Temporary**: the project does have a beginning and an end, as in our earlier definition, and requires a group of people to carry out the task (the establishment of a temporary organisation). When the project finishes, the team moves on. The financial resources available to the project are also temporary and almost always finite – when the project is completed the funding ceases.
3 **Focused**: the task of the project is to deliver a particular product, service or result (the specific mission). This is not to say that every project starts out with a complete and clear idea of exactly what will be achieved and how.

PRINCE2 2017 says that projects require the production of a specific **business case**. While this is evident in many organisations (and required for UK government-funded information technology (IT) projects), there are still many areas where this is not appropriate. For instance, when an earthquake and subsequent tsunami struck the Fukushima Daiichi nuclear power plant in March 2011, disabling the cooling systems for the plant, it started the second worst nuclear disaster in history. In addition to the task of bringing the reactors back under control, was the humanitarian project to help people (mainly local residents) whose lives had been changed forever by the disaster. There was not the time to prepare a business case and indeed, given no financial return was envisaged, it is inappropriate to use this term, and the more generic notion of achieving a particular **mission** is more useful. It is useful to look further than this, with the mission being a means to an end. We say that projects are undertaken to **deliver benefits**. This characteristic is evident in both commercial and non-commercial projects.

In many relief projects, both for this disaster and others, relief workers often remark that, 'We don't know what we will encounter until we get there.' This illustrates a further characteristic of many projects – that of **emergence**. The high-level benefits that the projects were undertaking were known (save lives), but the exact objectives and means to achieve them could be determined only once a certain amount of work had been done. These included assessments of the needs of different groups of people (for instance, some needed medical treatment, others needed shelter). Not all standards and processes recognise this emergence. The language in PRINCE2 (*delivering business products according to an agreed business case*) is inappropriate when the urgent requirement is to save lives. The exact timescale, budget and tasks are all unknown at the outset, but project management is still very much appropriate in addressing the evolving situation. Although disaster relief is an extreme example, it is a fact that many projects start with a limited or high-level view of what will constitute their performance measures and it is quite normal for such criteria to evolve as the project progresses.

Related to this characteristic, **uncertainty** is another fundamental of projects. The future cannot be predicted with certainty, and in many cases nor can the response to activities carried out in a project. Where emergence referred to the requirements of the project, uncertainty covers all of the environmental conditions in which a project has to operate. For instance, there may be uncertainty about costs of people or materials, or whether some part of the project is indeed achievable. We may not know how long tasks being undertaken for the first time will take. All of these provide the project manager with a major challenge: how they will work with such uncertainty.

A recent extreme example of this was the Covid-19 pandemic of 2020. Managers' plans across the world were thrown into turmoil by the crisis. The immediate concern was, of course, to safeguard lives, but projects were suddenly faced with massive uncertainty. Economies were being put on hold, throwing business cases into disarray. How long would this last? Weeks, months? Would the project still be viable afterwards? No one really knew. Hotels or restaurants in the middle of construction became somewhat more doubtful as the leisure and tourism industries ceased to function. As we will see within this book, there is a need both to plan the project and control the work so that it meets that plan, yet also a requirement to adapt to new circumstances should the situation need it. This can be a delicate balancing act, requiring both an inward focus on doing the work, while simultaneously looking out at the wider environment. Developing this judgement is important for a successful project manager.

In addition to having uncertainty, projects have another characteristic – they usually involve **change**. It used to be the case that an IT project such as an organisation adopting cloud computing would be viewed as a technical implementation of a new computer-based system. It is more usual now to consider it as an *IT-enabled change* project – the change brought about by any new system goes beyond the technology, to impact the way that people work.[4]

The change issue leads us to another facet of projects – they are not machines but are groups of people carrying out a (hopefully linked) set of tasks. We say that unlike a machine that is real and tangible, a project is a **social construction** – it was literally devised by people. It involves people and systems of people, both in the project team and associated with the project as customers, for instance. It is intangible. This has implications for the way that we consider projects.[5] For instance, treating a project as a mechanical system that responds easily to changes may be inappropriate. Because there are people and groups of people involved, there are going to be complex, dynamic interactions between those people and groups. The 'people challenge' is likely to be harder if the work includes a high level of uncertainty and emergence, as this implies a lack of stability which people can find unsettling.

It is not just people though that interact through a project. Sometimes major changes need to include the integration of the major, distinct, elements. Consider the introduction of electric vehicles to replace petrol cars. There is an underlying technical challenge in developing the technology (e.g. obtaining sufficient driving range from the batteries), yet this needs to be considered in light of the bigger picture. Electric vehicles need an appropriate charging infrastructure if they are to be adopted. Cars without a widely available charging network will remain a niche market, but neither governments nor private providers are keen to invest in a major network roll-out without a clear view of how many users they need to support. The growth of infrastructure needs to be in line with demand – if there is always a queue at the local charging points then few will upgrade their car. The incentives need to be aligned so that consumers are offered solutions that are practical. This needs to include the vehicle, its operation, and ongoing support such as servicing. If the change as a whole does not appeal, the new technology will not be adopted. Uncertainty is a major factor here, and although organisations will develop plans, these may need to be modified in light of events as they unfold.

The characteristics and their implications are shown in Figure 1.1. They either describe the nature of the task (aspects of uniqueness, mission focused, involving change, having
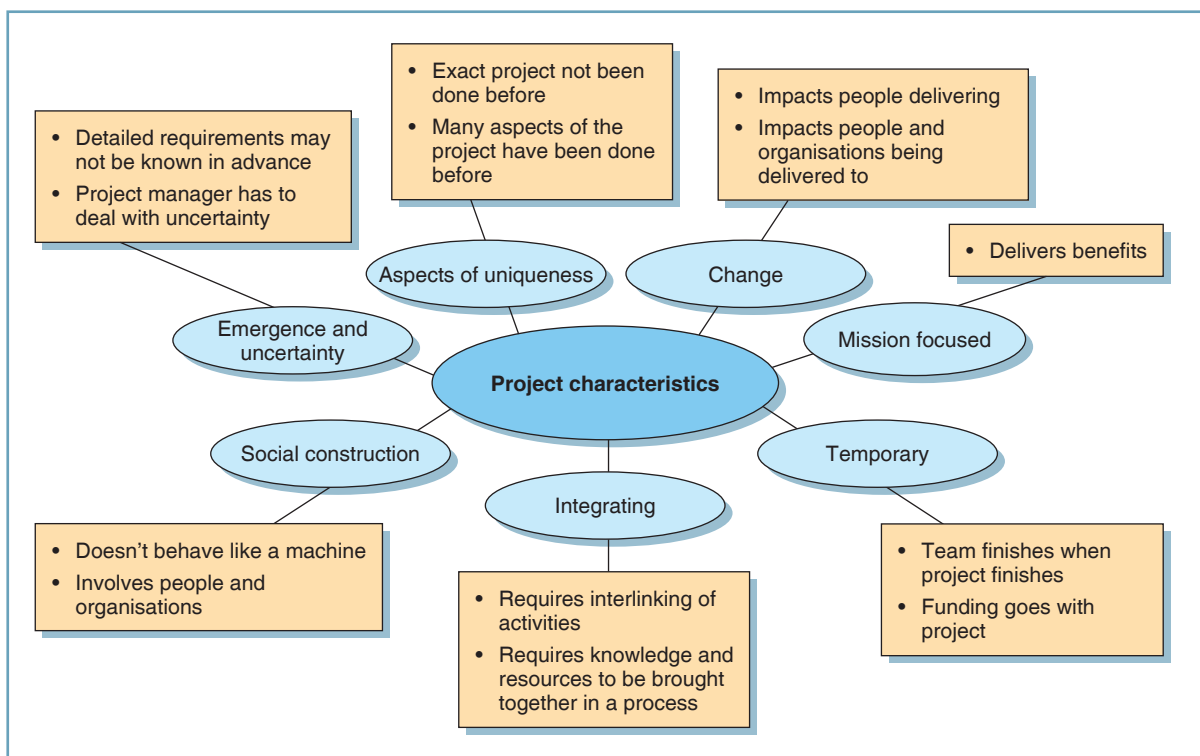

Figure 1.1 Project characteristics

emergence and uncertainty) or the means by which it is delivered (through a temporary organisation, which is a social construction involving integration). Further exploration of the means for delivery shows that this is rarely entirely random and that managers use combinations or systems of activities, people and organisations to deliver the project. Such a system of delivery is termed a **process**. The process is the main unit of analysis here.

A project as a process

The characteristics described above are useful to determine what is and is not a project. Further description of a project comes from analysing the system of delivery, including consideration of how activities in the project are identified, planned and executed, and how issues such as change and uncertainty are handled by the project team.

There are significant advantages to considering projects in this way (see Real World box).

A basic classification of processes considers **volume** and **variety**.[6] Volume is the quantity of throughput for that process. For a petrochemical plant, this is very high, whereas for a chauffeur service, it is low. The variety is the number of different variations of process possible. For instance, a petrochemical process is likely to have relatively little flexibility, while for a small operation such as the chauffeur service, the process will have far more flexibility to respond to the needs of individual passengers.

The relationship between volume and variety is shown in Figure 1.2. As you can see, there is generally an inverse relationship between volume and variety. For example, a noodle bar has a high-volume, low-variety process – it provides a high volume of products with very limited variety in the process for preparing the noodles and serving the customers. A strategic management consultancy, meanwhile, may operate at the other end of the scale, providing a low volume of services, with the process tailored to the needs of each client, and is therefore a high-variety process.

REAL WORLD   Benefits of the application of process thinking

It is now possible to build a McDonald's drive-through restaurant in just 24 hours. One project went from 'clear site' to 'open for business' in less than 48 hours, including foundations. Whatever your views of the proliferation of these outlets, they do represent a good case of what can be achieved when the true level of uniqueness of a project is assessed. The contractors who actually build the outlets are Yorkon and Britspace, and they have done so over 300 times in the UK alone. If each one had been considered to be a unique project, then we could reasonably expect the build time to be very long – months would be completely normal for such a space to be constructed. Recognising that this was likely to be a project that was repeated meant that it was worth the companies investing in finding ways to improve the *process*. So, instead of trying to build a unique store on each site, the firms considered the opportunities for making the building *modular* and *manufacturing* the modules off site. One store typically consists of six modules and these are shipped to the site and 'assembled' on site, rather than involving traditional building techniques. Each time it was done, the processes for carrying this out could be improved.
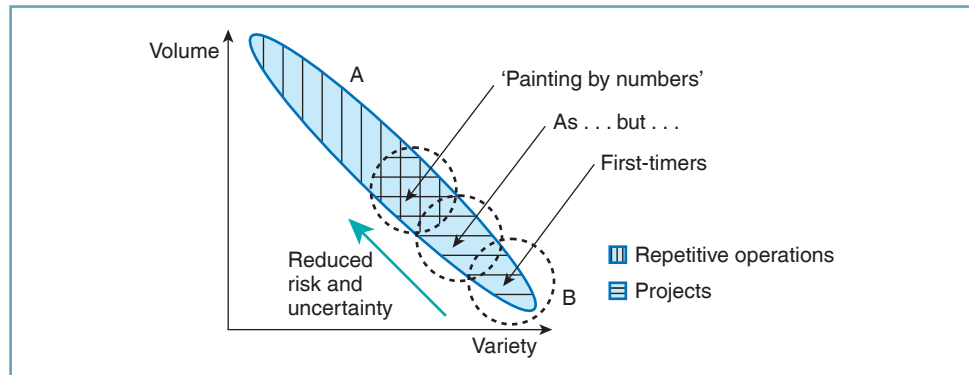

Source: Mark Richardson/Alamy

Source: Alex Segre/Alamy

Figure 1.2 Volume versus variety and projects

The traditional project management area is low-volume, high-variety processes, where the notion of *uniqueness* prevails. These are indicated on the figure as **first-timers**. Examples of these are the first moon landing and the development of the first computer. It is noticeable with the wider adoption of project management that individuals and organisations are running projects, often over time periods as short as a few weeks or months, and that these are being carried out on a regular basis as part of ordinary business activity. Here, the end product may be different, but the process by which it is delivered is often repeated over time. Two further scenarios are identified here. The first is where there is some similarity to previous work, in terms of either the process followed or the product being delivered. These are referred to in Figure 1.2 as '**as . . . but . . .** 's, that is, *as* the job we did last time, *but* with the following differences. The second of these is where there is a high degree of commonality in both process and outcome. These are termed **painting by numbers** projects[7] because the process and the outcome are well known. The project team has the task of following the path to the required outcome. Projects such as carrying out a financial audit of a company will be project-based, but the processes and the outcomes (a set of reports and accounts) are well known in advance. Marketing research projects are similarly painting by numbers projects in many instances and the construction of the drive-through also fits in this category.[8]

Moving away from considering all projects as first-timers can be beneficial. The more like repetitive operations a project is, the less the risk and uncertainty. This is certainly the view from many organisations who prefer the relative reliability that can come from projects that are 'painting by numbers'. However, it can be a considerable challenge for many project managers to agree that their project is a 'painting by numbers.' There is something about projects that are first-timers that many managers will insist on, possibly for the allure of the more complex, difficult or risky, and therefore their skills as project managers need to be appreciated.

The two example projects used earlier in this section are classified as shown in Figure 1.2. The environmental health 'projects' are at the point marked 'A' on the diagram, in the region where the primary area of interest is in *repetitive operations* rather than projects. The 60-year product lifecycle 'project' is marked at point B, similarly outside the *projects* area.

For the purpose of this book, a project is from one of the three of the categories of projects from Figure 1.2. However, the nature of the work may not always be as evident as we would like. Sometimes it is not completely clear whether a particular undertaking is a project or repetitive operations. Take, for example, training to win the Hawaii Ironman Triathlon World Championships, quite likely the most gruelling sport going. The 2.4-mile